INITIAL OPTIONS APPRAISAL APPENDIX A – FULL ANALYSIS TABLE

Stage 2 Develop and Assess

MAG East Midlands Airport

DEPARTURES

MAG East Midlands Airport

Departure Direction	Runway 09	Classification	Runway 27	Classification
North	R09_D_N_O1	REJECTED	R27_D_N_O1	PREFERRED
North	R09_D_N_O1A	FAVOURABLE		
North	R09_D_N_O2	REJECTED	R27_D_N_O2	REJECTED
North	R09_D_N_O3	REJECTED	R27_D_N_O3	REJECTED
North	R09_D_N_O4	PREFERRED	R27_D_N_O4	REJECTED
North	R09_D_N_O5	ACCEPTABLE	R27_D_N_O5	FAVOURABLE
North	R09_D_N_O6	REJECTED	R27_D_N_O6	ACCEPTABLE
North			R27_D_N_O7	REJECTED
North			R27_D_N_O8	REJECTED
East	R09_D_E_O1	REJECTED		
East	R09_D_E_O3	ACCEPTABLE		
East	R09_D_E_O4	FAVOURABLE		
East	R09_D_E_O5	PREFERRED		
South	R09_D_S_O1	ACCEPTABLE	R27_D_S_O1	REJECTED
South	R09_D_S_O1A	REJECTED	R27_D_S_O1A	REJECTED
South			R27_D_S_O2	REJECTED
South	R09_D_S_O3	REJECTED		
South			R27_D_S_O4	PREFERRED
South			R27_D_S_O5	REJECTED
South	R09_D_S_O6	PREFERRED	R27_D_S_O6	REJECTED
South			R27_D_S_O7	ACCEPTABLE
South	R09_D_S_O8	FAVOURABLE	R27_D_S_O8	REJECTED
South			R27_D_S_O9	REJECTED
South	R09_D_S_O10	REJECTED	R27_D_S_O10	FAVOURABLE
South			R27_D_S_O11	REJECTED
South	R09_D_S_O13	REJECTED		
South	R09_D_S_O14	REJECTED		
South	R09_D_S_O16	REJECTED		
South	R09_D_S_O14	REJECTED		
South	R09_D_S_O16	REJECTED		
West	R09_D_W_O1	REJECTED		
West	R09_D_W_O2	FAVOURABLE		
West	R09_D_W_O3	REJECTED	R27_D_W_O3	REJECTED
West			R27_D_W_O4	FAVOURABLE
West	R09_D_W_O5	REJECTED	R27_D_W_O5	PREFERRED
West	R09_D_W_O6	ACCEPTABLE	R27_D_W_O6	ACCEPTABLE
West	R09_D_W_O7	PREFERRED		
North west	R09_D_NW_O1A	REJECTED		
North west	R09_D_NW_O2	PREFERRED		
North west	R09_D_NW_O3	REJECTED		
North west	R09_D_NW_O4	REJECTED		
North west	R09_D_NW_O5	ACCEPTABLE		
North west	R09_D_NW_O6	REJECTED		
North west				
North west	R09_D_NW_O8	REJECTED		
North west	R09_D_NW_O9	FAVOURABLE		
North west	R09_D_NW_O10	REJECTED	R27_D_NW_O10	FAVOURABLE
North west			R27_D_NW_O11	ACCEPTABLE
North west			R27_D_NW_O13	REJECTED
North west			R27_D_NW_O14	REJECTED
North west			R27_D_NW_O15	PREFERRED
Southeast Options 1-7			R27_D_SE_O2	REJECTED
Southeast Options 1-7			R27_D_SE_O4	ACCEPTABLE
Southeast Options 1-7			R27_D_SE_O5	FAVOURABLE
Southeast Options 1-7			R27_D_SE_O7	PREFERRED
Southeast Options 12-18			R27_D_SE_O15	FAVOURABLE
Southeast Options 12-18			R27_D_SE_O16	PREFERRED
Southeast Options 12-18			R27_D_SE_O18	ACCEPTABLE
Southwest			R27_D_SW_O4	PREFERRED
Southwest			R27_D_SW_O9	FAVOURABLE

MAG EMA ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TABLE

Departure Envelope: SID Runway 27 North

SID 27 NORTH

Group	Impact	Level of Analysis	'DO NOTHING' BASELINE	R27_D_N_O1	R27_D_N_O2
			For the north design envelope, the 'do nothing' scenario for departures in terms of today's operation is based around the existing conventional TRENT SID. The 'do nothing' scenario for departures consists of a modal track that has been derived to provide an accurate representation of what occurs today. In addition to the modal track, a polygon has also been created that represents an area where current operations are dispersed due to radar vectoring and potentially may affect people on the ground. The overflight analysis conducted on this SID was based on the modal track created using Noise and Track Keeping data at altitudes of 4,000ft and 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the Departure End of Runway to the end of the modal track plus the distance from the end of the modal track to the common point.	Whilst this is not a replicated route, it reflects the current operational practice of initially using the TNT 2N SID to the north west followed by ATC vectoring to the north. This follows the runway heading for 1nm before commencing a right turn just to the north east of Melbourne, onto a north west heading to pass to the south west of Derby. A second right turn diverges it from the TNT departure and routes it on a north by north east heading to the terminating point north of Belper. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 2 proceeds straight ahead after take-off with no offset before making a single right turn to head directly north. After initial departure this option follows the runway heading for 1.4nm before commencing a 90o right turn to the north just to the north east of Melbourne. This north heading routes it over eastern Derby and the east edge of Belper and the route terminates to the north east of Crich. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.
			Runway 27	Runway 27	Runway 27
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes within the IOA, the 'do nothing' scenario was based upon the existing TRENT SID. In terms of potential noise impact, initial quantitative analysis has identified that: - Up to 4,000 ft, this 'do nothing' scenario is estimated to overfly approximately 1,800 households with an approximate population of 3,500. Taking account of 2,250 planned property developments, this option is estimated to overfly and impact a total population of 7,900. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 33,750 households with an approximate population of 65,200. Taking account of 10,550 planned property developments, this option is estimated to overfly and impact a total population of 85,600.	Up to 4,000ft, this option is estimated to overfly approximately 1,450 households with an approximate population of 2,700. Taking account of 2,350 planned property developments, this option is estimated to overfly and impact a total population of 7,100. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 6,850 households with an approximate population of 12,800. Taking account of 4,300 planned property developments, this option is estimated to overfly and impact a total population of 20,800. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 20,500 households with an approximate population of 37,700. Taking account of 700 planned property developments, this option is estimated to overfly and impact a total population of 39,000. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 30,900 households with an approximate population of 57,300. Taking account of 1,300 planned property developments, this option is estimated to overfly and impact a total population of 59,700. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity of the Departure End of Runway. In terms of AQMAs, the existing Runway 27 TRENT SID overflies one AQMA when the aircraft is above 1,000ft.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current routes do not enable continuous climb operations. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring, although aircraft do all follow the extant procedures in a broader sense. The existing procedures do not support optimal aircraft performance and therefore are predicted to have a greater environmental impact compared to proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative emissions analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length to the common point is 38.05km (20.55nm).	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 42.74 km (23.08 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 38.82 km (20.96 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Maintaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be significantly affected, following the removal of the TNT DVOR and the requirement to adopt PBN procedures as part of the FASI-N Programme.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario overflies no tranquility receptors (AONBs or National Parks).	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for departures do not enable continuous climb operations. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length to the common point is 38.05km (20.55nm).	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 42.74 km (23.08 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 38.82 km (20.96 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SID, aircraft departing EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	A possible hazard has been identified with aircraft departing on the SID to the north that could conflict with arrivals from the north resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. In addition, if the position of the existing airborne hold (ROKUP) within the ATC network (i.e. above 7,000ft) were to be moved by NERL, this may introduce a potential conflict with this envelope resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in ATCO workload. Further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A possible hazard has been identified with aircraft departing on the SID to the north that could conflict with arrivals from the north resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. In addition, if the position of the existing airborne hold (ROKUP) within the ATC network (i.e. above 7,000ft) were to be moved by NERL, this may introduce a potential conflict with this envelope resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in ATCO workload. Further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
		Summary of Analysis	The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation and is unviable following the removal of the TNT DVOR beacon, which could have a significant impact on capacity and resilience. The existing SID does not enable continuous climb operations to 7,000ft, which leads to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that the current EMA operations and procedures are safe. Following the removal of the TNT DVOR, it is acknowledged that the ATCOs workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact up to 4,000ft - Noise impact up to 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 4,000ft - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact up to 7,000ft Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on the IOA Shortlist Assessment methodology, Option O1 has been deemed the PREFERRED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O2 has been deemed the REJECTED option within the design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	PREFERRED	REJECTED

Group	Impact	R27_D_N_O3	R27_D_N_O4	R27_D_N_O5
		Option 3 proceeds straight ahead after take-off with no offset before making a single right turn to head north, but on a track that is slightly to the west of Option 2. After initial departure this option follows the runway heading for 1nm before commencing a right turn north just to the north east of Melbourne. This north heading routes it over central Derby and the west edge of Belper and the route terminates to the north west of Crich. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 4 proceeds straight ahead after take-off with no offset before making a single right turn to head north. It is similar to Options 2 and 3 but terminates further east. After initial departure this option follows the runway heading for 1nm before commencing a 90o right turn just to the north east of Melbourne. This takes it onto a north heading routing close to the eastern edge Derby and passing over eastern Ripley. The route terminates to the north east of Crich. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 5 has a 15° northerly offset to avoid Melbourne and is a route that takes multiple turns to avoid overflight of Derby. The initial 15° offset to the north results in the route passing north of Melbourne with the first turn to the north at 1.54nm beyond the DER onto a northerly heading, before commencing a second right-hand turn onto a north easterly heading to pass just east of Borrowash. A third turn to the left routes it between Derby and Nottingham and the route then turns to a north west heading before finally turning north and terminating north west of Belper. This route endeavours to avoid overflight of built up and noise sensitive areas; however, all turns have been limited to 190KIAS to enable tight turns. Although PANS-OPS compliant it is a complex route that will require to be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.
		Runway 27	Runway 27	Runway 27
Communities	Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 16,050 households with an approximate population of 28,700. Taking account of 350 planned property developments, this option is estimated to overfly and impact a total population of 29,400. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 25,200 households with an approximate population of 45,400. Taking account of 800 planned property developments, this option is estimated to overfly and impact a total population of 46,800. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 10,600 households with an approximate population of 20,300. Taking account of 2,250 planned property developments, this option is estimated to overfly and impact a total population of 24,600. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 28,950 households with an approximate population of 53,800. Taking account of 4,300 planned property developments, this option is estimated to overfly and impact a total population of 61,800. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 2,300 households with an approximate population of 4,300. Taking account of 2,150 planned property developments, this option is estimated to overfly and impact a total population of 8,300. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 8,850 households with an approximate population of 16,200. Taking account of 2,600 planned property developments, this option is estimated to overfly and impact a total population of 21,000. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be of dis-benefit as it overflies more AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 36.82 km (19.88 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a decrease in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 40.41 km (21.82 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 40.88 km (22.07 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 36.82 km (19.88 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 40.41 km (21.82 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 40.88 km (22.07 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	A possible hazard has been identified with aircraft departing on the SID to the north that could conflict with arrivals from the north resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. In addition, if the position of the existing airborne hold (ROKUP) within the ATC network (i.e. above 7,000ft) were to be moved by NERL, this may introduce a potential conflict with this envelope resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in ATCO workload. Further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A possible hazard has been identified with aircraft departing on the SID to the north that could conflict with arrivals from the north resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. In addition, if the position of the existing airborne hold (ROKUP) within the ATC network (i.e. above 7,000ft) were to be moved by NERL, this may introduce a potential conflict with this envelope resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in ATCO workload. Further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A possible hazard has been identified with aircraft departing on the SID to the north that could conflict with arrivals from the north resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. In addition, if the position of the existing airborne hold (ROKUP) within the ATC network (i.e. above 7,000ft) were to be moved by NERL, this may introduce a potential conflict with this envelope resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in ATCO workload. Further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
	Summary of Analysis	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 4,000ft Better in the following areas: - Noise impact up to 7,000ft - Greenhouse gas emissions - Fuel burn Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 4,000ft - Greenhouse gas emissions - Fuel burn - Air Quality Better in the following areas: - Noise impact up to 7,000ft Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 4,000ft - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact up to 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.
	IOA Shortlist Assessment	Based on the IOA Shortlist Assessment methodology, Option O3 has been deemed the REJECTED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O4 has been deemed the REJECTED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O5 has been deemed the FAVOURABLE option within the design envelope.
	OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	REJECTED	REJECTED	FAVOURABLE

Group	Impact	R27_D_N_O6	R27_D_N_O7	R27_D_N_O8
		Option 6 has a 15° northerly offset to avoid Melbourne and is a route designed to avoid overflight of Derby. It is similar to Option 5 however the turns have been designed for 210KIAS to align with the speed recommendations within CAP 778 which results in a slightly different track. The initial 15° offset to the north results in the route passing north of Melbourne with the first turn to the north at 1.26nm beyond the DER onto a north east heading over the south east edge of Derby and passing between Spondon and Borrowash. A second left turn is made between Derby and Nottingham which leads to a north west heading passing over southern Belper before finally turning north and terminating north east of Belper. Although PANS-OPS and CAP778 compliant it is a complex route that may require to be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.	Option 7 has a 15° northerly offset to avoid Melbourne and is a route that takes multiple turns to avoid overflight of Derby. It is similar to Option 5 but heads in a more northerly direction once past Derby. The initial 15° offset to the north results in the route passing north of Melbourne with the first turn to the north at 1.54nm beyond the DER onto a northerly heading, before commencing a second right hand turn onto a north easterly heading to pass just east of Borrowash. A third turn to the left takes the route north between Derby and Nottingham and it passes west of Ilkeston and terminates south east of Alfreton. This route is intended to avoid overflight of built up and noise sensitive areas with all turns being limited to 190KIAS to enable tight turns. Although PANS-OPS compliant it may need to be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.	Option 8 has a 15° northerly offset to avoid Melbourne and is a route that takes multiple turns to avoid overflight of Derby. It is similar to Option 7 however the turns have been designed for 210KIAS to align with the speed recommendations within CAP 778 which results in a slightly different track. The initial 15° offset to the north results in the route passing north of Melbourne with the first turn to the north at 1.26nm beyond the DER onto a north east heading over the south east edge of Derby and passing between Spondon and Borrowash. A second left turn is made between Derby and Nottingham which leads to a northerly heading passing west of Ilkeston and Heanor, and the route terminates over Alfreton. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.
		Runway 27	Runway 27	Runway 27
Communities	Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 5,500 households with an approximate population of 10,100. Taking account of 1,850 planned property developments, this option is estimated to overfly and impact a total population of 13,500. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 15,450 households with an approximate population of 28,300. Taking account of 2,350 planned property developments, this option is estimated to overfly and impact a total population of 32,600. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 1,650 households with an approximate population of 3,100. Taking account of 2,150 planned property developments, this option is estimated to overfly and impact a total population of 7,100. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 23,900 households with an approximate population of 44,100. Taking account of 4,450 planned property developments, this option is estimated to overfly and impact a total population of 52,300. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 6,400 households with an approximate population of 11,800. Taking account of 1,850 planned property developments, this option is estimated to overfly and impact a total population of 15,200. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 27,000 households with an approximate population of 50,000. Taking account of 4,400 planned property developments, this option is estimated to overfly and impact a total population of 58,100. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 39.57 km (21.37 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 42.71 km (23.06 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 40.83 km (22.05 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 39.57 km (21.37 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 42.71 km (23.06 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 40.83 km (22.05 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	A possible hazard has been identified with aircraft departing on the SID to the north that could conflict with arrivals from the north resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. In addition, if the position of the existing airborne hold (ROKUP) within the ATC network (i.e. above 7,000ft) were to be moved by NERL, this may introduce a potential conflict with this envelope resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in ATCO workload. Further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A possible hazard has been identified with aircraft departing on the SID to the north that could conflict with arrivals from the north resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. In addition, if the position of the existing airborne hold (ROKUP) within the ATC network (i.e. above 7,000ft) were to be moved by NERL, this may introduce a potential conflict with this envelope resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in ATCO workload. Further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A possible hazard has been identified with aircraft departing on the SID to the north that could conflict with arrivals from the north resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. In addition, if the position of the existing airborne hold (ROKUP) within the ATC network (i.e. above 7,000ft) were to be moved by NERL, this may introduce a potential conflict with this envelope resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in ATCO workload. Further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
	Summary of Analysis	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 4,000ft - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact up to 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact up to 4,000ft - Noise impact up to 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 4,000ft - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact up to 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.
	IOA Shortlist Assessment	Based on the IOA Shortlist Assessment methodology, Option O6 has been deemed the ACCEPTABLE option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O7 has been deemed the REJECTED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O8 has been deemed the REJECTED option within the design envelope.
	OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	ACCEPTABLE	REJECTED	REJECTED

MAG EMA ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TABLE

Departure Envelope: SID Runway 27 Southeast

				SID 27 Southeast Options 1-7			
			'DO NOTHING' BASELINE	R27_D_SE_O2	R27_D_SE_O4	R27_D_SE_O5	R27_D_SE_O7
			For the southeast design envelope, the 'do nothing' scenario for departures in terms of today's operation is based around the existing conventional DAVENTRY SID. The 'do nothing' scenario for departures consists of a modal track that has been derived to provide an accurate representation of what occurs today. In addition to the modal track, a polygon has also been created that represents an area where current operations are dispersed due to radar vectoring and potentially may affect people on the ground. The overflight analysis conducted on this SID was based on the modal track created using Noise and Track Keeping data at altitudes of 4,000ft and 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the Departure End of Runway to the end of the modal track plus the distance from the end of the modal track to the common point.	Option 2 proceeds straight ahead after take-off with no offset and uses CAP778 speeds and turn criteria to route to the south east. After departure this follows the runway heading for 1.4nm with no offset passing close to the south east corner of Melbourne. A left turn is then made onto a southerly heading for a short distance before making a second left turn to route north of Coalville. It heads in a south easterly direction overflying Mountsorrel and terminates close to Syston. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 4 has a 10° northerly offset, as an alternative to avoid Melbourne to the north. The 10° offset to the north results in the route passing north of Melbourne and then turning left to head south. A second turn is made to the north east of Ashby-de-la-Zouch to route in a south east direction, passing west of Coalville. The option terminates to the north west of Leicester close to Groby. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 5 has a 10° southerly offset followed by a series of tight turns to avoid Coalville and Leicester. The 10° offset to the south results in the route passing south of Melbourne and then making two turns in quick succession to head to the south east. This results in a track that passes north of Coalville and south of Shepshed and Loughborough before terminating north of Syston just to the north east of Leicester. The route has a constant climb gradient of 6%, terminating at 7,000ft. The two initial turns have been limited to 190KIAS to enable the tightest turn possible to achieve a more northerly route to avoid Coalville. The route is PANS-OPS compliant but should it become a preferred option then it is recommended that it is assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.	Option 7 has a 10° northerly offset and then heads south east to follow a similar route to Option 5 to avoid Coalville and Loughborough. The 10° offset results in the route passing north of Melbourne and then making two turns to head south then south east, remaining north of both Ashby-de-la-Zouch and Coalville. This track continues to pass south of Shepshed and Loughborough before terminating north of Syston. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.
Group	Impact	Level of Analysis	Runway 27	Runway 27	Runway 27	Runway 27	Runway 27
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes within the IOA, the 'do nothing' scenario was based upon the existing DAVENTRY SID. In terms of potential noise impact, initial quantitative analysis has identified that: - Up to 4,000 ft, this 'do nothing' scenario is estimated to overfly approximately 2,650 households with an approximate population of 5,000. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 5,000. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 9,200 households with an approximate population of 16,900. Taking account of 3,450 planned property developments, this option is estimated to overfly and impact a total population of 23,300.	Up to 4,000ft, this option is estimated to overfly approximately 3,450 households with an approximate population of 6,400. Taking account of 50 planned property developments, this option is estimated to overfly and impact a total population of 6,500. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 11,750 households with an approximate population of 22,200. Taking account of 600 planned property developments, this option is estimated to overfly and impact a total population of 23,300. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect same amount of people as the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 600 households with an approximate population of 1,200. Taking account of 1,250 planned property developments, this option is estimated to overfly and impact a total population of 3,700. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 16,300 households with an approximate population of 30,500. Taking account of 5,900 planned property developments, this option is estimated to overfly and impact a total population of 41,600. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect more people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 750 households with an approximate population of 1,500. Taking account of 750 planned property developments, this option is estimated to overfly and impact a total population of 3,000. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 15,700 households with an approximate population of 29,900. Taking account of 2,850 planned property developments, this option is estimated to overfly and impact a total population of 35,400. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect more people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 850 households with an approximate population of 1,700. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 1,700. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 10,800 households with an approximate population of 20,600. Taking account of 1,750 planned property developments, this option is estimated to overfly and impact a total population of 24,000. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect more people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity of the Departure End of Runway. In terms of AQMAs, the existing Runway 27 DAVENTRY SID overflies no AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be of dis-benefit as it overflies more AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be of dis-benefit as it overflies more AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be of dis-benefit as it overflies more AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current routes do not enable continuous climb operations. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring, although aircraft do all follow the extant procedures in a broader sense. The existing procedures do not support optimal aircraft performance and therefore are predicted to have a greater environmental impact compared to proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative emissions analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length to the common point is 34.88km (18.83nm).	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 52.82 km (28.52 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 57.58 km (31.09 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 50.72 km (27.38 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 57.29 km (30.93 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Maintaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be significantly affected, following the removal of the DTY DVOR and the requirement to adopt PBN procedures as part of the FASI-N Programme.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario overflies no tranquility receptors (AONBs or National Parks).	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for departures do not enable continuous climb operations. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length to the common point is 34.88km (18.83nm).	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 52.82 km (28.52 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 57.58 km (31.09 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 50.72 km (27.38 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 57.29 km (30.93 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SID, aircraft departing EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	Possible hazards have been identified, some of which are extant and are currently mitigated through existing ATC procedures. Firstly, aircraft departing on the SID to the south east may conflict with EMA arrivals from the south resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. Secondly, there could be unknown or no interaction possible between the departing aircraft and the ATC network and controlling authority (i.e., above 7,000ft) as it may involve flight in Class G 'uncontrolled' airspace. This could result in the potential loss of horizontal and/or vertical separation between aircraft that may result in an increase in ATCO workload. The sponsor would be required to maintain close liaison with NERL through bilateral meetings to ensure that network connectivity and additional airspace requirements are met. Further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	Possible hazards have been identified, some of which are extant and are currently mitigated through existing ATC procedures. Firstly, aircraft departing on the SID to the south east may conflict with EMA arrivals from the south resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. Secondly, there could be unknown or no interaction possible between the departing aircraft and the ATC network and controlling authority (i.e., above 7,000ft) as it may involve flight in Class G 'uncontrolled' airspace. This could result in the potential loss of horizontal and/or vertical separation between aircraft that may result in an increase in ATCO workload. The sponsor would be required to maintain close liaison with NERL through bilateral meetings to ensure that network connectivity and additional airspace requirements are met. Further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	Possible hazards have been identified, some of which are extant and are currently mitigated through existing ATC procedures. Firstly, aircraft departing on the SID to the south east may conflict with EMA arrivals from the south resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. Secondly, there could be unknown or no interaction possible between the departing aircraft and the ATC network and controlling authority (i.e., above 7,000ft) as it may involve flight in Class G 'uncontrolled' airspace. This could result in the potential loss of horizontal and/or vertical separation between aircraft that may result in an increase in ATCO workload. The sponsor would be required to maintain close liaison with NERL through bilateral meetings to ensure that network connectivity and additional airspace requirements are met. Further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	Possible hazards have been identified, some of which are extant and are currently mitigated through existing ATC procedures. Firstly, aircraft departing on the SID to the south east may conflict with EMA arrivals from the south resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. Secondly, there could be unknown or no interaction possible between the departing aircraft and the ATC network and controlling authority (i.e., above 7,000ft) as it may involve flight in Class G 'uncontrolled' airspace. This could result in the potential loss of horizontal and/or vertical separation between aircraft that may result in an increase in ATCO workload. The sponsor would be required to maintain close liaison with NERL through bilateral meetings to ensure that network connectivity and additional airspace requirements are met. Further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
Summary of Analysis			The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation and is unviable following the removal of the DTY DVOR beacon, which could have a significant impact on capacity and resilience. The existing SID does not enable continuous climb operations to 7,000ft, which leads to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. Following the removal of the DTY DVOR, it is acknowledged that the ATCOs workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 4,000ft - Noise impact up to 7,000ft - Greenhouse gas emissions - Fuel burn -Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 7,000ft - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact up to 4,000ft Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 7,000ft - Greenhouse gas emissions - Fuel burn -Air Quality Better in the following areas: - Noise impact up to 4,000ft Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 7,000ft - Greenhouse gas emissions - Fuel burn -Air Quality Better in the following areas: - Noise impact up to 4,000ft Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on the IOA Shortlist Assessment methodology, Option O2 has been deemed the REJECTED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O4 has been deemed the ACCEPTABLE option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O5 has been deemed the FAVOURABLE option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O7 has been deemed the PREFERRED option within the design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	REJECTED	ACCEPTABLE	FAVOURABLE	PREFERRED

MAG EMA ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TABLE

Departure Envelope: SID Runway 27 Southeast

				SID 27 Southeast Options 12-18		
			'DO NOTHING' BASELINE	R27_D_SE_O15	R27_D_SE_O16	R27_D_SE_O18
			For the southeast design envelope, the 'do nothing' scenario for departures in terms of today's operation is based around the existing conventional DAVENTRY SID. The 'do nothing' scenario for departures consists of a modal track that has been derived to provide an accurate representation of what occurs today. In addition to the modal track, a polygon has also been created that represents an area where current operations are dispersed due to radar vectoring and potentially may affect people on the ground. The overflight analysis conducted on this SID was based on the modal track created using Noise and Track Keeping data at altitudes of 4,000ft and 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the Departure End of Runway to the end of the modal track plus the distance from the end of the modal track to the common point.	Option 15 has a 10° northerly offset and then turns left south of Coalville to provide an alternative option for flights to the east. The 10° offset to the north results in the route passing north of Melbourne and then turning left to head south. A second turn is made to the north east of Ashby-de-la-Zouch to route in a south east direction, passing west of Coalville. It continues in this south easterly direction until passing Bardon Hill where it turns left to route towards Woodhouse Eaves and terminates just west of Quorn. The route has a constant climb gradient of 6% terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 16 has a 10° southerly offset and then turns left south of Quorn to provide an alternative option for flights to the east. The 10° offset to the south results in the route passing south of Melbourne and then making two turns in quick succession to head to the south east. This results in a track that passes north of Coalville and south of Shepshed and Loughborough. It continues in this south easterly direction until south of Quorn where it turns left to head in a north easterly direction, passing between Barrow upon Soar and Sileby and terminating west of Seagrave. The route has a constant climb gradient of 6%, terminating at 7,000ft. The two initial turns have been limited to 190KIAS. This slower speed enables a tighter turn that helps avoid built up areas. The route is PANS-OPS compliant but should it become a preferred option then it is recommended that it is assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.	Option 18 has a 10° northerly offset and then turns left south of Loughborough to provide an alternative option for flights to the east. The 10° offset results in the route passing north of Melbourne and then making two turns to head south then south east, remaining north of both Ashby-de-la-Zouch and Coalville. This track continues to pass south of Shepshed and Loughborough where it makes a left turn to head east and passes overhead Quorn and terminating over Barrow-upon-Soar. The route has a constant climb gradient of 6% terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.
Group	Impact	Level of Analysis	Runway 27	Runway 27	Runway 27	Runway 27
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes within the IOA, the 'do nothing' scenario was based upon the existing DAVENTRY SID. In terms of potential noise impact, initial quantitative analysis has identified that: - Up to 4,000 ft, this 'do nothing' scenario is estimated to overfly approximately 2,650 households with an approximate population of 5,000. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 5,000. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 9,200 households with an approximate population of 16,900. Taking account of 3,450 planned property developments, this option is estimated to overfly and impact a total population of 23,300.	Up to 4,000ft, this option is estimated to overfly approximately 600 households with an approximate population of 1,200. Taking account of 1,239 planned property developments, this option is estimated to overfly and impact a total population of 3,600. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 11,950 households with an approximate population of 22,700. Taking account of 4,800 planned property developments, this option is estimated to overfly and impact a total population of 31,800. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect more people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 750 households with an approximate population of 1,500. Taking account of 731 planned property developments, this option is estimated to overfly and impact a total population of 3,000. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 10,750 households with an approximate population of 20,500. Taking account of 2,527 planned property developments, this option is estimated to overfly and impact a total population of 25,300. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect more people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 1,950 households with an approximate population of 3,700. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 3,700. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 14,100 households with an approximate population of 27,000. Taking account of 2,677 planned property developments, this option is estimated to overfly and impact a total population of 32,200. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect more people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity of the Departure End of Runway. In terms of AQMAs, the existing Runway 27 DAVENTRY SID overflies no AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be of dis-benefit as it overflies more AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be of dis-benefit as it overflies more AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be of dis-benefit as it overflies more AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current routes do not enable continuous climb operations. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring, although aircraft do all follow the extant procedures in a broader sense. The existing procedures do not support optimal aircraft performance and therefore are predicted to have a greater environmental impact compared to proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative emissions analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length to the common point is 34.88km (18.83nm).	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 59.65 km (32.21 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 52.68 km (28.44 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 58.26 km (31.46 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Maintaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be significantly affected, following the removal of the DTY DVOR and the requirement to adopt PBN procedures as part of the FASI-N Programme.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario overflies no tranquility receptors (AONBs or National Parks).	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for departures do not enable continuous climb operations. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length to the common point is 34.88km (18.83nm).	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 59.65 km (32.21 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 52.68 km (28.44 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 58.26 km (31.46 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SID, aircraft departing EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	Possible hazards have been identified, some of which are extant and are currently mitigated through existing ATC procedures. Firstly, aircraft departing on the SID to the south east may conflict with EMA arrivals from the south resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. Secondly, there could be unknown or no interaction possible between the departing aircraft and the ATC network and controlling authority (i.e., above 7,000ft) as it may involve flight in Class G 'uncontrolled' airspace. This could result in the potential loss of horizontal and/or vertical separation between aircraft that may result in an increase in ATCO workload. The sponsor would be required to maintain close liaison with NERL through bilateral meetings to ensure that network connectivity and additional airspace requirements are met. Further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	Possible hazards have been identified, some of which are extant and are currently mitigated through existing ATC procedures. Firstly, aircraft departing on the SID to the south east may conflict with EMA arrivals from the south resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. Secondly, there could be unknown or no interaction possible between the departing aircraft and the ATC network and controlling authority (i.e., above 7,000ft) as it may involve flight in Class G 'uncontrolled' airspace. This could result in the potential loss of horizontal and/or vertical separation between aircraft that may result in an increase in ATCO workload. The sponsor would be required to maintain close liaison with NERL through bilateral meetings to ensure that network connectivity and additional airspace requirements are met. Further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	Possible hazards have been identified, some of which are extant and are currently mitigated through existing ATC procedures. Firstly, aircraft departing on the SID to the south east may conflict with EMA arrivals from the south resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. Secondly, there could be unknown or no interaction possible between the departing aircraft and the ATC network and controlling authority (i.e., above 7,000ft) as it may involve flight in Class G 'uncontrolled' airspace. This could result in the potential loss of horizontal and/or vertical separation between aircraft that may result in an increase in ATCO workload. The sponsor would be required to maintain close liaison with NERL through bilateral meetings to ensure that network connectivity and additional airspace requirements are met. Further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
		Summary of Analysis	The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation and is unviable following the removal of the DTY DVOR beacon, which could have a significant impact on capacity and resilience. The existing SID does not enable continuous climb operations to 7,000ft, which leads to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. Following the removal of the DTY DVOR, it is acknowledged that the ATCOs workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 7,000ft - Greenhouse gas emissions - Fuel burn -Air Quality Better in the following areas: - Noise impact up to 4,000ft Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 7,000ft - Greenhouse gas emissions - Fuel burn -Air Quality Better in the following areas: - Noise impact up to 4,000ft Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 7,000ft - Greenhouse gas emissions - Fuel burn -Air Quality Better in the following areas: - Noise impact up to 4,000ft Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on the IOA Shortlist Assessment methodology, Option O15 has been deemed the FAVOURABLE option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O16 has been deemed the PREFERRED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O18 has been deemed the ACCEPTABLE option within the design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	FAVOURABLE	PREFERRED	ACCEPTABLE

MAG EMA ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TABLE

Departure Envelope: SID Runway 27 Northwest

				SID 27 Northwest				
			'DO NOTHING' BASELINE	R27_D_NW_O10	R27_D_NW_O11	R27_D_NW_O13	R27_D_NW_O14	R27_D_NW_O15
			For the northwest design envelope, the 'do nothing' scenario for departures in terms of today's operation is based around the existing conventional TRENT SID. The 'do nothing' scenario for departures consists of a modal track that has been derived to provide an accurate representation of what occurs today. In addition to the modal track, a polygon has also been created that represents an area where current operations are dispersed due to radar vectoring and potentially may affect people on the ground. The overflight analysis conducted on this SID was based on the modal track created using Noise and Track Keeping data at altitudes of 4,000ft and 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the Departure End of Runway to the end of the modal track plus the distance from the end of the modal track to the common point.	Option 10 proceeds straight ahead after take-off with no offset and has been created to provide a route that has the maximum avoidance of Derby and Burton upon Trent. After departure this follows the runway heading with no offset to a point approximately 6.5nm from the DER, where the route passes south of Repton and turns onto to a north west heading. It passes between Derby and Burton upon Trent and overhead Hilton prior to terminating to the south of Ashbourne. Because there is no immediate turn a higher design speed of 250 KIAS can be used which is the CAP778 recommended speed when turning above 3000ft.	Option 11 has a 15° northerly offset to the runway and has been created to reduce the impact of noise immediately after departure and later in the route by avoiding Derby. The initial 15° offset to the north results in the route passing north of Melbourne and Kings Newton and this route heading is maintained for just over 6.5nm. The first turn is made to the south west of Derby, over the junction of the A38 and A50 which takes it onto a north westerly heading and the route terminates on the southern side of envelope, south of Ashbourne. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 13 proceeds straight ahead after take-off with no offset and has been created to avoid overflying Derby. It follows the same initial track as the current TNT SID but turns north west in the final part of the route to align to the revised network joining point at W89A. On this basis it has been created as the 'do minimum' option to the alternative network joining point if the current TNT replication is discontinued within the DPE or IOA. After departure this follows the runway heading with no offset along the extended runway centreline with a right turn to the north of Melbourne in a north westerly direction routing to the south west of Derby. Between the A38 and A516 the route turns to a north by north west heading to pass west of Derby. At Brailsford, the route turns west and terminates over south east Ashbourne. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 14 has a 15° northerly offset to the runway and has been created as a route that seeks to reduce the impact of noise by avoiding Derby, Burton upon Trent and remaining south of Ashbourne. The initial 15° offset to the north results in the route passing north of Melbourne and Kings Newton and the route continues on this heading to pass between Derby and Burton upon Trent. Around the junction of the A50 and A516 the route turns to a north west heading prior to terminating south west of Ashbourne. The route has a constant climb gradient of 6% terminating at 7,000ft and a speed restriction of 250 KIAS is applied to the first turn which is the CAP 778 recommended speed when turning above 3000ft on a 10% climb.	Option 15 has a 15° northerly offset to the runway and has been created as a route that seeks to reduce the impact of noise by avoiding Derby and Burton upon Trent. It takes the same initial track as Option 14 but routes further north after the first turn. The initial 15° offset to the north results in the route passing north of Melbourne and Kings Newton and the route continues on this heading to pass between Derby and Burton upon Trent. Around the junction of the A50 and A516 the route turns to a north west passing west of Derby and terminating south east of Ashbourne. The route has a constant climb gradient of 6% terminating at 7,000ft and a speed restriction of 250 KIAS is applied to the first turn which is the CAP 778 recommended speed when turning above 3000ft on a 10% climb.
Group	Impact	Level of Analysis	Runway 27	Runway 27	Runway 27	Runway 27	Runway 27	Runway 27
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes within the IOA, the 'do nothing' scenario was based upon the existing TRENT SID. In terms of potential noise impact, initial quantitative analysis has identified that: - Up to 4,000 ft, this 'do nothing' scenario is estimated to overfly approximately 1,800 households with an approximate population of 3,500. Taking account of 2,250 planned property developments, this option is estimated to overfly and impact a total population of 7,900. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 33,750 households with an approximate population of 65,200. Taking account of 10,550 planned property developments, this option is estimated to overfly and impact a total population of 85,600.	Up to 4,000ft, this option is estimated to overfly approximately 1,100 households with an approximate population of 2,100. Taking account of 450 planned property developments, this option is estimated to overfly and impact a total population of 3,000. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 5,100 households with an approximate population of 9,600. Taking account of 900 planned property developments, this option is estimated to overfly and impact a total population of 11,300. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 1,850 households with an approximate population of 3,400. Taking account of 250 planned property developments, this option is estimated to overfly and impact a total population of 3,800. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 2,600 households with an approximate population of 4,800. Taking account of 250 planned property developments, this option is estimated to overfly and impact a total population of 5,300. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 1,000 households with an approximate population of 1,800. Taking account of 400 planned property developments, this option is estimated to overfly and impact a total population of 2,500. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 6,050 households with an approximate population of 10,900. Taking account of 2,150 planned property developments, this option is estimated to overfly and impact a total population of 14,800. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 1,800 households with an approximate population of 3,300. Taking account of 250 planned property developments, this option is estimated to overfly and impact a total population of 3,800. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 3,850 households with an approximate population of 7,300. Taking account of 450 planned property developments, this option is estimated to overfly and impact a total population of 8,200. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 500 households with an approximate population of 1,000. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 1,000. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 2,000 households with an approximate population of 3,800. Taking account of 1,450 planned property developments, this option is estimated to overfly and impact a total population of 6,600. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity of the Departure End of Runway. In terms of AQMAs, the existing Runway 27 TRENT SID overflies one AQMA when the aircraft is above 1,000ft.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current routes do not enable continuous climb operations. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring, although aircraft do all follow the extant procedures in a broader sense. The existing procedures do not support optimal aircraft performance and therefore are predicted to have a greater environmental impact compared to proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative emissions analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length to the common point is 38.05km (20.55nm).	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 40.55 km (21.89 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 38.32 km (20.69 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 38.25 km (20.66 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 38.25 km (20.65 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 38.73 km (20.91 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Maintaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be significantly affected, following the removal of the TNT DVOR and the requirement to adopt PBN procedures as part of the FASI-N Programme.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario overflies no tranquility receptors (AONBs or National Parks).	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for departures do not enable continuous climb operations. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length to the common point is 38.05km (20.55nm).	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 40.55 km (21.89 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 38.32 km (20.69 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 38.25 km (20.66 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 38.25 km (20.65 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 38.73 km (20.91 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SID, aircraft departing EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	A possible hazard has been identified with aircraft departing on the SID to the north west that could conflict with arrivals from the north resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in ATCO workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. Further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A possible hazard has been identified with aircraft departing on the SID to the north west that could conflict with arrivals from the north resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in ATCO workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. Further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A possible hazard has been identified with aircraft departing on the SID to the north west that could conflict with arrivals from the north resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in ATCO workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. Further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A possible hazard has been identified with aircraft departing on the SID to the north west that could conflict with arrivals from the north resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in ATCO workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. Further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A possible hazard has been identified with aircraft departing on the SID to the north west that could conflict with arrivals from the north resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in ATCO workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. Further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
Summary of Analysis			The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation and is unviable following the removal of the TNT DVOR beacon, which could have a significant impact on capacity and resilience. The existing SID does not enable continuous climb operations to 7,000ft, which leads to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that the current EMA operations and procedures are safe. Following the removal of the TNT DVOR, it is acknowledged that the ATCOs workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact up to 4,000ft - Noise impact up to 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact up to 4,000ft - Noise impact up to 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact up to 4,000ft - Noise impact up to 7,000ft Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact up to 4,000ft - Noise impact up to 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact up to 4,000ft - Noise impact up to 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on the IOA Shortlist Assessment methodology, Option O10 has been deemed the FAVOURABLE option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O11 has been deemed the ACCEPTABLE option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O13 has been deemed the REJECTED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O14 has been deemed the REJECTED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O15 has been deemed the PREFERRED option within the design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	FAVOURABLE	ACCEPTABLE	REJECTED	REJECTED	PREFERRED

MAG EMA ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TABLE

Departure Envelope: SID Runway 27 South

				SID 27 SOUTH										
			'DO NOTHING' BASELINE	R27_D_S_O1	R27_D_S_O1A	R27_D_S_O2	R27_D_S_O4	R27_D_S_O5	R27_D_S_O6	R27_D_S_O7	R27_D_S_O8	R27_D_S_O9	R27_D_S_O10	R27_D_S_O11
			For the south design envelope, the 'do nothing' scenario for departures in terms of today's operation is based around the existing conventional DAVENTRY SID. The 'do nothing' scenario for departures consists of a modal track that has been derived to provide an accurate representation of what occurs today. In addition to the modal track, a polygon has also been created that represents an area where current operations are dispersed due to radar vectoring and potentially may affect people on the ground. The overflight analysis conducted on this SID was based on the modal track created using Noise and Track Keeping data at altitudes of 4,000ft and 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the Departure End of Runway to the end of the modal track plus the distance from the end of the modal track to the common point.	A re-creation of the current DTY 3N SID using the CAP 778 recommended design criteria. The first turn uses a speed of 210KIAS and commences at 1nm beyond the DER which is later than the current procedure but CAP778 recommended. As a replicated route it follows a similar track over the ground as the current route to connect to the NATS network. After departure this follows the runway heading for 1nm with no offset before commencing a left turn onto a south west heading just to the south east of Melbourne. It then makes a second left turn which overflies Ashby-de-la-Zouch and it then continues south to terminate north of Boswell and Earl Shilton. The SID is designed to terminate at 7,000ft and the climb gradient has been set at 6%. The CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	This is a replication of the current Daventry DTY 3N SID included as a 'do minimum' option. However, the first turn commences at 0.66nm beyond the DER which is exactly aligned to the first turn of the current procedure. After departure this follows the runway heading for 0.66nm with no offset before commencing a left turn onto a south west heading which takes it further to the south east of Melbourne than Option 1. It then makes a second left turn which overflies Ashby-de-la-Zouch and it then continues south to terminate north of Boswell and Earl Shilton. The SID is designed to terminate at 7,000ft and the climb gradient has been set at 6%. The CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 2 proceeds straight ahead after take-off with no offset and has been created to provide a shorter and more fuel efficient route to the south. After departure this follows the runway heading for 1.4nm with no offset before commencing a single left turn onto a southerly heading just to the south of Melbourne. It passes between Ashby-de-la-Zouch and Coalville, and just west of Ibstock and terminates north of Hinckley. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 4 proceeds straight ahead after take-off with no offset and has been created to provide the most direct and fuel efficient route to the expected network join to the south. After departure this follows the runway heading for 1.4nm with no offset passing close to the south east corner of Melbourne. A single left turn is then made onto a southerly heading and it passes between Ashby-de-la-Zouch and Coalville. This option is slightly further west than Option 2, resulting in the route passing to the west of Ibstock and terminating north of Nuneaton. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turning.	Option 5 has a 12° southerly offset and has been created as a route that specifically seeks to reduce the impact of noise on built up areas, whilst also retaining the fuel benefits of Option 4. The initial 15° offset to the south results in the route passing south of Melbourne. A left turn is made at approximately 1.6nm beyond the DER onto a southerly heading to pass between Ashby-de-la-Zouch and Coalville, but with slightly greater distance from Ashby-de-la-Zouch than Option 4. It then seeks to avoid Ibstock to the west and terminates to the north of Nuneaton. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 6 has a 10° northerly offset, as an alternative to avoid Melbourne to the north. It also seeks to reduce the impact of noise on built up areas to the south west. The initial 10° offset to the north results in the route passing north of Melbourne and this heading is continued for approximately 3nm. At this point a turn onto a south westerly heading is made, followed by a second left turn to the west of Hicknall to achieve a more southerly heading passing between Swadlincote and Ashby-de-la-Zouch. A third turn onto a southerly direction is made near Ibstock, and it terminates to the west of Market Bosworth. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 7 has a 12° southerly offset to avoid Melbourne whilst seeking to reduce the impact of noise on built up areas. It is similar to Option 6 once the route options combine to the north of Ashby-de-la-Zouch. The initial 12° southerly offset results in the route passing south of Melbourne and this heading is continued for approximately 4.5nm until a point close to Ticknall. At this point a turn onto a southerly heading is made where it joins with the track for Option 6 to pass between Swadlincote and Ashby-de-la-Zouch. A third turn onto a southerly direction is made near Ibstock, and it terminates to the south west of Market Bosworth. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 8 has a 15° southerly offset to avoid Melbourne whilst seeking to reduce the impact of noise on built up areas. It is similar to Option 6 and 7 but terminates further east, close to Mallory Park circuit. This higher initial offset achieves a slightly greater divergence from Melbourne. The initial 15° southerly offset results in the route passing south of Melbourne and this heading is continued for approximately 4.5nm until a point close to Ticknall. At this point a turn onto a southerly heading is made where it joins with the track for Option 6 to pass between Swadlincote and Ashby-de-la-Zouch. A third turn onto a south easterly direction is made close to Measham, and it maintains this heading terminating to the south east of Market Bosworth. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 9 has a 15° southerly offset to avoid Melbourne but has a more direct and fuel efficient route that still avoids the impact of noise on built up areas. It is similar to Option 8 but routes to the east of Ashby-de-la-Zouch. The initial 15° southerly offset results in the route passing south of Melbourne where a turn to the south is made. The track passes to the east of Ashby-de-la-Zouch and once west of Ibstock, it makes a second left turn to achieve a south east heading terminating over Earl Shilton. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 10 has a 12° southerly offset to avoid Melbourne whilst seeking to reduce the impact of noise on built up areas. It is similar to Option 7 but the higher initial offset achieves a slightly greater divergence from Melbourne. The initial 15° southerly offset results in the route passing south of Melbourne and this heading is continued for approximately 4.5nm until a point close to Ticknall. At this point a turn onto a southerly heading is made where it joins with the track for Option 6 to pass between Swadlincote and Ashby-de-la-Zouch. A third turn onto a southerly direction is made near Ibstock, and it terminates to the south west of Market Bosworth. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 11 has a 15° northerly offset to avoid Melbourne to the north and also seeks to reduce the impact of noise on built up areas to the south west. It is similar to Option 6 but the higher initial offset achieves a slightly greater divergence from Melbourne. The initial 15° offset to the north results in the route passing north of Melbourne and this heading is continued for approximately 2.2nm beyond the DER, where a turn to south westerly heading is made. To the west of Hicknall a second turn is made to achieve a more southerly heading passing between Swadlincote and Ashby-de-la-Zouch. A third turn is made near Ibstock, and it terminates to the west of Market Bosworth. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.
Group	Impact	Level of Analysis	Runway 27	Runway 27	Runway 27	Runway 27	Runway 27	Runway 27	Runway 27	Runway 27	Runway 27	Runway 27	Runway 27	Runway 27
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes within the IOA, the 'do nothing' scenario was based upon the existing DAVENTRY SID. In terms of potential noise impact, initial quantitative analysis has identified that: - Up to 4,000 ft, this 'do nothing' scenario is estimated to overfly approximately 2,650 households with an approximate population of 5,000. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 5,000. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 9,200 households with an approximate population of 16,900. Taking account of 3,450 planned property developments, this option is estimated to overfly and impact a total population of 23,300.	Up to 4,000ft, this option is estimated to overfly approximately 4,900 households with an approximate population of 8,800. Taking account of 2,050 planned property developments, this option is estimated to overfly and impact a total population of 12,500. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 8,300 households with an approximate population of 15,100. Taking account of 3,150 planned property developments, this option is estimated to overfly and impact a total population of 20,800. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 5,300 households with an approximate population of 9,700. Taking account of 2,150 planned property developments, this option is estimated to overfly and impact a total population of 13,600. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 7,600 households with an approximate population of 13,900. Taking account of 2,350 planned property developments, this option is estimated to overfly and impact a total population of 18,200. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 1,150 households with an approximate population of 2,200. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 2,200. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 8,950 households with an approximate population of 16,500. Taking account of 1,000 planned property developments, this option is estimated to overfly and impact a total population of 18,400. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 300 households with an approximate population of 500. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 500. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 1,500 households with an approximate population of 2,900. Taking account of 950 planned property developments, this option is estimated to overfly and impact a total population of 4,700. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 450 households with an approximate population of 900. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 900. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 1,800 households with an approximate population of 3,500. Taking account of 2,400 planned property developments, this option is estimated to overfly and impact a total population of 8,200. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 1,350 households with an approximate population of 2,500. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 2,500. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 2,200 households with an approximate population of 4,200. Taking account of 300 planned property developments, this option is estimated to overfly and impact a total population of 4,800. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 1,150 households with an approximate population of 2,100. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 2,100. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 1,900 households with an approximate population of 3,600. Taking account of 150 planned property developments, this option is estimated to overfly and impact a total population of 3,900. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 1,050 households with an approximate population of 2,000. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 2,000. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 4,400 households with an approximate population of 8,200. Taking account of 600 planned property developments, this option is estimated to overfly and impact a total population of 9,300. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 300 households with an approximate population of 500. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 500. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 9,900 households with an approximate population of 18,000. Taking account of 1,200 planned property developments, this option is estimated to overfly and impact a total population of 20,200. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 1,050 households with an approximate population of 2,000. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 2,000. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 1,800 households with an approximate population of 3,500. Taking account of 150 planned property developments, this option is estimated to overfly and impact a total population of 3,800. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 1,350 households with an approximate population of 2,500. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 2,500. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 2,200 households with an approximate population of 4,200. Taking account of 300 planned property developments, this option is estimated to overfly and impact a total population of 4,700. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity of the Departure End of Runway. In terms of AQMAs, the existing Runway 27 DAVENTRY SID overflies no AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current routes do not enable continuous climb operations. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring, although aircraft do all follow the extant procedures in a broader sense. The existing procedures do not support optimal aircraft performance and therefore are predicted to have a greater environmental impact compared to proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative emissions analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length to the common point is 34.88km (18.83nm).	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 36.10 km (19.49 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Maintaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be significantly affected, following the removal of the DTY DVOR and the requirement to adopt PBN procedures as part of the FASI-N Programme.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario overflies no tranquility receptors (AONBs or National Parks).	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for departures do not enable continuous climb operations. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length to the common point is 34.88km (18.83nm).	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 36.10 km (19.49 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SID, aircraft departing EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	A hazard relating to an aircraft departing on the SID to the South was identified where an aircraft could conflict with departures from BHX resulting in the potential for loss of lateral and/or vertical separation between aircraft. ATC intervention or IFP design parameters may be required to be applied to mitigate this potential extant hazard. The change sponsor is maintaining close liaison with both BHX and NERL through trilateral meetings to ensure that network connectivity requirements are met now and for the future. This hazard will be further be mitigated through the design process and a further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to an aircraft departing on the SID to the South was identified where an aircraft could conflict with departures from BHX resulting in the potential for loss of lateral and/or vertical separation between aircraft. ATC intervention or IFP design parameters may be required to be applied to mitigate this potential extant hazard. The change sponsor is maintaining close liaison with both BHX and NERL through trilateral meetings to ensure that network connectivity requirements are met now and for the future. 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Summary of Analysis			The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation and is unviable following the removal of the DTY DVOR beacon, which could have a significant impact on capacity and resilience. The existing SID does not enable continuous climb operations to 7,000ft, which leads to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. Following the removal of the DTY DVOR, it is acknowledged that the ATCOs workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 4,000ft - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact up to 7,000ft Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some routes operated by other routes/nearby airports have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.	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			IOA Shortlist Assessment	Based on the IOA Shortlist Assessment methodology, Option O1 has been deemed the REJECTED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O1A has been deemed the REJECTED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O2 has been deemed the REJECTED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O4 has been deemed the PREFERRED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O5 has been deemed the REJECTED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O6 has been deemed the REJECTED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O7 has been deemed the ACCEPTABLE option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O8 has been deemed the REJECTED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O9 has been deemed the REJECTED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O10 has been deemed the FAVOURABLE option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O11 has been deemed the REJECTED option within the design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	REJECTED	REJECTED	REJECTED	PREFERRED	REJECTED	REJECTED	ACCEPTABLE	REJECTED	REJECTED	FAVOURABLE	REJECTED

MAG EMA ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TABLE

Departure Envelope: SID Runway 27 Southwest

				SID 27 SOUTHWEST	
			'DO NOTHING' BASELINE	R27_D_SW_O4	R27_D_SW_O9
			For the southwest design envelope, the 'do nothing' scenario for departures in terms of today's operation is based around the existing conventional DAVENTRY SID. The 'do nothing' scenario for departures consists of a modal track that has been derived to provide an accurate representation of what occurs today. In addition to the modal track, a polygon has also been created that represents an area where current operations are dispersed due to radar vectoring and potentially may affect people on the ground. The overflight analysis conducted on this SID was based on the modal track created using Noise and Track Keeping data at altitudes of 4,000ft and 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the Departure End of Runway to the end of the modal track plus the distance from the end of the modal track to the common point.	Option 4 has a 10° southerly offset to avoid Melbourne and has been created to avoid Ashby-de-la-Zouch and Tamworth. The 10° offset results in the route passing south east of Melbourne and it then makes a left turn to pass north of Ashby-de-la-Zouch prior to turning slightly more to the south to follow the line of the M42 and terminates south east of Tamworth and the A5 and M42 junction. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 9 has a 15° southerly offset to avoid Melbourne and then routes to avoid both Swadlincote and Ashby-de-la-Zouch. The 15° offset results in the route passing south east of Melbourne. At 2nm beyond the DER the route turns left to a south westerly heading, making a second left turn to pass between Swadlincote and Ashby-de-la-Zouch. It cuts across the M42 and terminates south east of Tamworth in the same position as Option 7. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.
Group	Impact	Level of Analysis	Runway 27	Runway 27	Runway 27
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes within the IOA, the 'do nothing' scenario was based upon the existing DAVENTRY SID. In terms of potential noise impact, initial quantitative analysis has identified that: - Up to 4,000 ft, this 'do nothing' scenario is estimated to overfly approximately 2,650 households with an approximate population of 5,000. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 5,000. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 9,200 households with an approximate population of 16,900. Taking account of 3,450 planned property developments, this option is estimated to overfly and impact a total population of 23,300.	Up to 4,000ft, this option is estimated to overfly approximately 2,200 households with an approximate population of 4,100. Taking account of 150 planned property developments, this option is estimated to overfly and impact a total population of 4,400. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 11,650 households with an approximate population of 22,700. Taking account of 3,050 planned property developments, this option is estimated to overfly and impact a total population of 28,600. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect more people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 2,750 households with an approximate population of 5,300. Taking account of 50 planned property developments, this option is estimated to overfly and impact a total population of 5,400. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 6,400 households with an approximate population of 12,300. Taking account of 2,600 planned property developments, this option is estimated to overfly and impact a total population of 17,300. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity of the Departure End of Runway. In terms of AQMAs, the existing Runway 27 DAVENTRY SID overflies no AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current routes do not enable continuous climb operations. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring, although aircraft do all follow the extant procedures in a broader sense. The existing procedures do not support optimal aircraft performance and therefore are predicted to have a greater environmental impact compared to proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative emissions analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length to the common point is 34.88km (18.83nm).	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 34.07 km (18.40 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a decrease in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 37.97 km (20.50 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Maintaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be significantly affected, following the removal of the DTY DVOR and the requirement to adopt PBN procedures as part of the FASI-N Programme.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario overflies no tranquility receptors (AONBs or National Parks).	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for departures do not enable continuous climb operations. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length to the common point is 34.88km (18.83nm).	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 34.07 km (18.40 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 37.97 km (20.50 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SID, aircraft departing EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	Possible hazards have been identified, some of which are extant and are currently mitigated through ATC procedures. Firstly, aircraft departing on the SID to the south west could conflict with BHX departures flying the LUVUM SID. This could lead to the potential for loss of horizontal and/or vertical separation between aircraft and an increase in ATCO workload. Secondly, conflict with BHX easterly arrivals could occur that could lead to the potential for loss of horizontal and/or vertical separation between aircraft and an increase in ATCO workload. ATC tactical intervention or IFP design parameters may be required to be applied to mitigate these potential hazards. These hazards will be further be mitigated through the design process and a further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	Possible hazards have been identified, some of which are extant and are currently mitigated through ATC procedures. Firstly, aircraft departing on the SID to the south west could conflict with BHX departures flying the LUVUM SID. This could lead to the potential for loss of horizontal and/or vertical separation between aircraft and an increase in ATCO workload. Secondly, conflict with BHX easterly arrivals could occur that could lead to the potential for loss of horizontal and/or vertical separation between aircraft and an increase in ATCO workload. ATC tactical intervention or IFP design parameters may be required to be applied to mitigate these potential hazards. These hazards will be further be mitigated through the design process and a further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
		Summary of Analysis	The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation and is unviable following the removal of the DTY DVOR beacon, which could have a significant impact on capacity and resilience. The existing SID does not enable continuous climb operations to 7,000ft, which leads to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. Following the removal of the DTY DVOR, it is acknowledged that the ATCOs workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 7,000ft Better in the following areas: - Noise impact up to 4,000ft - Greenhouse gas emissions - Fuel burn Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some routes operated by other routes/nearby airports have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 4,000ft - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact up to 7,000ft Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some routes operated by other routes/nearby airports have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on the IOA Shortlist Assessment methodology, Option O4 has been deemed the PREFERRED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O9 has been deemed the FAVOURABLE option within the design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	PREFERRED	FAVOURABLE

MAG EMA ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TABLE

Departure Envelope: SID Runway 27 West

				SID 27 WEST			
			'DO NOTHING' BASELINE	R27_D_W_O3	R27_D_W_O4	R27_D_W_O5	R27_D_W_O6
			For the west design envelope, the 'do nothing' scenario for departures in terms of today's operation is based around the existing conventional TRENT SID. The 'do nothing' scenario for departures consists of a modal track that has been derived to provide an accurate representation of what occurs today. In addition to the modal track, a polygon has also been created that represents an area where current operations are dispersed due to radar vectoring and potentially may affect people on the ground. The overflight analysis conducted on this SID was based on the modal track created using Noise and Track Keeping data at altitudes of 4,000ft and 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the Departure End of Runway to the end of the modal track plus the distance from the end of the modal track to the common point.	Option 3 has a 15° northerly offset to avoid Melbourne and has been created to avoid both Derby and Burton upon Trent. The 15° offset results in the route passing north of Melbourne and it continues on this heading for approximately 7.5nm until a point north of Willington and close to Derby aerodrome. A left turn is made to head west, passing north of Burton upon Trent and terminating north east of Abbots Bromley and south of Uttoxeter. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 4 has a 10° northerly offset and has a track that is a hybrid of Options 1 and 3 avoiding Burton upon Trent. The 10° northerly offset results in the route passing north of Melbourne and it continues on this heading until south of Willington where it makes a turn left to head west, routing just north of Burton upon Trent terminating north east of Abbots Bromley. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 5 is similar to Option 3 but deviates slight further north west and is the most northerly option in this envelope. A 15° northerly offset results in the route passing north of Melbourne and it continues on this heading until the vicinity of Hilton on the A50 where it makes a turn left to head west following the line of the A50 and terminating just south of Uttoxeter. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	This option is the same as Option 4 until north west of Burton upon Trent where it turns south by south west to provide an alternative joining point. The 10° northerly offset results in the route passing north of Melbourne and it continues on this heading until south of Willington where it makes a turn left to head west, routing just north of Burton upon Trent. Once north west of Burton upon Trent the route turns south by south west and terminates to the south east of Abbots Bromley. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.
Group	**Impact**	**Level of Analysis**	**Runway 27**	**Runway 27**	**Runway 27**	**Runway 27**	**Runway 27**
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes within the IOA, the 'do nothing' scenario was based upon the existing TRENT SID. In terms of potential noise impact, initial quantitative analysis has identified that: - Up to 4,000 ft, this 'do nothing' scenario is estimated to overfly approximately 1,800 households with an approximate population of 3,500. Taking account of 2,250 planned property developments, this option is estimated to overfly and impact a total population of 7,900. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 33,750 households with an approximate population of 65,200. Taking account of 10,550 planned property developments, this option is estimated to overfly and impact a total population of 85,600.	Up to 4,000ft, this option is estimated to overfly approximately 2,900 households with an approximate population of 5,500. Taking account of 800 planned property developments, this option is estimated to overfly and impact a total population of 7,000. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 7,200 households with an approximate population of 14,200. Taking account of 1,150 planned property developments, this option is estimated to overfly and impact a total population of 16,500. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 2,400 households with an approximate population of 4,600. Taking account of 400 planned property developments, this option is estimated to overfly and impact a total population of 5,300. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 4,600 households with an approximate population of 8,700. Taking account of 950 planned property developments, this option is estimated to overfly and impact a total population of 10,500. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 2,550 households with an approximate population of 4,700. Taking account of 300 planned property developments, this option is estimated to overfly and impact a total population of 5,200. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 5,500 households with an approximate population of 11,300. Taking account of 700 planned property developments, this option is estimated to overfly and impact a total population of 12,800. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 2,400 households with an approximate population of 4,600. Taking account of 400 planned property developments, this option is estimated to overfly and impact a total population of 5,300. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 4,600 households with an approximate population of 8,800. Taking account of 950 planned property developments, this option is estimated to overfly and impact a total population of 10,600. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity of the Departure End of Runway. In terms of AQMAs, the existing Runway 27 TRENT SID overflies one AQMA when the aircraft is above 1,000ft.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current routes do not enable continuous climb operations. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring, although aircraft do all follow the extant procedures in a broader sense. The existing procedures do not support optimal aircraft performance and therefore are predicted to have a greater environmental impact compared to proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative emissions analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length to the common point is 38.05km (20.55nm).	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 39.56 km (21.36 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 39.59 km (21.38 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 39.61 km (21.39 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 43.04 km (23.24 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Maintaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be significantly affected, following the removal of the TNT DVOR and the requirement to adopt PBN procedures as part of the FASI-N Programme.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario overflies no tranquility receptors (AONBs or National Parks).	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for departures do not enable continuous climb operations. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length to the common point is 38.05km (20.55nm).	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 39.56 km (21.36 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 39.59 km (21.38 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 39.61 km (21.39 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 43.04 km (23.24 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SID, aircraft departing EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	For this new envelope, possible hazards have been identified, some of which are extant and are currently mitigated through ATC procedures. Firstly, aircraft departing on the SID to the west could conflict with BHX departures flying the existing published LUVUM SID. This could lead to the potential for loss of horizontal and/or vertical separation between aircraft and an increase in ATCO workload. Secondly, conflict with BHX easterly arrivals could occur that could lead to the potential for loss of horizontal and/or vertical separation between aircraft and an increase in ATCO workload. ATC tactical intervention or IFP design parameters may be required to be applied to mitigate these potential hazards. Finally, there could be unknown or no interaction possible with the network (i.e., above 7,000ft). This could result in an increase in ATCO workload to ensure that horizontal and/or vertical separation is maintained and avoid potential loss of separation between aircraft. As well as ATC tactical intervention to mitigate the above hazards, the change sponsor is maintaining close liaison with both BHX and NERL through trilateral meetings to ensure that network connectivity requirements are met now and for the future. These hazards will be further be mitigated through the design process and a further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	For this new envelope, possible hazards have been identified, some of which are extant and are currently mitigated through ATC procedures. Firstly, aircraft departing on the SID to the west could conflict with BHX departures flying the existing published LUVUM SID. This could lead to the potential for loss of horizontal and/or vertical separation between aircraft and an increase in ATCO workload. Secondly, conflict with BHX easterly arrivals could occur that could lead to the potential for loss of horizontal and/or vertical separation between aircraft and an increase in ATCO workload. ATC tactical intervention or IFP design parameters may be required to be applied to mitigate these potential hazards. Finally, there could be unknown or no interaction possible with the network (i.e., above 7,000ft). This could result in an increase in ATCO workload to ensure that horizontal and/or vertical separation is maintained and avoid potential loss of separation between aircraft. As well as ATC tactical intervention to mitigate the above hazards, the change sponsor is maintaining close liaison with both BHX and NERL through trilateral meetings to ensure that network connectivity requirements are met now and for the future. These hazards will be further be mitigated through the design process and a further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	For this new envelope, possible hazards have been identified, some of which are extant and are currently mitigated through ATC procedures. Firstly, aircraft departing on the SID to the west could conflict with BHX departures flying the existing published LUVUM SID. This could lead to the potential for loss of horizontal and/or vertical separation between aircraft and an increase in ATCO workload. Secondly, conflict with BHX easterly arrivals could occur that could lead to the potential for loss of horizontal and/or vertical separation between aircraft and an increase in ATCO workload. ATC tactical intervention or IFP design parameters may be required to be applied to mitigate these potential hazards. Finally, there could be unknown or no interaction possible with the network (i.e., above 7,000ft). This could result in an increase in ATCO workload to ensure that horizontal and/or vertical separation is maintained and avoid potential loss of separation between aircraft. As well as ATC tactical intervention to mitigate the above hazards, the change sponsor is maintaining close liaison with both BHX and NERL through trilateral meetings to ensure that network connectivity requirements are met now and for the future. These hazards will be further be mitigated through the design process and a further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	For this new envelope, possible hazards have been identified, some of which are extant and are currently mitigated through ATC procedures. Firstly, aircraft departing on the SID to the west could conflict with BHX departures flying the existing published LUVUM SID. This could lead to the potential for loss of horizontal and/or vertical separation between aircraft and an increase in ATCO workload. Secondly, conflict with BHX easterly arrivals could occur that could lead to the potential for loss of horizontal and/or vertical separation between aircraft and an increase in ATCO workload. ATC tactical intervention or IFP design parameters may be required to be applied to mitigate these potential hazards. Finally, there could be unknown or no interaction possible with the network (i.e., above 7,000ft). This could result in an increase in ATCO workload to ensure that horizontal and/or vertical separation is maintained and avoid potential loss of separation between aircraft. As well as ATC tactical intervention to mitigate the above hazards, the change sponsor is maintaining close liaison with both BHX and NERL through trilateral meetings to ensure that network connectivity requirements are met now and for the future. These hazards will be further be mitigated through the design process and a further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
Summary of Analysis			The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation and is unviable following the removal of the TNT DVOR beacon, which could have a significant impact on capacity and resilience. The existing SID does not enable continuous climb operations to 7,000ft, which leads to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that the current EMA operations and procedures are safe. Following the removal of the TNT DVOR, it is acknowledged that the ATCOs workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact up to 4,000ft - Noise impact up to 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some routes operated by other routes/nearby airports have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact up to 4,000ft - Noise impact up to 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some routes operated by other routes/nearby airports have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact up to 4,000ft - Noise impact up to 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some routes operated by other routes/nearby airports have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact up to 4,000ft - Noise impact up to 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some routes operated by other routes/nearby airports have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on the IOA Shortlist Assessment methodology, Option O3 has been deemed the REJECTED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O4 has been deemed the FAVOURABLE option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O5 has been deemed the PREFERRED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O6 has been deemed the ACCEPTABLE option within the design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	**REJECTED**	**FAVOURABLE**	**PREFERRED**	**ACCEPTABLE**

MAG EMA ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TABLE

Departure Envelope: SID Runway 09 North

				SID 09 NORTH						
			'DO NOTHING' BASELINE	R09_D_N_O1	R09_D_N_O1A	R09_D_N_O2	R09_D_N_O3	R09_D_N_O4	R09_D_N_O5	R09_D_N_O6
			For the north design envelope, the 'do nothing' scenario for departures in terms of today's operation is based around the existing conventional POLE HILL SID. The 'do nothing' scenario for departures consists of a modal track that has been derived to provide an accurate representation of what occurs today. In addition to the modal track, a polygon has also been created that represents an area where current operations are dispersed due to radar vectoring and potentially may affect people on the ground. The overflight analysis conducted on this SID was based on the modal track created using Noise and Track Keeping data at altitudes of 4,000ft and 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the Departure End of Runway to the end of the modal track plus the distance from the end of the modal track to the common point.	Option 1 is a re-creation of the current POL SID based on CAP778 recommended turn criteria and speeds. It has an initial offset of 10° to the south followed by a left turn to the north. The rate of turn of is dictated by following the design speed recommended within CAP778 and the design uses fly-by waypoints to create an approximate replication of the existing conventional departure. As a replicated route it follows a similar track over the ground as the current POL SID routing to the east of Long Eaton and west of Hucknall to connect to the NATS network. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 1A is an RNAV 1 replication of the current POL SID included as a 'do minimum' option. It has an initial offset of 10° to the south followed by a left turn to the north. However, the commencement of the first turn is the same as the current POL SID, i.e. 1.5nm beyond the DER. By commencing the turn at this point a higher speed of 220kts is required. At the apex of the initial turn Option 1A is approximately 200m north west of Option 1. The design uses fly-by waypoints to create an approximate replication of the existing conventional departure. As a replicated SID it then follows a similar track over the ground as the current POL routing to the east of Long Eaton and west of Hucknall to connect to the NATS network.	This option follows the extended runway centreline initially, with no offset, with a left turn at 1nm from the DER which is as close as allowed according to CAP 778. It then routes north taking a slightly shorter route to the termination point, whilst seeking to follow the railway line between Long Eaton and Ilkeston. The route overflies the southern edge of Kegworth, before passing close to the Ratcliffe on Soar power station, Long Eaton and the Toton rail depot. It routes east of Ilkeston before terminating close to Hilcote. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	This option follows the extended runway centreline initially with no offset, with a left turn at 1nm from the DER which is as close as allowed according to CAP 778. The route overflies the southern edge of Kegworth, before passing close to the Ratcliffe on Soar power station, Long Eaton and the Toton rail depot. It routes west of Ilkeston before terminating close to Alfreton. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	This option is similar to the replicated Option 1 but the route straightens up, after the initial left turn to end on the east side of the design envelope. After departure it follows the extended runway centreline with no offset, with a left turn at 1nm from the DER which is as close as allowed according to CAP 778. The route overflies the southern edge of Kegworth, before turning north passing between the Ratcliffe on Soar power station and Clifton and routing to the east of Long Eaton and west of Hucknall. The route terminates close to the M1 Junction 28 at South Normanton. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	This option has an initial offset by 5° to the south of the extended runway centreline seeking to avoid Kegworth. The route turns left at 1nm from the DER which is as close as allowed according to CAP 778. The initial 5° offset to the south results in the route, passing just south of Kegworth and it then turns north passing between the Ratcliffe on Soar power station and Clifton, passing between Long Eaton and Beeston before making a second left turn north west. It routes between Ilkeston and Giltbrook before turning north and terminating between Alfreton and South Normanton. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	This option has an initial offset of 15° to the south of the extended runway centreline which is the maximum permissible under PANS-OPS rules. The route turns left at 1nm from the DER which is as close as allowed according to CAP 778. The initial 15° offset to the south results in the route, passing south of Kegworth and this greater offset also takes the route slightly further east than other options before the first turn north, passing between the Ratcliffe on Soar power station and Clifton. It passes between Long Eaton and Beeston before making a second left turn north west between Ilkeston and Giltbrook before turning north and terminating between Alfreton and South Normanton. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.
Group	Impact	Level of Analysis	Runway 09	Runway 09	Runway 09	Runway 09	Runway 09	Runway 09	Runway 09	Runway 09
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes within the IOA, the 'do nothing' scenario was based upon the existing POLE HILL SID. In terms of potential noise impact, initial quantitative analysis has identified that: - Up to 4,000 ft, this 'do nothing' scenario is estimated to overfly approximately 950 households with an approximate population of 2,100. Taking account of 350 planned property developments, this option is estimated to overfly and impact a total population of 2,900. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 56,250 households with an approximate population of 104,100. Taking account of 6,100 planned property developments, this option is estimated to overfly and impact a total population of 115,400.	Up to 4,000ft, this option is estimated to overfly approximately 11,950 households with an approximate population of 22,700. Taking account of 2,150 planned property developments, this option is estimated to overfly and impact a total population of 26,800. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 31,450 households with an approximate population of 59,000. Taking account of 1,000 planned property developments, this option is estimated to overfly and impact a total population of 60,900. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 12,050 households with an approximate population of 22,900. Taking account of 1,000 planned property developments, this option is estimated to overfly and impact a total population of 24,800. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 31,300 households with an approximate population of 58,700. Taking account of 1,000 planned property developments, this option is estimated to overfly and impact a total population of 60,600. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 14,200 households with an approximate population of 26,300. Taking account of 3,900 planned property developments, this option is estimated to overfly and impact a total population of 33,500. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 41,800 households with an approximate population of 75,700. Taking account of 800 planned property developments, this option is estimated to overfly and impact a total population of 77,200. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 14,250 households with an approximate population of 25,700. Taking account of 5,900 planned property developments, this option is estimated to overfly and impact a total population of 36,300. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 38,300 households with an approximate population of 70,800. Taking account of 3,350 planned property developments, this option is estimated to overfly and impact a total population of 77,000. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 11,600 households with an approximate population of 21,600. Taking account of 1,450 planned property developments, this option is estimated to overfly and impact a total population of 24,300. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 23,450 households with an approximate population of 44,200. Taking account of 1,050 planned property developments, this option is estimated to overfly and impact a total population of 46,100. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 10,150 households with an approximate population of 19,100. Taking account of 3,500 planned property developments, this option is estimated to overfly and impact a total population of 25,700. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 30,550 households with an approximate population of 56,300. Taking account of 1,100 planned property developments, this option is estimated to overfly and impact a total population of 58,300. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 11,450 households with an approximate population of 21,300. Taking account of 2,150 planned property developments, this option is estimated to overfly and impact a total population of 25,300. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 31,750 households with an approximate population of 58,600. Taking account of 2,150 planned property developments, this option is estimated to overfly and impact a total population of 62,600. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity of the Departure End of Runway. In terms of AQMAs, the existing Runway 09 POLE HILL SID overflies two AQMAs when the aircraft is above 1,000ft.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current routes do not enable continuous climb operations. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring, although aircraft do all follow the extant procedures in a broader sense. The existing procedures do not support optimal aircraft performance and therefore are predicted to have a greater environmental impact compared to proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative emissions analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length to the common point is 40.26km (21.74nm).	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 40.69 km (21.97 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 40.42 km (21.82 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 38.45 km (20.76 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a decrease in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 37.65 km (20.33 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a decrease in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 40.71 km (21.98 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 40.18 km (21.70 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a decrease in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 41.51 km (22.41 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Maintaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be significantly affected, following the removal of the POL DVOR and the requirement to adopt PBN procedures as part of the FASI-N Programme.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario overflies no tranquility receptors (AONBs or National Parks).	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	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CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for departures do not enable continuous climb operations. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length to the common point is 40.26km (21.74nm).	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 40.69 km (21.97 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 40.42 km (21.82 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 38.45 km (20.76 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 37.65 km (20.33 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 40.71 km (21.98 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 40.18 km (21.70 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 41.51 km (22.41 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SID, aircraft departing EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	Possible hazards have been identified, some of which are extant and are currently mitigated through existing ATC procedures. Firstly, aircraft departing on the SID may leave CAS, leading to a potential conflict with military and or GA aircraft (including Langar parachutes) in Class G airspace. This is an extant hazard and can be mitigated through the design process and potential additional CAS requirements that are being investigated by NERL. Secondly, there could be unknown or no interaction possible between the departing aircraft, the ATC network and the controlling authority (i.e., above 7,000ft) as it may involve flight in Class G 'uncontrolled' airspace. This may result in the potential loss of horizontal and/or vertical separation between aircraft, that in turn could result in an increase in ATCO workload. In addition, if the position of the existing airborne hold (ROKUP) within the ATC network (i.e. above 7,000ft) were to be moved by NERL, this may introduce a potential conflict with this envelope resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in ATCO workload. The sponsor would be required to maintain close liaison with NERL through bilateral meetings to ensure that network connectivity and additional airspace requirements are met to ensure network connectivity is possible. 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Further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
		Summary of Analysis	The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation and is unviable following the removal of the POL DVOR beacon, which would have a significant impact on capacity and resilience. The existing SID does not enable continuous climb operations to 7,000ft, which leads to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. Following the removal of the POL DVOR, it is acknowledged that the ATCOs workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 4,000ft - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact up to 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	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			IOA Shortlist Assessment	Based on the IOA Shortlist Assessment methodology, Option O1 has been deemed the REJECTED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O1A has been deemed the FAVOURABLE option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O2 has been deemed the REJECTED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O3 has been deemed the REJECTED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O4 has been deemed the PREFERRED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O5 has been deemed the ACCEPTABLE option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O6 has been deemed the REJECTED option within the design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	REJECTED	FAVOURABLE	REJECTED	REJECTED	PREFERRED	ACCEPTABLE	REJECTED

MAG EMA ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TABLE

Departure Envelope: SID Runway 09 Northwest

SID 09 NORTHWEST

Group	Impact	Level of Analysis	'DO NOTHING' BASELINE	R09 D NW O1A
			For the northwest design envelope, the 'do nothing' scenario for departures in terms of today's operation is based around the existing conventional TRENT SID. The 'do nothing' scenario for departures consists of a modal track that has been derived to provide an accurate representation of what occurs today. In addition to the modal track, a polygon has also been created that represents an area where current operations are dispersed due to radar vectoring and potentially may affect people on the ground. The overflight analysis conducted on this SID was based on the modal track created using Noise and Track Keeping data at altitudes of 4,000ft and 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the Departure End of Runway to the end of the modal track plus the distance from the end of the modal track to the common point.	Option 1A is an RNAV 1 replication of the current TNT SID departure and is included as a 'do minimum' option. The initial turn is replicated as closely as possible to the existing SID but cannot be replicated exactly due to requirements in CAP 778 for two waypoints to be created for turns in excess of 120o (rather than a single point). As a replicated route it follows a similar track over the ground as the current SID. After take-off the route has a 7° southerly offset from the runway heading, to pass to the south of Kegworth. The track then turns north east of West Leake and then north west passing to the north of Long Eaton. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.
			Runway 09	Runway 09
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes within the IOA, the 'do nothing' scenario was based upon the existing TRENT SID. In terms of potential noise impact, initial quantitative analysis has identified that: - Up to 4,000 ft, this 'do nothing' scenario is estimated to overfly approximately 10,500 households with an approximate population of 19,300. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 19,300. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 44,450 households with an approximate population of 82,100. Taking account of 1,900 planned property developments, this option is estimated to overfly and impact a total population of 85,600.	Up to 4,000ft, this option is estimated to overfly approximately 10,100 households with an approximate population of 19,000. Taking account of 1,250 planned property developments, this option is estimated to overfly and impact a total population of 21,400. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 22,150 households with an approximate population of 42,100. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 42,100. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity of the Departure End of Runway. In terms of AQMAs, the existing Runway 09 TRENT SID overflies one AQMA when the aircraft is above 1,000ft.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current routes do not enable continuous climb operations. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring, although aircraft do all follow the extant procedures in a broader sense. The existing procedures do not support optimal aircraft performance and therefore are predicted to have a greater environmental impact compared to proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative emissions analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length to the common point is 37.37km (20.18nm).	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 39.16 km (21.15 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Maintaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be significantly affected, following the removal of the TNT DVOR and the requirement to adopt PBN procedures as part of the FASI-N Programme.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario overflies no tranquility receptors (AONBs or National Parks).	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for departures do not enable continuous climb operations. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length to the common point is 37.37km (20.18nm).	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 39.16 km (21.15 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SID, aircraft departing EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	Possible hazards have been identified, some of which are extant and are currently mitigated through ATC procedures. Firstly, aircraft departing from EMA on the SID may conflict with arrivals to Runway 09 routing via ROKUP resulting in a potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. Secondly, aircraft flying the SID may conflict with aircraft executing the MAP. This is an extant hazard and would be tactically managed by ATC. These hazards will be further be mitigated through the design process and a further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
		Summary of Analysis	The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation and is unviable following the removal of the TNT DVOR beacon, which would have a significant impact on capacity and resilience. The existing SID does not enable continuous climb operations to 7,000ft, which leads to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. Following the removal of the TNT DVOR, it is acknowledged that the ATCOs workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 4,000ft - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact up to 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some inbound routes and the MAP have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on the IOA Shortlist Assessment methodology, Option O1A has been deemed the REJECTED option within the design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	REJECTED

Criterion	R09 D NW O2	R09 D NW O3	R09 D NW O4	R09 D NW O5
Option description	Option 2 proceeds straight ahead after take-off with no offset and commences the initial left turn 1.4nm from the DER, the closest that is supported by CAP 778 and PANS-OPS when followed by a turn in excess of 120°. The route overflies the southern edge of Kegworth, before turning left and passing between the Ratcliffe on Soar power station and Clifton. It then turns onto a north west heading passing just north of the M1 junction 25, to the north east of Derby and terminates west of Duffield. The CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 3 proceeds straight ahead after take-off with no offset and commences the initial left turn 1.4nm from the DER, the closest that is supported by CAP 778 and PANS-OPS when followed by a turn in excess of 120°. The route overflies the southern edge of Kegworth, before turning left and passing between the Ratcliffe on Soar power station and Clifton. It then turns onto a north west heading passing just south of the M1 junction 25 and maintains this heading passing over northern Derby and terminates at the southern edge of the design envelope close to Kirk Langley. The CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 4 proceeds straight ahead after take-off with no offset and commences the initial left turn 1.4nm from the DER, the closest that is supported by CAP 778 and PANS-OPS when followed by a turn in excess of 120°. The route overflies the southern edge of Kegworth, before turning left and passing between the Ratcliffe on Soar power station and Clifton. It then turns onto a north west heading passing south of Ilkeston, terminating west of Belper close to Blackbrook. The CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	This option has an initial offset of 10° to the south from the runway heading and has been created to reduce the impact of noise on Long Eaton. The final element of the route was modified after engagement following feedback from NERL to ensure it is orientated in the correct direction to join the NERL network. The initial 10° offset to the south results in the route, passing south of Kegworth with the first turn to the north made at 1nm after the DER passing between the Ratcliffe on Soar power station and Clifton. This takes it onto westerly heading where it overflies the southern portion of Long Eaton. A right turn to the north west is made to ensure the route passes between Ilkeston and Derby with final left turn occurring north of Derby with the route terminating close to Duffield. The initial turns have been limited to 190KIAS to enable the tightest turn possible to achieve a more southerly route over Long Eaton. The route is PANS-OPS compliant but should it become a preferred option then it is recommended that it is assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.
	Runway 09	Runway 09	Runway 09	Runway 09
Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 8,450 households with an approximate population of 15,900. Taking account of 100 planned property developments, this option is estimated to overfly and impact a total population of 16,100. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. [illegible]	Up to 4,000ft, this option is estimated to overfly approximately 9,850 households with an approximate population of 18,300. Taking account of 1,900 planned property developments, this option is estimated to overfly and impact a total population of 21,800. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. [illegible]	Up to 4,000ft, this option is estimated to overfly approximately 9,150 households with an approximate population of 17,100. Taking account of 1,600 planned property developments, this option is estimated to overfly and impact a total population of 20,100. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. [illegible]	Up to 4,000ft, this option is estimated to overfly approximately 10,100 households with an approximate population of 18,400. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 18,400. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. [illegible]
Air Quality	Although there is likely to be [illegible] is not within the vicinity of [illegible] This option overflies no AQM[illegible]	[illegible]	[illegible]	[illegible]
Greenhouse Gas impact	This option has been design[illegible] may still be required to man[illegible] km (20.76 nm). When co[illegible] expected to result in an incr[illegible] and is deemed to be of envi[illegible] confirm [illegible]	[illegible]	[illegible]	[illegible]
Capacity and resilience	The introduction of PBN ro[illegible] subsequently leads to more p[illegible] The reduction of the relianc[illegible] oper[illegible]	[illegible]	[illegible]	[illegible]
Tranquillity	This option overflies no stat[illegible] identified through community [illegible]	[illegible]	[illegible]	[illegible]
Biodiversity	The change sponsor has m[illegible] Protection Areas (SPAs), Spe[illegible] DEFRA MAGiC Map. CAP16[illegible] there is unlikely to be an[illegible] CAP1616, Appendix B, pa[illegible] impact on biodiversity as they[illegible] acknowledges that any poten[illegible]	[illegible]	[illegible]	[illegible]
Access	Impact to General Aviation [illegible] Visual Reference Points and [illegible] reviewed and updated (whe[illegible] Airspace classification requi[illegible]	[illegible]	[illegible]	[illegible]
Economic impact from increased effective capacity	The introduction of PBN is ex[illegible] lead to more predictable fligh[illegible] to facilitate economic ben[illegible] increasing p[illegible]	[illegible]	[illegible]	[illegible]
Fuel burn	This option supports continuo[illegible] requirement within Stage 2 [illegible] Stage 3. Therefore, to enab[illegible] less fuel is burnt. With regar[illegible] 'do nothing' scenario, this opti[illegible] benefit as more fuel will be [illegible]	[illegible]	[illegible]	[illegible]
Training costs	It is anticipated that no ext[illegible] procedures as PBN [illegible]	[illegible]	[illegible]	[illegible]
Other costs	Other costs to commerci[illegible] navigation databases and o[illegible] proportionate at this stage of[illegible]	[illegible]	[illegible]	[illegible]
Infrastructure costs	There are no expected addit[illegible] and no additional infrastruct[illegible] infrastructure, in [illegible]	[illegible]	[illegible]	[illegible]
Operational costs	Some operational costs ar[illegible] training of air traffic controllin[illegible]	[illegible]	[illegible]	[illegible]
Deployment costs	Some deployment costs [illegible] procedures and training of a[illegible]	[illegible]	[illegible]	[illegible]
Safety Assessment	Possible hazards have been [illegible] Firstly, aircraft departing f[illegible] ROKUP resulting in a potenti[illegible] in controller workload. This [illegible] Secondly, aircraft flying the [illegible] These hazards will be further[illegible] conducted at Stages 3 and [illegible]	[illegible]	[illegible]	[illegible]
Summary of Analysis	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact up to 4,000ft - Noise impact up to 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some inbound routes and the MAP have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.	[illegible] Better in the following areas: - Noise impact up to 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some inbound routes and the MAP have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.	[illegible] Better in the following areas: - Noise impact up to 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some inbound routes and the MAP have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.	[illegible] - Noise impact up to 4,000ft - Noise impact up to 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some inbound routes and the MAP have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.
IOA Shortlist Assessment	Based on the IOA Shortlist Assessment methodology, Option O2 has been deemed the PREFERRED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O3 has been deemed the REJECTED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O4 has been deemed the REJECTED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O5 has been deemed the ACCEPTABLE option within the design envelope.
OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	PREFERRED	REJECTED	REJECTED	ACCEPTABLE

Criterion	R09 D NW O6	R09 D NW O8	R09 D NW O9	R09 D NW O10
Option description	This option has an initial offset of 10° to the south from the runway heading and has been created to reduce the impact of noise on Long Eaton. It is identical to Option 5 until reaching west of West Hallam at which point this route takes a slightly more northerly track. The initial 10° offset to the south results in the route, passing south of Kegworth with the first turn to the north made at 1nm after the DER passing between the Ratcliffe on Soar power station and Clifton. This takes it onto westerly heading where it overflies the southern portion of Long Eaton. A right turn to the north west is made to ensure the route passes between Ilkeston and Derby with final left turn occurring north of Derby with the route terminating north of Duffield. The initial turns have been limited to 190KIAS to enable the tightest turn possible to achieve a more southerly route over Long Eaton. The route is PANS-OPS compliant, but should it become a preferred option then it is recommended that it is assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.	This option is responding to stakeholder feedback to use the maximum 15° southerly offset to reduce the impact of noise on Kegworth whilst also using the later first turn of Option 7. The initial 15° offset to the south results in the route, passing south of Kegworth and the route then makes a left turn north at 2nm beyond the DER passing between West Leake and East Leake, and south west of Clifton. The route then turns north west passing north of Long Eaton and south of Ilkeston. The route terminates south east of Belper close to Lower Kilburn. The CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	This option is responding to stakeholder feedback to use the maximum 15° southerly offset to reduce the impact of noise on Kegworth. The final element of the route was modified after engagement following feedback from NERL to ensure it is orientated in the correct direction to join the NERL network. It is similar to Option 5 but uses a greater offset. The initial 15° offset to the south results in the route, passing south of Kegworth with the first turn to the north made at 1nm after the DER passing between the Ratcliffe on Soar power station and Clifton. This takes it onto westerly heading where it overflies the southern portion of Long Eaton. A right turn to the north west is made to ensure the route passes between Ilkeston and Derby with final left turn occurring north of Derby with the route terminating close to Duffield. The initial turns have been limited to 190KIAS to enable the tightest turn possible to achieve a more southerly route over Long Eaton. The route is PANS-OPS compliant, but should it become a preferred option then it is recommended that it is assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.	This option is responding to stakeholder feedback to use the maximum 15° southerly offset to reduce the impact of noise on Kegworth. It is similar to Option 6, but with a greater offset. The initial 15° offset to the south results in the route, passing south of Kegworth with the first turn to the north made at 1nm after the DER passing between the Ratcliffe on Soar power station and Clifton. This takes it onto westerly heading where it overflies the southern portion of Long Eaton. A right turn to the north west is made to ensure the route passes between Ilkeston and Derby with final left turn occurring north of Derby with the route terminating north of Duffield. The initial turns have been limited to 190KIAS to enable the tightest turn possible to achieve a more southerly route over Long Eaton. The route is PANS-OPS compliant, but should it become a preferred option then it is recommended that it is assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616
	Runway 09	Runway 09	Runway 09	Runway 09
Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 10,150 households with an approximate population of 18,400. Taking account of 200 planned property developments, this option is estimated to overfly and impact a total population of 18,800. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. [illegible]	Up to 4,000ft, this option is estimated to overfly approximately 7,200 households with an approximate population of 14,000. Taking account of 1,700 planned property developments, this option is estimated to overfly and impact a total population of 17,300. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. [illegible]	Up to 4,000ft, this option is estimated to overfly approximately 10,100 households with an approximate population of 18,200. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 18,200. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. [illegible]	Up to 4,000ft, this option is estimated to overfly approximately 10,150 households with an approximate population of 18,300. Taking account of 200 planned property developments, this option is estimated to overfly and impact a total population of 18,700. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. [illegible]
Air Quality	[illegible]	[illegible]	[illegible]	[illegible]
Greenhouse Gas impact	[illegible]	[illegible]	[illegible]	[illegible]
Capacity and resilience	[illegible]	[illegible]	[illegible]	[illegible]
Tranquillity	[illegible]	[illegible]	[illegible]	[illegible]
Biodiversity	[illegible]	[illegible]	[illegible]	[illegible]
Access	[illegible]	[illegible]	[illegible]	[illegible]
Economic impact from increased effective capacity	[illegible]	[illegible]	[illegible]	[illegible]
Fuel burn	[illegible]	[illegible]	[illegible]	[illegible]
Training costs	[illegible]	[illegible]	[illegible]	[illegible]
Other costs	[illegible]	[illegible]	[illegible]	[illegible]
Infrastructure costs	[illegible]	[illegible]	[illegible]	[illegible]
Operational costs	[illegible]	[illegible]	[illegible]	[illegible]
Deployment costs	[illegible]	[illegible]	[illegible]	[illegible]
Safety Assessment	[illegible]	[illegible]	[illegible]	[illegible]
Summary of Analysis	[illegible] - Noise impact up to 4,000ft - Noise impact up to 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some inbound routes and the MAP have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.	[illegible] - Noise impact up to 4,000ft - Noise impact up to 7,000ft Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some inbound routes and the MAP have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.	[illegible] - Noise impact up to 4,000ft - Noise impact up to 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some inbound routes and the MAP have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.	[illegible] - Noise impact up to 4,000ft - Noise impact up to 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some inbound routes and the MAP have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.
IOA Shortlist Assessment	Based on the IOA Shortlist Assessment methodology, Option O6 has been deemed the REJECTED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O8 has been deemed the REJECTED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O9 has been deemed the FAVOURABLE option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O10 has been deemed the REJECTED option within the design envelope.
OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	REJECTED	REJECTED	FAVOURABLE	REJECTED

MAG EMA ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TABLE

Departure Envelope: SID Runway 09 West

Group	Impact	Level of Analysis	'DO NOTHING' BASELINE
			For the west design envelope, the 'do nothing' scenario for departures in terms of today's operation is based around the existing conventional TRENT SID. The 'do nothing' scenario for departures consists of a modal track that has been derived to provide an accurate representation of what occurs today. In addition to the modal track, a polygon has also been created that represents an area where current operations are dispersed due to radar vectoring and potentially may affect people on the ground. The overflight analysis conducted on this SID was based on the modal track created using Noise and Track Keeping data at altitudes of 4,000ft and 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the Departure End of Runway to the end of the modal track plus the distance from the end of the modal track to the common point.
			Runway 09
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes within the IOA, the 'do nothing' scenario was based upon the existing TRENT SID. In terms of potential noise impact, initial quantitative analysis has identified that: - Up to 4,000 ft, this 'do nothing' scenario is estimated to overfly approximately 10,500 households with an approximate population of 19,300. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 19,300. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 44,450 households with an approximate population of 82,100. Taking account of 1,900 planned property developments, this option is estimated to overfly and impact a total population of 85,600.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity of the Departure End of Runway. In terms of AQMAs, the existing Runway 09 TRENT SID overflies one AQMA when the aircraft is above 1,000ft.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current routes do not enable continuous climb operations. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring, although aircraft do all follow the extant procedures in a broader sense. The existing procedures do not support optimal aircraft performance and therefore are predicted to have a greater environmental impact compared to proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative emissions analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length to the common point is 37.37km (20.18nm).
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Maintaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be significantly affected, following the removal of the TNT DVOR and the requirement to adopt PBN procedures as part of the FASI-N Programme.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario overflies no tranquility receptors (AONBs or National Parks).
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for departures do not enable continuous climb operations. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length to the common point is 37.37km (20.18nm).
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SID, aircraft departing EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.
Summary of Analysis			The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation and is unviable following the removal of the TNT DVOR beacon, which would have a significant impact on capacity and resilience. The existing SID does not enable continuous climb operations to 7,000ft, which leads to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. Following the removal of the TNT DVOR, it is acknowledged that the ATCOs workload is likely to increase due to the enduring requirement for radar vectoring.
			IOA Shortlist Assessment
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3

SID 09 WEST

Group	Impact	R09_D_W_O1	R09_D_W_O2	R09_D_W_O3
		Option 1 proceeds straight ahead after take-off with no offset and then turns north then west. The route overflies the southern edge of Kegworth, before making a 90o turn to the north at 1.4nm past the DER, passing between the Ratcliffe on Soar power station and Clifton. It then turns left as tightly as permitted by CAP 778, passing over Long Eaton and the Toton rail depot to achieve a westerly heading before routing over south Deby and terminating close to the junction between the A38 and A50, south west of Findern. The CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 2 proceeds straight ahead after take-off with no offset and then turns north then west. It is similar to Option 1 until crossing the M1 just south of Junction 25 from where it takes a more southerly route. The route overflies the southern edge of Kegworth, before making a 90o turn to the north at 1.4nm past the DER, passing between the Ratcliffe on Soar power station and Clifton. It then turns left as tightly as permitted by CAP 778, passing over Long Eaton and the Toton rail depot to achieve a westerly heading before just south of Derby and terminating south west of Findern. The CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 3 proceeds straight ahead after take-off with no offset and then turns north then west. It is similar to Option 1 until crossing the M1 just south of Junction 25 from where it takes a more northerly route. The route overflies the southern edge of Kegworth, before making a 90o turn to the north at 1.4nm past the DER, passing between the Ratcliffe on Soar power station and Clifton. It then turns left as tightly as permitted by CAP 778, passing over Long Eaton and the Toton rail depot to achieve a westerly heading passing over Derby and terminating close to Etwall, approximately 1nm further north of Option 1. The CAP 778 recommended speed of 210 KIAS has been applied to the first turn.
		Runway 09	**Runway 09**	**Runway 09**
Communities	Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 11,150 households with an approximate population of 20,600. Taking account of 5,450 planned property developments, this option is estimated to overfly and impact a total population of 30,700. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 39,750 households with an approximate population of 73,800. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 73,800. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 10,900 households with an approximate population of 20,300. Taking account of 5,350 planned property developments, this option is estimated to overfly and impact a total population of 30,200. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 31,300 households with an approximate population of 58,700. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 58,700. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 9,000 households with an approximate population of 16,800. Taking account of 2,950 planned property developments, this option is estimated to overfly and impact a total population of 22,300. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 48,400 households with an approximate population of 91,400. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 91,400. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect more people than the 'do nothing' scenario.
Communities	Air Quality	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.
Wider Society	Greenhouse Gas impact	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 38.53 km (20.80 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 39.18 km (21.15 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 38.93 km (21.02 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 38.53 km (20.80 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 39.18 km (21.15 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 38.93 km (21.02 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Possible hazards have been identified, some of which are extant and are currently mitigated through ATC procedures. Firstly, aircraft departing on the SID to the West could conflict with arrivals from the north resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. Secondly, confliction with an aircraft conducting an Instrument Approach Procedure (IAP)to Runway 09 could occur resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. Aircraft departing on the SID could conflict with aircraft departing BHX on the LUVUM SID. ATC tactical intervention or IFP design parameters may be required to be applied to mitigate this. The change sponsor is maintaining close liaison with both BHX and NERL through trilateral meetings to ensure that network connectivity requirements are met now and for the future. There could also be unknown or no interaction possible with the network (i.e., above 7,000ft) that could result in the potential loss of horizontal and/or vertical separation between aircraft that would result in an increase in ATCO workload. The sponsor would be required to maintain close liaison with NERL through bilateral meetings to ensure that network connectivity requirements are met. Finally, there is the potential for confliction with GA traffic due to GA traffic operating from Derby Airfield possibly infringing CAS. This would be mitigated through ensuring that the departing traffic are at altitudes where the SID terminates above CTA5. These hazards will be further be mitigated through the design process and a further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	Possible hazards have been identified, some of which are extant and are currently mitigated through ATC procedures. Firstly, aircraft departing on the SID to the West could conflict with arrivals from the north resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. Secondly, confliction with an aircraft conducting an Instrument Approach Procedure (IAP)to Runway 09 could occur resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. Aircraft departing on the SID could conflict with aircraft departing BHX on the LUVUM SID. ATC tactical intervention or IFP design parameters may be required to be applied to mitigate this. The change sponsor is maintaining close liaison with both BHX and NERL through trilateral meetings to ensure that network connectivity requirements are met now and for the future. There could also be unknown or no interaction possible with the network (i.e., above 7,000ft) that could result in the potential loss of horizontal and/or vertical separation between aircraft that would result in an increase in ATCO workload. The sponsor would be required to maintain close liaison with NERL through bilateral meetings to ensure that network connectivity requirements are met. Finally, there is the potential for confliction with GA traffic due to GA traffic operating from Derby Airfield possibly infringing CAS. This would be mitigated through ensuring that the departing traffic are at altitudes where the SID terminates above CTA5. These hazards will be further be mitigated through the design process and a further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	Possible hazards have been identified, some of which are extant and are currently mitigated through ATC procedures. Firstly, aircraft departing on the SID to the West could conflict with arrivals from the north resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. Secondly, confliction with an aircraft conducting an Instrument Approach Procedure (IAP)to Runway 09 could occur resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. Aircraft departing on the SID could conflict with aircraft departing BHX on the LUVUM SID. ATC tactical intervention or IFP design parameters may be required to be applied to mitigate this. The change sponsor is maintaining close liaison with both BHX and NERL through trilateral meetings to ensure that network connectivity requirements are met now and for the future. There could also be unknown or no interaction possible with the network (i.e., above 7,000ft) that could result in the potential loss of horizontal and/or vertical separation between aircraft that would result in an increase in ATCO workload. The sponsor would be required to maintain close liaison with NERL through bilateral meetings to ensure that network connectivity requirements are met. Finally, there is the potential for confliction with GA traffic due to GA traffic operating from Derby Airfield possibly infringing CAS. This would be mitigated through ensuring that the departing traffic are at altitudes where the SID terminates above CTA5. These hazards will be further be mitigated through the design process and a further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
Summary of Analysis		When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 4,000ft - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact up to 7,000ft Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some routes operated by other routes/nearby airports have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 4,000ft - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact up to 7,000ft Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some routes operated by other routes/nearby airports have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 4,000ft - Noise impact up to 7,000ft - Greenhouse gas emissions - Fuel burn Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some routes operated by other routes/nearby airports have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.
IOA Shortlist Assessment		Based on the IOA Shortlist Assessment methodology, Option O1 has been deemed the REJECTED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O2 has been deemed the FAVOURABLE option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O3 has been deemed the REJECTED option within the design envelope.
OPTION SHORTLIST CLASSIFICATION FOR STAGE 3		REJECTED	FAVOURABLE	REJECTED

Group	Impact	R09_D_W_O5	R09_D_W_O6	R09_D_W_O7
		Option 5 has a 10° southerly offset but with an earlier and tighter first turn than Option 1 which results in a track closer to Long Eaton. The initial 10° offset to the south results in the route, passing south of Kegworth with the first turn to the north commencing at 1nm beyond the DOR. Once on a northerly heading the route passes between the Ratcliffe on Soar power station and Clifton before commencing a left turn just east of Long Eaton, passing over Stapleford, before achieving more south westerly heading. The route terminates close to the south of Derby and south of Sinfin. The initial two turns have been limited to 190KIAS to enable the tightest turns possible. The route is PANS-OPS compliant, but should it become a preferred option then it is recommended that it is assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.	Option 6 has a 10° southerly offset with the same tighter first turn as Option 5 but using multiple turns to create a route aimed at reducing noise impact. The initial 10° offset to the south results in the route, passing south of Kegworth with the first turn to the north at 1nm beyond the DOR. It passes between the Ratcliffe on Soar power station and Clifton before commencing a second left turn before Long Eaton and a third shortly after to head in a south westerly direction. The route terminates between Willington and Repton to the south of the junction between the A38 and A50. The initial two turns have been limited to 190KIAS to enable the tightest turns possible. The route is PANS-OPS compliant, but should it become a preferred option then it is recommended that it is assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.	Option 7 has a 10° southerly offset but with an extended route east initially to help avoid the overflight of major urban areas. This option commences with a 10° offset from the runway heading passing to the south of Kegworth which is maintained for an extended distance of 4.2nm. Once past East Leake it makes a 90o left turn to the to the north and runs parallel to the A60 before commencing a second 90o left turn to achieve a westerly heading and passing just to the south of Long Eaton. The route terminates to the south east of Derby in the vicinity of Boulton Moor. The route does manage but to achieve avoid the overflight of major urban areas but the initial easterly track is extended and the initial two turns have been limited to 190KIAS to enable the tightest turns possible. The route is PANS-OPS compliant, but should it become a preferred option then it is recommended that it is assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.
		Runway 09	**Runway 09**	**Runway 09**
Communities	Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 12,300 households with an approximate population of 23,100. Taking account of 4,750 planned property developments, this option is estimated to overfly and impact a total population of 32,000. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 35,600 households with an approximate population of 66,700. Taking account of 150 planned property developments, this option is estimated to overfly and impact a total population of 67,000. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 11,850 households with an approximate population of 21,200. Taking account of 5,400 planned property developments, this option is estimated to overfly and impact a total population of 30,800. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 25,450 households with an approximate population of 47,100. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 47,100. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 700 households with an approximate population of 1,300. Taking account of 3,750 planned property developments, this option is estimated to overfly and impact a total population of 8,300. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 23,750 households with an approximate population of 43,800. Taking account of 700 planned property developments, this option is estimated to overfly and impact a total population of 45,100. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be of dis-benefit as it overflies more AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.
Wider Society	Greenhouse Gas impact	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 39.96 km (21.58 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 40.69 km (21.97 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 40.42 km (21.82 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 39.96 km (21.58 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 40.69 km (21.97 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 40.42 km (21.82 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Possible hazards have been identified, some of which are extant and are currently mitigated through ATC procedures. Firstly, aircraft departing on the SID to the West could conflict with arrivals from the north resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. Secondly, confliction with an aircraft conducting an Instrument Approach Procedure (IAP)to Runway 09 could occur resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. Aircraft departing on the SID could conflict with aircraft departing BHX on the LUVUM SID. ATC tactical intervention or IFP design parameters may be required to be applied to mitigate this. The change sponsor is maintaining close liaison with both BHX and NERL through trilateral meetings to ensure that network connectivity requirements are met now and for the future. There could also be unknown or no interaction possible with the network (i.e., above 7,000ft) that could result in the potential loss of horizontal and/or vertical separation between aircraft that would result in an increase in ATCO workload. The sponsor would be required to maintain close liaison with NERL through bilateral meetings to ensure that network connectivity requirements are met. Finally, there is the potential for confliction with GA traffic due to GA traffic operating from Derby Airfield possibly infringing CAS. This would be mitigated through ensuring that the departing traffic are at altitudes where the SID terminates above CTA5. These hazards will be further be mitigated through the design process and a further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	Possible hazards have been identified, some of which are extant and are currently mitigated through ATC procedures. Firstly, aircraft departing on the SID to the West could conflict with arrivals from the north resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. Secondly, confliction with an aircraft conducting an Instrument Approach Procedure (IAP)to Runway 09 could occur resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. Aircraft departing on the SID could conflict with aircraft departing BHX on the LUVUM SID. ATC tactical intervention or IFP design parameters may be required to be applied to mitigate this. The change sponsor is maintaining close liaison with both BHX and NERL through trilateral meetings to ensure that network connectivity requirements are met now and for the future. There could also be unknown or no interaction possible with the network (i.e., above 7,000ft) that could result in the potential loss of horizontal and/or vertical separation between aircraft that would result in an increase in ATCO workload. The sponsor would be required to maintain close liaison with NERL through bilateral meetings to ensure that network connectivity requirements are met. Finally, there is the potential for confliction with GA traffic due to GA traffic operating from Derby Airfield possibly infringing CAS. This would be mitigated through ensuring that the departing traffic are at altitudes where the SID terminates above CTA5. These hazards will be further be mitigated through the design process and a further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	Possible hazards have been identified, some of which are extant and are currently mitigated through ATC procedures. Firstly, aircraft departing on the SID to the West could conflict with arrivals from the north resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. Secondly, confliction with an aircraft conducting an Instrument Approach Procedure (IAP)to Runway 09 could occur resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation if required. Aircraft departing on the SID could conflict with aircraft departing BHX on the LUVUM SID. ATC tactical intervention or IFP design parameters may be required to be applied to mitigate this. The change sponsor is maintaining close liaison with both BHX and NERL through trilateral meetings to ensure that network connectivity requirements are met now and for the future. There could also be unknown or no interaction possible with the network (i.e., above 7,000ft) that could result in the potential loss of horizontal and/or vertical separation between aircraft that would result in an increase in ATCO workload. The sponsor would be required to maintain close liaison with NERL through bilateral meetings to ensure that network connectivity requirements are met. Finally, there is the potential for confliction with GA traffic due to GA traffic operating from Derby Airfield possibly infringing CAS. This would be mitigated through ensuring that the departing traffic are at altitudes where the SID terminates above CTA5. These hazards will be further be mitigated through the design process and a further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
Summary of Analysis		When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 4,000ft - Greenhouse gas emissions - Fuel burn -Air Quality Better in the following areas: - Noise impact up to 7,000ft Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some routes operated by other routes/nearby airports have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 4,000ft - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact up to 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some routes operated by other routes/nearby airports have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact up to 4,000ft - Noise impact up to 7,000ft Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some routes operated by other routes/nearby airports have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.
IOA Shortlist Assessment		Based on the IOA Shortlist Assessment methodology, Option O5 has been deemed the REJECTED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O6 has been deemed the ACCEPTABLE option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O7 has been deemed the PREFERRED option within the design envelope.
OPTION SHORTLIST CLASSIFICATION FOR STAGE 3		REJECTED	ACCEPTABLE	PREFERRED

MAG EMA ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TABLE

Departure Envelope: SID Runway 09 East

				SID 09 EAST			
			'DO NOTHING' BASELINE	R09_D_E_O1	R09_D_E_O3	R09_D_E_O4	R09_D_E_O5
			For the east design envelope, the 'do nothing' scenario for departures in terms of today's operation is based around the existing conventional DAVENTRY SID. The 'do nothing' scenario for departures consists of a modal track that has been derived to provide an accurate representation of what occurs today. In addition to the modal track, a polygon has also been created that represents an area where current operations are dispersed due to radar vectoring and potentially may affect people on the ground. The overflight analysis conducted on this SID was based on the modal track created using Noise and Track Keeping data at altitudes of 4,000ft and 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the Departure End of Runway to the end of the modal track plus the distance from the end of the modal track to the common point.	Option 1 proceeds straight ahead after take-off with no offset before making two right-hand turns to head east. The route follows a runway heading for 1.4nm before initiating a 90° right turn to the north just to the north east of Melbourne. The option then routes over south east Derby before commencing a second right turn to achieve an east-south east heading, terminating just to the east of Ruddington on the southern edge of Nottingham. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 3 proceeds straight ahead after take-off with no offset before making two right-hand turns to head east. It is similar to Option 1 but terminates slightly further north. The route follows a runway heading for 1.4nm before initiating a 90o right turn to the north just to the north east of Melbourne. The option then routes over south east Derby before commencing a second right turn to achieve an east-south east heading, terminating just to the south of Ruddington. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 4 differs to the majority of options in that it is a RNP1 departure using RF turns, rather than RNAV1 with fly-by waypoints. It was created to offer an alternative option to see if an RF turn could minimise the impact of noise on Derby. It proceeds straight ahead after take-off with no offset, and then makes a single right turn to head east. The initial departure is along the extended runway centreline for 1nm prior to commencing a 180° RF turn to achieve an east heading. This minimises the overflight of south east Derby and the route then continues east with a small right turn to the north of Long Eaton to terminate to the east of Ruddington. The route has a constant climb gradient of 6%, terminating at 7,000ft and the CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 5 is a tight RNAV1 right-hand wrap-around with no offset, which has been created to see if a combination of RNAV1 turns could minimise the impact of noise on Derby. This is achieved by applying a 200KIAS speed restriction to achieve tighter turns than if the CAP 778 recommended 210KIAS was to be applied. The route follows a runway heading for 1.4nm before initiating a 90° right turn to the north, restricted to 200KIAS, to achieve a northerly heading. A second 90° turn, also restricted to 200KIAS, commences just as the route crosses the A50 south of Derby and results in a direct track east over Long Eaton and Ruddington to terminate south east of Nottingham. The 200KIAS turns are PANS-OPS compliant but should this become a preferred option then it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.
Group	**Impact**	**Level of Analysis**	Runway 09	Runway 09	Runway 09	Runway 09	Runway 09
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes within the IOA, the 'do nothing' scenario was based upon the existing DAVENTRY SID. In terms of potential noise impact, initial quantitative analysis has identified that: - Up to 4,000 ft, this 'do nothing' scenario is estimated to overfly approximately 750 households with an approximate population of 1,800. Taking account of 650 planned property developments, this option is estimated to overfly and impact a total population of 3,400. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 10,450 households with an approximate population of 19,400. Taking account of 1,400 planned property developments, this option is estimated to overfly and impact a total population of 22,000.	Up to 4,000ft, this option is estimated to overfly approximately 1,750 households with an approximate population of 3,400. Taking account of 50 planned property developments, this option is estimated to overfly and impact a total population of 3,500. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 2,700 households with an approximate population of 5,200. Taking account of 50 planned property developments, this option is estimated to overfly and impact a total population of 5,300. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 750 households with an approximate population of 1,500. Taking account of 350 planned property developments, this option is estimated to overfly and impact a total population of 2,200. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 1,800 households with an approximate population of 3,600. Taking account of 50 planned property developments, this option is estimated to overfly and impact a total population of 3,700. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 800 households with an approximate population of 1,600. Taking account of 100 planned property developments, this option is estimated to overfly and impact a total population of 1,800. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 1,850 households with an approximate population of 3,500. Taking account of 100 planned property developments, this option is estimated to overfly and impact a total population of 3,700. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 750 households with an approximate population of 1,500. Taking account of 50 planned property developments, this option is estimated to overfly and impact a total population of 1,600. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 1,850 households with an approximate population of 3,500. Taking account of 50 planned property developments, this option is estimated to overfly and impact a total population of 3,600. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity of the Departure End of Runway. In terms of AQMAs, the existing Runway 27 DAVENTRY SID overflies one AQMAs when the aircraft is above 1,000ft.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current routes do not enable continuous climb operations. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring, although aircraft do all follow the extant procedures in a broader sense. The existing procedures do not support optimal aircraft performance and therefore are predicted to have a greater environmental impact compared to proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative emissions analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length to the common point is 42.31km (22.85nm).	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 38.53 km (20.80 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a decrease in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 38.93 km (21.02 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a decrease in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 39.55 km (21.36 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a decrease in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 39.96 km (21.58 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a decrease in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Maintaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be significantly affected, following the removal of the DTY DVOR and the requirement to adopt PBN procedures as part of the FASI-N Programme.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario overflies no tranquility receptors (AONBs or National Parks).	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for departures do not enable continuous climb operations. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length to the common point is 42.31km (22.85nm).	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 38.53 km (20.80 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 38.93 km (21.02 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 39.55 km (21.36 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 39.96 km (21.58 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SID, aircraft departing EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	Possible hazards have been identified, some of which are extant and are currently mitigated through existing ATC procedures. Firstly, aircraft departing may conflict with an aircraft conducting the EMA lost communications procedure. This is an extant hazard and ATC would manage the ATC situation tactically at this point allowing priority to the emergency aircraft. Secondly, it was identified that the options within this envelope may conflict with military and or GA aircraft (including Langar parachutes) in Class G airspace, both of which can be mitigated through the design process and potential additional CAS requirements that are being investigated by NERL. Finally, there could be unknown or no interaction possible with the network (i.e., above 7,000ft). This could result in an increase in ATCO workload to ensure that horizontal and/or vertical separation is maintained and avoid potential loss of separation between aircraft. The sponsor would be required to maintain close liaison with NERL through bilateral meetings to ensure that network connectivity requirements are met. Further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	Possible hazards have been identified, some of which are extant and are currently mitigated through existing ATC procedures. Firstly, aircraft departing may conflict with an aircraft conducting the EMA lost communications procedure. This is an extant hazard and ATC would manage the ATC situation tactically at this point allowing priority to the emergency aircraft. Secondly, it was identified that the options within this envelope may conflict with military and or GA aircraft (including Langar parachutes) in Class G airspace, both of which can be mitigated through the design process and potential additional CAS requirements that are being investigated by NERL. Finally, there could be unknown or no interaction possible with the network (i.e., above 7,000ft). This could result in an increase in ATCO workload to ensure that horizontal and/or vertical separation is maintained and avoid potential loss of separation between aircraft. The sponsor would be required to maintain close liaison with NERL through bilateral meetings to ensure that network connectivity requirements are met. Further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	Possible hazards have been identified, some of which are extant and are currently mitigated through existing ATC procedures. Firstly, aircraft departing may conflict with an aircraft conducting the EMA lost communications procedure. This is an extant hazard and ATC would manage the ATC situation tactically at this point allowing priority to the emergency aircraft. Secondly, it was identified that the options within this envelope may conflict with military and or GA aircraft (including Langar parachutes) in Class G airspace, both of which can be mitigated through the design process and potential additional CAS requirements that are being investigated by NERL. Finally, there could be unknown or no interaction possible with the network (i.e., above 7,000ft). This could result in an increase in ATCO workload to ensure that horizontal and/or vertical separation is maintained and avoid potential loss of separation between aircraft. The sponsor would be required to maintain close liaison with NERL through bilateral meetings to ensure that network connectivity requirements are met. Further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	Possible hazards have been identified, some of which are extant and are currently mitigated through existing ATC procedures. Firstly, aircraft departing may conflict with an aircraft conducting the EMA lost communications procedure. This is an extant hazard and ATC would manage the ATC situation tactically at this point allowing priority to the emergency aircraft. Secondly, it was identified that the options within this envelope may conflict with military and or GA aircraft (including Langar parachutes) in Class G airspace, both of which can be mitigated through the design process and potential additional CAS requirements that are being investigated by NERL. Finally, there could be unknown or no interaction possible with the network (i.e., above 7,000ft). This could result in an increase in ATCO workload to ensure that horizontal and/or vertical separation is maintained and avoid potential loss of separation between aircraft. The sponsor would be required to maintain close liaison with NERL through bilateral meetings to ensure that network connectivity requirements are met. Further assessment will be conducted at Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
		Summary of Analysis	The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation and is unviable following the removal of the DTY DVOR beacon, which would have a significant impact on capacity and resilience. The existing SID does not enable continuous climb operations to 7,000ft, which leads to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. Following the removal of the DTY DVOR, it is acknowledged that the ATCOs workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 4,000ft Better in the following areas: - Noise impact up to 7,000ft - Greenhouse gas emissions - Fuel burn - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Better in the following areas: - Noise impact up to 4,000ft - Noise impact up to 7,000ft - Greenhouse gas emissions - Fuel burn - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Better in the following areas: - Noise impact up to 4,000ft - Noise impact up to 7,000ft - Greenhouse gas emissions - Fuel burn - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Better in the following areas: - Noise impact up to 4,000ft - Noise impact up to 7,000ft - Greenhouse gas emissions - Fuel burn - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on the IOA Shortlist Assessment methodology, Option O1 has been deemed the REJECTED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O3 has been deemed the ACCEPTABLE option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O4 has been deemed the FAVOURABLE option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O5 has been deemed the PREFERRED option within the design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	**REJECTED**	**ACCEPTABLE**	**FAVOURABLE**	**PREFERRED**

MAG EMA ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TABLE

Departure Envelope: SID Runway 09 South

SID 09 SOUTH

Group	Impact	Level of Analysis	'DO NOTHING' BASELINE	R09_D_S_O1	R09_D_S_O1A	R09_D_S_O3	R09_D_S_O6
			For the south design envelope, the 'do nothing' scenario for departures in terms of today's operation is based around the existing conventional DAVENTRY SID. The 'do nothing' scenario for departures consists of a modal track that has been derived to provide an accurate representation of what occurs today. In addition to the modal track, a polygon has also been created that represents an area where current operations are dispersed due to radar vectoring and potentially may affect people on the ground. The overflight analysis conducted on this SID was based on the modal track created using Noise and Track Keeping data at altitudes of 4,000ft and 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the Departure End of Runway to the end of the modal track plus the distance from the end of the modal track to the common point.	This is an RNAV re-creation of the current DTY 4P SID with a southerly offset but with an initial turn at 1nm beyond the DER which is earlier than the current route. An initial 7° southerly offset leads to the first turn which commences 1nm after the DER which is PANS-OPS compliant but earlier than the current SID. It utilises fly-by waypoints to create an approximate replication of the existing SID. As a replicated route it follows a similar track over the ground as the current route, turning right after departure to route east of Loughborough, before turning right to the south west and terminating in the vicinity of Mallory Park, west of Leicester. The CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 1A is an RNAV 1 replication of the current Daventry 4P SID with a southerly offset included as a 'do minimum' option. An initial 7° southerly offset leads to the first turn which commences in the same place as the current SID, 2nm beyond the DER, and it uses fly-by waypoints to create an approximate replication of the existing SID. As a replicated route it follows a similar track over the ground as the current route, turning right after departure to route east of Loughborough, before turning right to the south west and terminating in the vicinity of Mallory Park, west of Leicester. The CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 3 proceeds straight ahead after take-off with no offset and commences the single right turn south at 1.2nm beyond the DER. This turn is slightly tighter than Option 2 with the aim of reducing overflight of Loughborough. The route overflies the southern edge of Kegworth, before turning right and passing between Sutton Bonington and East Leake before routing over the western edge of Loughborough and terminating north of Hinckley near Mallory Park. The CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 6 is a replication of the existing Brookmans Park (BPK 2P) departure that has a 10° southerly offset, and which has been included as a 'do minimum' option that also avoids large built up areas. The initial 10° offset to the south results in the route, passing south of Kegworth with the first turn to the south east made at 1.7nm beyond the DER, thereby passing to the north east of Loughborough and Syston. It then turns south and terminates to the east of Leicester, close to Houghton on the Hill.
			Runway 09	Runway 09	Runway 09	Runway 09	Runway 09
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes within the IOA, the 'do nothing' scenario was based upon the existing DAVENTRY SID. In terms of potential noise impact, initial quantitative analysis has identified that: - Up to 4,000 ft, this 'do nothing' scenario is estimated to overfly approximately 750 households with an approximate population of 1,800. Taking account of 650 planned property developments, this option is estimated to overfly and impact a total population of 3,400. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 10,450 households with an approximate population of 19,400. Taking account of 1,400 planned property developments, this option is estimated to overfly and impact a total population of 22,000.	Up to 4,000ft, this option is estimated to overfly approximately 2,950 households with an approximate population of 5,400. Taking account of 1,100 planned property developments, this option is estimated to overfly and impact a total population of 7,400. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 7,050 households with an approximate population of 12,900. Taking account of 650 planned property developments, this option is estimated to overfly and impact a total population of 14,000. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 3,900 households with an approximate population of 7,300. Taking account of 650 planned property developments, this option is estimated to overfly and impact a total population of 8,500. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 7,800 households with an approximate population of 14,500. Taking account of 650 planned property developments, this option is estimated to overfly and impact a total population of 15,700. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 4,750 households with an approximate population of 9,600. Taking account of 1,150 planned property developments, this option is estimated to overfly and impact a total population of 11,900. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 7,600 households with an approximate population of 14,600. Taking account of 700 planned property developments, this option is estimated to overfly and impact a total population of 16,000. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 600 households with an approximate population of 1,100. Taking account of 1,900 planned property developments, this option is estimated to overfly and impact a total population of 4,600. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 5,850 households with an approximate population of 11,500. Taking account of 300 planned property developments, this option is estimated to overfly and impact a total population of 12,100. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity of the Departure End of Runway. In terms of AQMAs, the existing Runway 27 DAVENTRY SID overflies one AQMAs when the aircraft is above 1,000ft.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current routes do not enable continuous climb operations. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring, although aircraft do all follow the extant procedures in a broader sense. The existing procedures do not support optimal aircraft performance and therefore are predicted to have a greater environmental impact compared to proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative emissions analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length to the common point is 42.31km (22.85nm).	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 41.34 km (22.32 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a decrease in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 41.98 km (22.67 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a decrease in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 37.45 km (20.22 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a decrease in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 42.99 km (23.21 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Maintaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be significantly affected, following the removal of the DTY DVOR and the requirement to adopt PBN procedures as part of the FASI-N Programme.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario overflies no tranquility receptors (AONBs or National Parks).	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for departures do not enable continuous climb operations. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length to the common point is 42.31km (22.85nm).	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 41.34 km (22.32 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 41.98 km (22.67 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 37.45 km (20.22 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 42.99 km (23.21 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SID, aircraft departing EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	Possible hazards have been identified, some of which are extant and are currently mitigated through ATC procedures. Firstly, aircraft departing on the SID to the south may conflict with arrivals from the south resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation as required. Secondly, aircraft departing EMA on the SID could conflict with aircraft departing BHX on the LUVUM SID if routing along the western edge of the design envelope. ATC tactical intervention or IFP design parameters may be required to be applied to mitigate this. EMA will continue to work collaboratively with BHX and if necessary NERL, through subsequent stages of this ACP, to refine the design options. It is possible that this work will identify some options that cannot be safely deconflicted from the existing published BHX SIDs which may mean that some options will be discounted. Finally, there could be unknown or no interaction possible between with the network (i.e., above 7,000ft). This could result in an increase in ATCO workload to ensure that horizontal and/or vertical separation is maintained and avoid potential loss of separation between aircraft. The sponsor would be required to maintain close liaison with NERL through bilateral meetings to ensure that network connectivity requirements are met. These hazards and mitigations will be captured as part of the safety and risk mitigation process within Stages 3 and 4 of CAP1616 and the Masterplan and in line with CAP760.	Possible hazards have been identified, some of which are extant and are currently mitigated through ATC procedures. Firstly, aircraft departing on the SID to the south may conflict with arrivals from the south resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation as required. Secondly, aircraft departing EMA on the SID could conflict with aircraft departing BHX on the LUVUM SID if routing along the western edge of the design envelope. ATC tactical intervention or IFP design parameters may be required to be applied to mitigate this. EMA will continue to work collaboratively with BHX and if necessary NERL, through subsequent stages of this ACP, to refine the design options. It is possible that this work will identify some options that cannot be safely deconflicted from the existing published BHX SIDs which may mean that some options will be discounted. Finally, there could be unknown or no interaction possible between with the network (i.e., above 7,000ft). This could result in an increase in ATCO workload to ensure that horizontal and/or vertical separation is maintained and avoid potential loss of separation between aircraft. The sponsor would be required to maintain close liaison with NERL through bilateral meetings to ensure that network connectivity requirements are met. 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EMA will continue to work collaboratively with BHX and if necessary NERL, through subsequent stages of this ACP, to refine the design options. It is possible that this work will identify some options that cannot be safely deconflicted from the existing published BHX SIDs which may mean that some options will be discounted. Finally, there could be unknown or no interaction possible between with the network (i.e., above 7,000ft). This could result in an increase in ATCO workload to ensure that horizontal and/or vertical separation is maintained and avoid potential loss of separation between aircraft. The sponsor would be required to maintain close liaison with NERL through bilateral meetings to ensure that network connectivity requirements are met. These hazards and mitigations will be captured as part of the safety and risk mitigation process within Stages 3 and 4 of CAP1616 and the Masterplan and in line with CAP760.	Possible hazards have been identified, some of which are extant and are currently mitigated through ATC procedures. Firstly, aircraft departing on the SID to the south may conflict with arrivals from the south resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation as required. Secondly, aircraft departing EMA on the SID could conflict with aircraft departing BHX on the LUVUM SID if routing along the western edge of the design envelope. ATC tactical intervention or IFP design parameters may be required to be applied to mitigate this. EMA will continue to work collaboratively with BHX and if necessary NERL, through subsequent stages of this ACP, to refine the design options. It is possible that this work will identify some options that cannot be safely deconflicted from the existing published BHX SIDs which may mean that some options will be discounted. Finally, there could be unknown or no interaction possible between with the network (i.e., above 7,000ft). This could result in an increase in ATCO workload to ensure that horizontal and/or vertical separation is maintained and avoid potential loss of separation between aircraft. The sponsor would be required to maintain close liaison with NERL through bilateral meetings to ensure that network connectivity requirements are met. These hazards and mitigations will be captured as part of the safety and risk mitigation process within Stages 3 and 4 of CAP1616 and the Masterplan and in line with CAP760.
		Summary of Analysis	The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation and is unviable following the removal of the DTY DVOR beacon, which would have a significant impact on capacity and resilience. The existing SID does not enable continuous climb operations to 7,000ft, which leads to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. Following the removal of the DTY DVOR, it is acknowledged that the ATCOs workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 4,000ft Better in the following areas: - Noise impact up to 7,000ft - Greenhouse gas emissions - Fuel burn Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some routes operated by other routes/nearby airports have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 4,000ft Better in the following areas: - Noise impact up to 7,000ft - Greenhouse gas emissions - Fuel burn Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some routes operated by other routes/nearby airports have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 4,000ft Better in the following areas: - Noise impact up to 7,000ft - Greenhouse gas emissions - Fuel burn Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some routes operated by other routes/nearby airports have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 4,000ft - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact up to 7,000ft -Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some routes operated by other routes/nearby airports have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.
		IOA Shortlist Assessment		Based on the IOA Shortlist Assessment methodology, Option O1 has been deemed the ACCEPTABLE option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option 1A has been deemed the REJECTED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O3 has been deemed the REJECTED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O6 has been deemed the PREFERRED option within the design envelope.
		OPTION SHORTLIST CLASSIFICATION FOR STAGE 3		ACCEPTABLE	REJECTED	REJECTED	PREFERRED

Group	Impact	R09_D_S_O8	R09_D_S_O10	R09_D_S_O13	R09_D_S_O14	R09_D_S_O16
		Option 8 has a 10° southerly offset and follows the early part of the current BPK 2P departure but turns south west earlier to route north of Leicester. The initial 10° offset to the south results in the route, passing south of Kegworth with the first turn to the south east made at 1.7nm beyond the DER, passing to the north east of Loughborough. It then makes a second turn onto a south west heading routing south east of Loughborough and passing between Leicester and Coalville and terminating north east of Market Bosworth. The CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 10 has been created to provide a fuel efficient route to the south west. The route proceeds straight ahead after take-off and overflies the southern edge of Kegworth with no offset and commences a first 90o right turn to the south at 1.4nm beyond the DER. As the route passes over northern Loughborough it turns right onto a south west heading passing over central Loughborough, south of Coalville and terminates to the west of Market Bosworth. The CAP 778 recommended speed of 210 KIAS has been applied to the first turn.	Option 13 proceeds straight ahead with no offset for approximately 2.5nm beyond the DER before making the first turn. This is greater than the existing SID and this extended easterly track allows the route to pass to the east and south east of Loughborough, rather than overflying it. After departure the route overflies the southern edge of Kegworth before making its first right turn close to West Leake onto a southerly heading. A second turn takes the route south east of Loughborough and south of Coalville to terminate close to Nailstone. The first turn takes place when the aircraft is above 3,000ft and has therefore been designed to be flown at 250 KIAS as per the recommendation in CAP 778.	Option 14 is responding to stakeholder feedback to use the maximum 15° southerly offset to reduce the impact of noise on Kegworth. The remainder of the route is similar to Option 3. The initial 15° offset to the south results in the route, passing south of Kegworth with the first turn to the right turn onto a southerly heading commencing at approximately 1.2nm beyond the DER. This takes it between Sutton Bonington and East Leake before routing over the western edge of Loughborough and terminating north of Hinckley near Mallory Park The CAP 778 recommended speed of 210 KIAS has been applied to the first turn	Option 16 is responding to stakeholder feedback to use the maximum 15° southerly offset to reduce the impact of noise on Kegworth whilst also avoiding Loughborough. The remainder of the route is similar to Option 8. The initial 15° offset to the south results in the route, passing south of Kegworth with the first turn to the south east made at 1.7nm beyond the DER, passing to the north east of Loughborough. It then makes a second turn onto a south west heading routing south east of Loughborough and passing between Leicester and Coalville and terminating north east of Market Bosworth. The CAP 778 recommended speed of 210 KIAS has been applied to the first turn.
		Runway 09	Runway 09	Runway 09	Runway 09	Runway 09
Communities	Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 2,000 households with an approximate population of 3,900. Taking account of 1,700 planned property developments, this option is estimated to overfly and impact a total population of 7,200. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 7,400 households with an approximate population of 13,800. Taking account of 800 planned property developments, this option is estimated to overfly and impact a total population of 15,300. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 6,000 households with an approximate population of 17,900. Taking account of 1,400 planned property developments, this option is estimated to overfly and impact a total population of 22,100. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 8,000 households with an approximate population of 21,800. Taking account of 200 planned property developments, this option is estimated to overfly and impact a total population of 22,300. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect more people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 2,750 households with an approximate population of 5,600. Taking account of 1,400 planned property developments, this option is estimated to overfly and impact a total population of 8,400. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 6,350 households with an approximate population of 12,200. Taking account of 1,000 planned property developments, this option is estimated to overfly and impact a total population of 14,100. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 4,200 households with an approximate population of 8,400. Taking account of 550 planned property developments, this option is estimated to overfly and impact a total population of 9,500. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 7,700 households with an approximate population of 14,700. Taking account of 550 planned property developments, this option is estimated to overfly and impact a total population of 15,800. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	Up to 4,000ft, this option is estimated to overfly approximately 1,950 households with an approximate population of 3,900. Taking account of 800 planned property developments, this option is estimated to overfly and impact a total population of 5,500. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 7,400 households with an approximate population of 13,900. Taking account of 800 planned property developments, this option is estimated to overfly and impact a total population of 15,400. The potential noise impact on health and quality of life up to 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.	Although there is likely to be a change in aviation emissions by location below 1,000 feet, the location is not within the vicinity of a designated AQMA and as per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 43.27 km (23.37 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 36.57 km (19.75 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a decrease in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 46.01 km (24.84 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 36.74 km (19.84 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a decrease in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous climb operations. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 43.35 km (23.41 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario, and is deemed to be of enviromental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 43.27 km (23.37 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 36.57 km (19.75 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 46.01 km (24.84 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 36.74 km (19.84 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous climb operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 43.35 km (23.41 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Possible hazards have been identified, some of which are extant and are currently mitigated through ATC procedures. Firstly, aircraft departing on the SID to the south may conflict with arrivals from the south resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation as required. Secondly, aircraft departing EMA on the SID could conflict with aircraft departing BHX on the LUVUM SID if routing along the western edge of the design envelope. ATC tactical intervention or IFP design parameters may be required to be applied to mitigate this. EMA will continue to work collaboratively with BHX and if necessary NERL, through subsequent stages of this ACP, to refine the design options. It is possible that this work will identify some options that cannot be safely deconflicted from the existing published BHX SIDs which may mean that some options will be discounted. Finally, there could be unknown or no interaction possible between with the network (i.e., above 7,000ft). This could result in an increase in ATCO workload to ensure that horizontal and/or vertical separation is maintained and avoid potential loss of separation between aircraft. The sponsor would be required to maintain close liaison with NERL through bilateral meetings to ensure that network connectivity requirements are met. These hazards and mitigations will be captured as part of the safety and risk mitigation process within Stages 3 and 4 of CAP1616 and the Masterplan and in line with CAP760.	Possible hazards have been identified, some of which are extant and are currently mitigated through ATC procedures. Firstly, aircraft departing on the SID to the south may conflict with arrivals from the south resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation as required. Secondly, aircraft departing EMA on the SID could conflict with aircraft departing BHX on the LUVUM SID if routing along the western edge of the design envelope. ATC tactical intervention or IFP design parameters may be required to be applied to mitigate this. EMA will continue to work collaboratively with BHX and if necessary NERL, through subsequent stages of this ACP, to refine the design options. It is possible that this work will identify some options that cannot be safely deconflicted from the existing published BHX SIDs which may mean that some options will be discounted. Finally, there could be unknown or no interaction possible between with the network (i.e., above 7,000ft). This could result in an increase in ATCO workload to ensure that horizontal and/or vertical separation is maintained and avoid potential loss of separation between aircraft. The sponsor would be required to maintain close liaison with NERL through bilateral meetings to ensure that network connectivity requirements are met. These hazards and mitigations will be captured as part of the safety and risk mitigation process within Stages 3 and 4 of CAP1616 and the Masterplan and in line with CAP760.	Possible hazards have been identified, some of which are extant and are currently mitigated through ATC procedures. Firstly, aircraft departing on the SID to the south may conflict with arrivals from the south resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation as required. Secondly, aircraft departing EMA on the SID could conflict with aircraft departing BHX on the LUVUM SID if routing along the western edge of the design envelope. ATC tactical intervention or IFP design parameters may be required to be applied to mitigate this. EMA will continue to work collaboratively with BHX and if necessary NERL, through subsequent stages of this ACP, to refine the design options. It is possible that this work will identify some options that cannot be safely deconflicted from the existing published BHX SIDs which may mean that some options will be discounted. Finally, there could be unknown or no interaction possible between with the network (i.e., above 7,000ft). This could result in an increase in ATCO workload to ensure that horizontal and/or vertical separation is maintained and avoid potential loss of separation between aircraft. The sponsor would be required to maintain close liaison with NERL through bilateral meetings to ensure that network connectivity requirements are met. These hazards and mitigations will be captured as part of the safety and risk mitigation process within Stages 3 and 4 of CAP1616 and the Masterplan and in line with CAP760.	Possible hazards have been identified, some of which are extant and are currently mitigated through ATC procedures. Firstly, aircraft departing on the SID to the south may conflict with arrivals from the south resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation as required. Secondly, aircraft departing EMA on the SID could conflict with aircraft departing BHX on the LUVUM SID if routing along the western edge of the design envelope. ATC tactical intervention or IFP design parameters may be required to be applied to mitigate this. EMA will continue to work collaboratively with BHX and if necessary NERL, through subsequent stages of this ACP, to refine the design options. It is possible that this work will identify some options that cannot be safely deconflicted from the existing published BHX SIDs which may mean that some options will be discounted. Finally, there could be unknown or no interaction possible between with the network (i.e., above 7,000ft). This could result in an increase in ATCO workload to ensure that horizontal and/or vertical separation is maintained and avoid potential loss of separation between aircraft. The sponsor would be required to maintain close liaison with NERL through bilateral meetings to ensure that network connectivity requirements are met. These hazards and mitigations will be captured as part of the safety and risk mitigation process within Stages 3 and 4 of CAP1616 and the Masterplan and in line with CAP760.	Possible hazards have been identified, some of which are extant and are currently mitigated through ATC procedures. Firstly, aircraft departing on the SID to the south may conflict with arrivals from the south resulting in the potential loss of horizontal or vertical separation between aircraft and an increase in controller workload. This is an extant hazard and ATC would manage the ATC situation tactically to maintain separation as required. Secondly, aircraft departing EMA on the SID could conflict with aircraft departing BHX on the LUVUM SID if routing along the western edge of the design envelope. ATC tactical intervention or IFP design parameters may be required to be applied to mitigate this. EMA will continue to work collaboratively with BHX and if necessary NERL, through subsequent stages of this ACP, to refine the design options. It is possible that this work will identify some options that cannot be safely deconflicted from the existing published BHX SIDs which may mean that some options will be discounted. Finally, there could be unknown or no interaction possible between with the network (i.e., above 7,000ft). This could result in an increase in ATCO workload to ensure that horizontal and/or vertical separation is maintained and avoid potential loss of separation between aircraft. The sponsor would be required to maintain close liaison with NERL through bilateral meetings to ensure that network connectivity requirements are met. These hazards and mitigations will be captured as part of the safety and risk mitigation process within Stages 3 and 4 of CAP1616 and the Masterplan and in line with CAP760.
	Summary of Analysis	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 4,000ft - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact up to 7,000ft -Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some routes operated by other routes/nearby airports have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 4,000ft - Noise impact up to 7,000ft Better in the following areas: - Greenhouse gas emissions - Fuel burn Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some routes operated by other routes/nearby airports have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 4,000ft - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact up to 7,000ft Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some routes operated by other routes/nearby airports have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 4,000ft Better in the following areas: - Noise impact up to 7,000ft - Greenhouse gas emissions - Fuel burn Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some routes operated by other routes/nearby airports have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact up to 4,000ft - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact up to 7,000ft -Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option. Possible conflicts with some routes operated by other routes/nearby airports have been identified, but the exact nature of these conflicts is unclear at this stage. Further analysis and engagement is required in Stage 3 and 4 of the CAP1616 process to determine this. Furthermore, this option has been assessed as in isolation rather than as a set of design options as part of a wider system/runway pair. Additional analysis is required in Stage 3 to determine the cumulative impact of this option when compared to all the other options.
	IOA Shortlist Assessment	Based on the IOA Shortlist Assessment methodology, Option O8 has been deemed the FAVOURABLE option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O10 has been deemed the REJECTED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O13 has been deemed the REJECTED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O14 has been deemed the REJECTED option within the design envelope.	Based on the IOA Shortlist Assessment methodology, Option O16 has been deemed the REJECTED option within the design envelope.
	OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	FAVOURABLE	REJECTED	REJECTED	REJECTED	REJECTED

ARRIVALS

MAG East Midlands Airport

P, F, A (Runway 27N_Arrivals)

IAF	D/I	Name	Classification
ROKUP	Direct	R27_A_N_O1	PREFERRED
ROKUP	Direct	R27_A_N_O2	REJECTED
ROKUP	Indirect	R27_A_N_O3	FAVOURABLE
ROKUP	Indirect	R27_A_N_O4	ACCEPTABLE
DIPSO	Direct	R27_A_N_O5	REJECTED
DIPSO	Direct	R27_A_N_O6	REJECTED
DIPSO	Direct	R27_A_N_O7	FAVOURABLE
DIPSO	Direct	R27_A_N_O8	PREFERRED
DIPSO	Indirect	R27_A_N_O29	REJECTED
DIPSO	Indirect	R27_A_N_O30	ACCEPTABLE
IAF 1	Direct	R27_A_N_O17	ACCEPTABLE
IAF 1	Direct	R27_A_N_O18	REJECTED
IAF 1	Indirect	R27_A_N_O19	FAVOURABLE
IAF 1	Indirect	R27_A_N_O20	PREFERRED
IAF 2	Direct	R27_A_N_O13	ACCEPTABLE
IAF 2	Direct	R27_A_N_O14	REJECTED
IAF 2	Indirect	R27_A_N_O21	PREFERRED
IAF 2	Indirect	R27_A_N_O22	FAVOURABLE
IAF 3	Indirect	R27_A_N_O11	FAVOURABLE
IAF 3	Indirect	R27_A_N_O12	PREFERRED
IAF 3	Direct	R27_A_N_O23	REJECTED
IAF 3	Direct	R27_A_N_O24	ACCEPTABLE
IAF 4	Direct	R27_A_N_O9	FAVOURABLE
IAF 4	Direct	R27_A_N_O10	REJECTED
IAF 4	Indirect	R27_A_N_O25	PREFERRED
IAF 4	Indirect	R27_A_N_O26	ACCEPTABLE
IAF 5	Direct	R27_A_N_O15	FAVOURABLE
IAF 5	Direct	R27_A_N_O16	REJECTED
IAF 5	Indirect	R27_A_N_O27	ACCEPTABLE
IAF 5	Indirect	R27_A_N_O28	PREFERRED

P, F, A (Runway 09N_Arrivals)

IAF	D/I	Name	Classification
ROKUP	Direct	R09_A_N_O1	PREFERRED
ROKUP	Direct	R09_A_N_O2	ACCEPTABLE
ROKUP	Indirect	R09_A_N_O3	REJECTED
ROKUP	Indirect	R09_A_N_O4	ALTERNATE
ROKUP	Direct	R09_A_N_O4A	FAVOURABLE
DIPSO	Indirect	R09_A_N_O5	REJECTED
DIPSO	Indirect	R09_A_N_O6	REJECTED
DIPSO	Direct	R09_A_N_O7	PREFERRED
DIPSO	Direct	R09_A_N_O8	ACCEPTABLE
DIPSO	Direct	R09_A_N_O8A	FAVOURABLE
DIPSO	Indirect	R09_A_N_O29	REJECTED
DIPSO	Indirect	R09_A_N_O30	ALTERNATE
IAF1	Indirect	R09_A_N_O17	FAVOURABLE
IAF1	Indirect	R09_A_N_O18	REJECTED
IAF1	Direct	R09_A_N_O19	PREFERRED
IAF1	Direct	R09_A_N_O20	REJECTED
IAF1	Direct	R09_A_N_O20A	ACCEPTABLE
IAF2	Indirect	R09_A_N_O13	REJECTED
IAF2	Indirect	R09_A_N_O14	ALTERNATE
IAF2	Direct	R09_A_N_O21	PREFERRED
IAF2	Direct	R09_A_N_O22	ACCEPTABLE
IAF2	Direct	R09_A_N_O22A	FAVOURABLE
IAF3	Direct	R09_A_N_O11	PREFERRED
IAF3	Direct	R09_A_N_O12	ACCEPTABLE
IAF3	Direct	R09_A_N_O12A	FAVOURABLE
IAF3	Indirect	R09_A_N_O23	REJECTED
IAF3	Indirect	R09_A_N_O24	ALTERNATE
IAF4	Direct	R09_A_N_O9	PREFERRED
IAF4	Direct	R09_A_N_O10	ACCEPTABLE
IAF4	Direct	R09_A_N_O10A	FAVOURABLE
IAF4	Indirect	R09_A_N_O25	REJECTED
IAF4	Indirect	R09_A_N_O26	ALTERNATE
IAF5	Direct	R09_A_N_O15	PREFERRED
IAF5	Direct	R09_A_N_O16	FAVOURABLE
IAF5	Indirect	R09_A_N_O27	REJECTED
IAF5	Indirect	R09_A_N_O28	ACCEPTABLE

P, F, A (Runway 27S_Arrivals)

IAF	D/I	Name	Classification
JUNCK	Direct	R27_A_S_O1	FAVOURABLE
JUNCK	Direct	R27_A_S_O2	PREFERRED
JUNCK	Indirect	R27_A_S_O4	ACCEPTABLE
JUNCK	Direct	R27_A_S_O7	REJECTED
JUNCK	Direct	R27_A_S_O8	REJECTED
JUNCK	Indirect	R27_A_S_O9	REJECTED
LEICE	Indirect	R27_A_S_O5	ACCEPTABLE
LEICE	Indirect	R27_A_S_O6	FAVOURABLE
LEICE	Indirect	R27_A_S_O11	REJECTED
LEICE	Indirect	R27_A_S_O12	PREFERRED
LEICE	Direct	R27_A_S_O23	REJECTED
LEICE	Direct	R27_A_S_O24	ALTERNATE
EYEHO	Indirect	R27_A_S_O13	ACCEPTABLE
EYEHO	Indirect	R27_A_S_O14	PREFERRED
EYEHO	Direct	R27_A_S_O21	REJECTED
EYEHO	Direct	R27_A_S_O22	FAVOURABLE
STAPL	Direct	R27_A_S_O15	ACCEPTABLE
STAPL	Direct	R27_A_S_O16	FAVOURABLE
STAPL	Indirect	R27_A_S_O19	REJECTED
STAPL	Indirect	R27_A_S_O20	PREFERRED

P, F, A (Runway 09S_Arrivals)

IAF	D/I	Name	Classification
JUNCK	Direct	R09_A_S_O1	PREFERRED
JUNCK	Direct	R09_A_S_O2	ACCEPTABLE
JUNCK	Indirect	R09_A_S_O3	REJECTED
JUNCK	Indirect	R09_A_S_O4	REJECTED
JUNCK	Indirect	R09_A_S_O7	ALTERNATE
JUNCK	Indirect	R09_A_S_O8	REJECTED
JUNCK	Direct	R09_A_S_O9	REJECTED
JUNCK	Direct	R09_A_S_O10	REJECTED
JUNCK	Direct	R09_A_S_O18	FAVOURABLE
LEICE	Direct	R09_A_S_O5	PREFERRED
LEICE	Direct	R09_A_S_O6	FAVOURABLE
LEICE	Indirect	R09_A_S_O11	ACCEPTABLE
LEICE	Indirect	R09_A_S_O12	REJECTED
EYEHO	Direct	R09_A_S_O13	PREFERRED
EYEHO	Direct	R09_A_S_O14	FAVOURABLE
EYEHO	Indirect	R09_A_S_O23	ACCEPTABLE
EYEHO	Indirect	R09_A_S_O24	REJECTED
STAPL	Direct	R09_A_S_O15	PREFERRED
STAPL	Direct	R09_A_S_O16	FAVOURABLE
STAPL	Indirect	R09_A_S_O21	ACCEPTABLE
STAPL	Indirect	R09_A_S_O22	REJECTED

				ROKUP	ROKUP	ROKUP	ROKUP
				Direct	Direct	Indirect	Indirect
			'DO NOTHING' BASELINE	**R27_A_N_O1**	**R27_A_N_O2**	**R27_A_N_O3**	**R27_A_N_O4**
			For arrivals from the north, the 'do nothing' scenario in terms of today's operation is based around the existing ROKUP Hold. A modal track has been derived to provide an accurate representation of what occurs today. The 'do nothing' scenario for arrivals consists of modal tracks that have been created based upon current operations where most arrivals are radar vectored by air traffic controllers from the Hold. In addition to the modal track, a polygon has also been created that represents an area where current operations and approaches are dispersed due to radar vectoring and potentially may affect people on the ground. The overflight analysis conducted on this transition was based on the modal track created using Noise and Track Keeping data from an altitude of 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the start of the modal track to the Arrival end (Touchdown point) of the runway.	The IAF for this option is ROKUP and the style of the route is 'direct' which means the distance to the final approach has been minimised. This option starts at IAF ROKUP west of Belper and initially tracks south-east over southern Ilkeston and southern Nottingham. It continues on this track until south of Gamston where the route turns south and routes east of Keyworth before turning left to join the extended runway centreline. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 2.13° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is ROKUP and the style of the route is 'direct' which means the distance to the final approach has been minimised. It follows a similar route to Option 1 but routes further east before joining the final approach. The option starts at IAF ROKUP west of Belper and initially tracks south-east over southern Ilkeston and southern Nottingham. It continues on this track until Cotgrave to the south east of Nottingham where the route turns south and routes east of Keyworth briefly following the line of the A46, before turning left to join the extended runway centreline. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (5nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 1.93° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is ROKUP and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. The option starts at IAF ROKUP west of Belper and initially tracks south-east before turning south over West Hallam, just to the west of Ilkeston, then turning east to fly over Long Eaton and Clifton. To the south-east of Nottingham, the route turns south and routes east of Keyworth before turning left to join the extended runway centreline. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 1.96° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is ROKUP and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. It follows a similar route to Option 3 but routes further east before joining the final approach. The option starts at IAF ROKUP west of Belper and initially tracks south-east before turning south over West Hallam, just to the west of Ilkeston, then turning east to fly over Long Eaton and Clifton. It continues on this track until south west of Cotgrave to the south east of Nottingham where the route turns south and routes east of Keyworth briefly following the line of the A46, before turning left to join the extended runway centreline. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (5nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 1.81° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.
Group	**Impact**	**Level of Analysis**	**Runway 27**	**Runway 27**	**Runway 27**	**Runway 27**	**Runway 27**
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes in the IOA, in terms of potential noise impact, initial quantitive analysis has identified that the ROKUP 'do nothing' scenario for Runway 27 is estimated to overfly the following. From 7,000ft: is estimated to overfly approximately 221,550 households with an approximate population of 436,600. Taking account of 18,000 planned property developments, this option is estimated to overfly and impact a total population of 472,100. From 4,000ft: is estimated to overfly approximately 58,550 households with an approximate population of 122,600. Taking account of 7,500 planned property developments, this option is estimated to overfly and impact a total population of 138,300.	From 7,000ft, this option is estimated to overfly approximately 45,350 households with an approximate population of 90,500. Taking account of 4,450 planned property developments, this option is estimated to overfly and impact a total population of 99,400. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 10,500 households with an approximate population of 20,000. Taking account of 1,850 planned property developments, this option is estimated to overfly and impact a total population of 23,500. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 48,200 households with an approximate population of 96,100. Taking account of 4,500 planned property developments, this option is estimated to overfly and impact a total population of 105,100. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 14,200 households with an approximate population of 26,900. Taking account of 2,600 planned property developments, this option is estimated to overfly and impact a total population of 31,800. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 36,450 households with an approximate population of 66,300. Taking account of 5,050 planned property developments, this option is estimated to overfly and impact a total population of 75,500. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 10,050 households with an approximate population of 18,600. Taking account of 3,400 planned property developments, this option is estimated to overfly and impact a total population of 24,900. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 34,000 households with an approximate population of 61,800. Taking account of 3,600 planned property developments, this option is estimated to overfly and impact a total population of 68,400. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 10,450 households with an approximate population of 19,200. Taking account of 5,500 planned property developments, this option is estimated to overfly and impact a total population of 29,400. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to EMA. In terms of AQMAs, the ROKUP 'do nothing' scenario overflies 3 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies three AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival options do not facilitate continuous descent approaches to EMA from 7,000ft. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring. Existing procedures do not support optimal aircraft performance and therefore are predicated to have greater environmental impact compared to the proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn or emissions analysis; this will be conducted in Stage 3. In order to make a comparison, track mileage is used as a proxy using the theory that the shorter the track mileage, the less greenhouse gases are emitted. The track length of the 'do nothing' scenario for Runway 27 from the North is 55.06km (29.73nm).	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 55.29 km (29.85 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 59.46 km (32.10 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 58.85 km (31.78 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 62.56 km (33.78 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Retaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be adversely affected, following the removal of the TNT DVOR and the requirement to adopt PBN procedures.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario does not overfly any AONBs or National Parks.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for arrivals do not facilitate continuous descent operations from 7,000ft. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length is 55.06km (29.73nm).	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 55.29 km (29.85 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 59.46 km (32.10 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 58.85 km (31.78 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 62.56 km (33.78 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids, aircraft arriving at EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
		Summary of Analysis	The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation. The existing arrival arrangements do not enable continuous descent operations from 7,000ft, which could lead to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. It is acknowledged that ATCO workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option O1 has been deemed the PREFERRED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option O2 has been deemed the REJECTED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option O3 has been deemed the FAVOURABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option O4 has been deemed the ACCEPTABLE option within this design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	**PREFERRED**	**REJECTED**	**FAVOURABLE**	**ACCEPTABLE**

				DIPSO	DIPSO	DIPSO	DIPSO	DIPSO	DIPSO
				Direct	Direct	Direct	Direct	Indirect	Indirect
			'DO NOTHING' BASELINE	R27_A_N_O5	R27_A_N_O6	R27_A_N_O7	R27_A_N_O8	R27_A_N_O29	R27_A_N_O30
			For arrivals from the north, the 'do nothing' scenario in terms of today's operation is based around the existing ROKUP Hold. A modal track has been derived to provide an accurate representation of what occurs today. The 'do nothing' scenario for arrivals consists of modal tracks that have been created based upon current operations where most arrivals are radar vectored by air traffic controllers from the Hold. In addition to the modal track, a polygon has also been created that represents an area where current operations and approaches are dispersed due to radar vectoring and potentially may affect people on the ground. The overflight analysis conducted on this transition was based on the modal track created using Noise and Track Keeping data from an altitude of 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the start of the modal track to the Arrival end (Touchdown point) of the runway.	The IAF for this option is DIPSO and the style of the route is 'direct' which means the distance to the final approach has been minimised. The option starts at IAF DIPSO, east of Ripley and initially tracks south-east over Eastwood, Kimberley, and central Nottingham. It continues on this track until south of Gamston where the route turns south and routes east of Keyworth before turning left to join the extended runway centreline. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 2.59° which is within the optimum range for low noise approaches and is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is DIPSO and the style of the route is 'direct' which means the distance to the final approach has been minimised. It follows a similar route to Option 5 but routes further east before joining the final approach. The option starts at IAF DIPSO, east of Ripley and initially tracks south-east over Eastwood, Kimberley, and central Nottingham. It continues on this track until overhead Cotgrave to the south east of Nottingham where the route turns south and routes east of Keyworth briefly following the line of the A46, before turning left to join the extended runway centreline. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (5nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 2.33° which is within the optimum range for low noise approaches and is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is DIPSO and the style of the route is 'direct' which means the distance to the final approach has been minimised. It follows a similar track to Option 5 but routes slightly further south west over Nottingham. The option starts at IAF DIPSO east of Ripley and initially tracks south-east passing just south of Kimberley. Just west of Nottingham it makes a slight left turn and continues over central Nottingham until south of Gamston where the route turns south and routes east of Keyworth before turning left to join the extended runway centreline. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 2.57° which is within the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is DIPSO and the style of the route is 'direct' which means the distance to the final approach has been minimised. It follows a similar route to Option 7 but routes further east before joining the final approach. The option starts at IAF DIPSO east of Ripley and initially tracks south-east passing just south of Kimberley. Just west of Nottingham it makes a slight left turn and continues over central Nottingham until overhead Cotgrave to the south east of Nottingham where the route turns south and routes east of Keyworth briefly following the line of the A46, before turning left to join the extended runway centreline. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (5nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 2.3° which is within the optimum range for low noise approaches and is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is DIPSO and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. The option starts at IAF DIPSO, east of Ripley and tracks south between Heanor and Eastwood and west of Ilkeston and Nottingham. It then turns east to fly over Long Eaton and Clifton. To the south-east of Nottingham the route turns south and routes east of Keyworth before turning left to join the extended runway centreline. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 2.1° which is close to the optimum range for low noise approaches and is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is DIPSO and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. The option starts at IAF DIPSO, east of Ripley and tracks south between Heanor and Eastwood and west of Ilkeston and Nottingham. It then turns east to fly over Long Eaton and Clifton. It continues on this track until south west of Cotgrave to the south east of Nottingham where the route turns south and routes east of Keyworth briefly following the line of the A46, before turning left to join the extended runway centreline. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (5nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 1.9° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.
Group	**Impact**	**Level of Analysis**	**Runway 27**	**Runway 27**	**Runway 27**	**Runway 27**	**Runway 27**	**Runway 27**	**Runway 27**
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes in the IOA, in terms of potential noise impact, initial quantitive analysis has identified that the ROKUP 'do nothing' scenario for Runway 27 is estimated to overfly the following. From 7,000ft: is estimated to overfly approximately 221,550 households with an approximate population of 436,600. Taking account of 18,000 planned property developments, this option is estimated to overfly and impact a total population of 472,100. From 4,000ft: is estimated to overfly approximately 58,550 households with an approximate population of 122,600. Taking account of 7,500 planned property developments, this option is estimated to overfly and impact a total population of 138,300.	From 7,000ft, this option is estimated to overfly approximately 78,650 households with an approximate population of 162,300. Taking account of 3,000 planned property developments, this option is estimated to overfly and impact a total population of 168,500. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 6,450 households with an approximate population of 12,200. Taking account of 2,750 planned property developments, this option is estimated to overfly and impact a total population of 17,400. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 80,100 households with an approximate population of 158,300. Taking account of 3,750 planned property developments, this option is estimated to overfly and impact a total population of 165,700. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 3,750 households with an approximate population of 7,400. Taking account of 3,000 planned property developments, this option is estimated to overfly and impact a total population of 13,300. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 58,100 households with an approximate population of 120,300. Taking account of 2,900 planned property developments, this option is estimated to overfly and impact a total population of 126,300. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 7,350 households with an approximate population of 13,900. Taking account of 1,850 planned property developments, this option is estimated to overfly and impact a total population of 17,400. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 67,550 households with an approximate population of 138,200. Taking account of 5,000 planned property developments, this option is estimated to overfly and impact a total population of 148,400. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 3,400 households with an approximate population of 6,900. Taking account of 3,850 planned property developments, this option is estimated to overfly and impact a total population of 14,700. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 44,400 households with an approximate population of 81,200. Taking account of 6,550 planned property developments, this option is estimated to overfly and impact a total population of 93,200. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 10,400 households with an approximate population of 19,100. Taking account of 3,700 planned property developments, this option is estimated to overfly and impact a total population of 25,900. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 45,600 households with an approximate population of 83,300. Taking account of 6,900 planned property developments, this option is estimated to overfly and impact a total population of 95,900. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 9,250 households with an approximate population of 17,200. Taking account of 1,600 planned property developments, this option is estimated to overfly and impact a total population of 20,100. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to EMA. In terms of AQMAs, the ROKUP 'do nothing' scenario overflies 3 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival options do not facilitate continuous descent approaches to EMA from 7,000ft. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring. Existing procedures do not support optimal aircraft performance and therefore are predicated to have greater environmental impact compared to the proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn or emissions analysis; this will be conducted in Stage 3. In order to make a comparison, track mileage is used as a proxy using the theory that the shorter the track mileage, the less greenhouse gases are emitted. The track length of the 'do nothing' scenario for Runway 27 from the North is 55.06km (29.73nm).	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 47.95 km (25.89 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a reduction in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 51.74 km (27.94 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a reduction in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 48.23 km (26.04 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a reduction in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 52.16 km (28.16 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a reduction in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 55.79 km (30.12 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 60.18 km (32.50 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Retaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be adversely affected, following the removal of the TNT DVOR and the requirement to adopt PBN procedures.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario does not overfly any AONBs or National Parks.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for arrivals do not facilitate continuous descent operations from 7,000ft. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length is 55.06km (29.73nm).	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 47.95 km (25.89 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 51.74 km (27.94 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 48.23 km (26.04 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 52.16 km (28.16 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 55.79 km (30.12 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 60.18 km (32.50 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids, aircraft arriving at EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
		Summary of Analysis	The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation. The existing arrival arrangements do not enable continuous descent operations from 7,000ft, which could lead to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. It is acknowledged that ATCO workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Greenhouse gas emissions - Fuel burn - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Greenhouse gas emissions - Fuel burn - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Greenhouse gas emissions - Fuel burn - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Greenhouse gas emissions - Fuel burn - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option O5 has been deemed the REJECTED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option O6 has been deemed the REJECTED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option O7 has been deemed the FAVOURABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option O8 has been deemed the PREFERRED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 29 has been deemed the REJECTED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 30 has been deemed the ACCEPTABLE option within this design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	**REJECTED**	**REJECTED**	**FAVOURABLE**	**PREFERRED**	**REJECTED**	**ACCEPTABLE**

				IAF 1	IAF 1	IAF 1	IAF 1
				Direct	Direct	Indirect	Indirect
			'DO NOTHING' BASELINE	R27_A_N_O17	R27_A_N_O18	R27_A_N_O19	R27_A_N_O20
			For arrivals from the north, the 'do nothing' scenario in terms of today's operation is based around the existing ROKUP Hold. A modal track has been derived to provide an accurate representation of what occurs today. The 'do nothing' scenario for arrivals consists of modal tracks that have been created based upon current operations where most arrivals are radar vectored by air traffic controllers from the Hold. In addition to the modal track, a polygon has also been created that represents an area where current operations and approaches are dispersed due to radar vectoring and potentially may affect people on the ground. The overflight analysis conducted on this transition was based on the modal track created using Noise and Track Keeping data from an altitude of 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the start of the modal track to the Arrival end (Touchdown point) of the runway.	The IAF for this option is IAF1 and the style of the route is ‘direct’ which means the distance to the final approach has been minimised. The option starts at IAF1 west of Sutton-in-Ashfield and tracks south-east following the line of the M1 motorway, passing between Hucknall and Kimberley. It then makes a slight left turn passing over central Nottingham and continues on this track until south of Gamston where the route turns south and routes east of Keyworth before turning left to join the extended runway centreline. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 2.3° which is within the optimum range for low noise approaches and is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF1 and the style of the route is ‘direct’ which means the distance to the final approach has been minimised. It follows a similar route as Option 17 but routes further east before joining the final approach. The option starts at IAF1 west of Sutton-in-Ashfield and tracks south-east following the line of the M1 motorway, passing between Hucknall and Kimberley. It then makes a slight left turn passing over central Nottingham and continues on this track until overhead Cotgrave to the south east of Nottingham where the route turns south and routes east of Keyworth briefly following the line of the A46, before turning left to join the extended runway centreline. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (5nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 2.08° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF1 and the style of the route is ‘indirect’ which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a ‘direct’ route. The option starts at IAF1 west of Sutton-in-Ashfield and tracks south passing over Heanor and routing west of Ilkeston and Nottingham. It then turns east to fly over Long Eaton and Clifton. To the south-east of Nottingham the route turns south and routes east of Keyworth before turning left to join the extended runway centreline. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 1.82° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF1 and the style of the route is ‘indirect’ which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a ‘direct’ route. It follows the same route as Option 19 but routes further east before joining the final approach. The option starts at IAF1 west of Sutton-in-Ashfield and tracks south passing over Heanor and routing west of Ilkeston and Nottingham and then turns east to fly over Long Eaton and Clifton. It continues on this track until south west of Cotgrave to the south east of Nottingham where the route turns south and routes east of Keyworth briefly following the line of the A46, before turning left to join the extended runway centreline. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (5nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 1.67° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.
Group	**Impact**	**Level of Analysis**	**Runway 27**	**Runway 27**	**Runway 27**	**Runway 27**	**Runway 27**
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes in the IOA, in terms of potential noise impact, initial quantitive analysis has identified that the ROKUP 'do nothing' scenario for Runway 27 is estimated to overfly the following. From 7,000ft: is estimated to overfly approximately 221,550 households with an approximate population of 436,600. Taking account of 18,000 planned property developments, this option is estimated to overfly and impact a total population of 472,100. From 4,000ft: is estimated to overfly approximately 58,550 households with an approximate population of 122,600. Taking account of 7,500 planned property developments, this option is estimated to overfly and impact a total population of 138,300.	From 7,000ft, this option is estimated to overfly approximately 78,200 households with an approximate population of 157,400. Taking account of 4,850 planned property developments, this option is estimated to overfly and impact a total population of 167,100. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 14,750 households with an approximate population of 28,200. Taking account of 2,750 planned property developments, this option is estimated to overfly and impact a total population of 33,500. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 69,550 households with an approximate population of 137,000. Taking account of 4,950 planned property developments, this option is estimated to overfly and impact a total population of 146,700. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 28,900 households with an approximate population of 60,000. Taking account of 2,900 planned property developments, this option is estimated to overfly and impact a total population of 66,000. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 50,650 households with an approximate population of 93,000. Taking account of 7,050 planned property developments, this option is estimated to overfly and impact a total population of 105,900. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 12,850 households with an approximate population of 23,200. Taking account of 3,150 planned property developments, this option is estimated to overfly and impact a total population of 28,900. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 52,200 households with an approximate population of 95,700. Taking account of 7,500 planned property developments, this option is estimated to overfly and impact a total population of 109,500. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 10,100 households with an approximate population of 18,600. Taking account of 3,500 planned property developments, this option is estimated to overfly and impact a total population of 25,100. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to EMA. In terms of AQMAs, the ROKUP 'do nothing' scenario overflies 3 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival options do not facilitate continuous descent approaches to EMA from 7,000ft. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring. Existing procedures do not support optimal aircraft performance and therefore are predicated to have greater environmental impact compared to the proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn or emissions analysis; this will be conducted in Stage 3. In order to make a comparison, track mileage is used as a proxy using the theory that the shorter the track mileage, the less greenhouse gases are emitted. The track length of the 'do nothing' scenario for Runway 27 from the North is 55.06km (29.73nm).	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 52.44 km (28.32 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a reduction in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 46.55 km (25.13 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a reduction in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 62.07 km (33.52 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 66.47 km (35.89 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Retaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be adversely affected, following the removal of the TNT DVOR and the requirement to adopt PBN procedures.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario does not overfly any AONBs or National Parks.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for arrivals do not facilitate continuous descent operations from 7,000ft. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length is 55.06km (29.73nm).	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 52.44 km (28.32 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 46.55 km (25.13 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 62.07 km (33.52 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 66.47 km (35.89 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids, aircraft arriving at EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
Summary of Analysis			The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation. The existing arrival arrangements do not enable continuous descent operations from 7,000ft, which could lead to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. It is acknowledged that ATCO workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Greenhouse gas emissions - Fuel burn - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Greenhouse gas emissions - Fuel burn - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option 17 has been deemed the ACCEPTABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 18 has been deemed the REJECTED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 19 has been deemed the FAVOURABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 20 has been deemed the PREFERRED option within this design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	**ACCEPTABLE**	**REJECTED**	**FAVOURABLE**	**PREFERRED**

				IAF 2	IAF 2	IAF 2	IAF 2
				Direct	Direct	Indirect	Indirect
			'DO NOTHING' BASELINE	R27_A_N_O13	R27_A_N_O14	R27_A_N_O21	R27_A_N_O22
			For arrivals from the north, the 'do nothing' scenario in terms of today's operation is based around the existing ROKUP Hold. A modal track has been derived to provide an accurate representation of what occurs today. The 'do nothing' scenario for arrivals consists of modal tracks that have been created based upon current operations where most arrivals are radar vectored by air traffic controllers from the Hold. In addition to the modal track, a polygon has also been created that represents an area where current operations and approaches are dispersed due to radar vectoring and potentially may affect people on the ground. The overflight analysis conducted on this transition was based on the modal track created using Noise and Track Keeping data from an altitude of 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the start of the modal track to the Arrival end (Touchdown point) of the runway.	The IAF for this option is IAF2 and the style of the route is 'direct' which means the distance to the final approach has been minimised. The option starts at IAF2 near Alfreton and tracks south-east between Heanor and Eastwood and overflies the eastern side of Ilkeston where it turns slightly left. It then passes over south-west Nottingham and continues on this track until south-east of Nottingham to a point south of Gamston. At this point the route turns south and routes east of Keyworth before turning left to join the extended runway centreline. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 2.18° which is close to the optimum range for low noise approaches and is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF2 and the style of the route is 'direct' which means the distance to the final approach has been minimised. It follows a similar route as Option 13 but routes further east before joining the final approach. The option starts at IAF2 near Alfreton and tracks south-east between Heanor and Eastwood and overflies the eastern side of Ilkeston where it turns slightly left. It then passes over south-west Nottingham and continues on this track until overhead Cotgrave to the south east of Nottingham where the route turns south and routes east of Keyworth, briefly following the line of the A46, before turning left to join the extended runway centreline. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (5nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 1.99° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF2 and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. The option starts at IAF2 near Alfreton from where it tracks south-east turning south between Heanor and Eastwood and routing west of Ilkeston and Nottingham. It then turns east to fly over Long Eaton and Clifton. To the south-east of Nottingham the route turns south and routes east of Keyworth before turning left to join the extended runway centreline. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 1.89° which is within the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF2 and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. It follows the same route as Option 21 but routes further east before joining the final approach. The option starts at IAF2 near Alfreton from where it tracks south-east turning south between Heanor and Eastwood and routing west of Ilkeston and Nottingham. It then turns east to fly over Long Eaton and Clifton. It continues on this track until south west of Cotgrave to the south east of Nottingham where the route turns south and routes east of Keyworth briefly following the line of the A46, before turning left to join the extended runway centreline. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (5nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 1.72° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.
Group	**Impact**	**Level of Analysis**	**Runway 27**	**Runway 27**	**Runway 27**	**Runway 27**	**Runway 27**
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes in the IOA, in terms of potential noise impact, initial quantitive analysis has identified that the ROKUP 'do nothing' scenario for Runway 27 is estimated to overfly the following. From 7,000ft: is estimated to overfly approximately 221,550 households with an approximate population of 436,600. Taking account of 18,000 planned property developments, this option is estimated to overfly and impact a total population of 472,100. From 4,000ft: is estimated to overfly approximately 58,550 households with an approximate population of 122,600. Taking account of 7,500 planned property developments, this option is estimated to overfly and impact a total population of 138,300.	From 7,000ft, this option is estimated to overfly approximately 55,100 households with an approximate population of 106,200. Taking account of 5,750 planned property developments, this option is estimated to overfly and impact a total population of 117,300. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 12,000 households with an approximate population of 22,700. Taking account of 1,700 planned property developments, this option is estimated to overfly and impact a total population of 25,900. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 64,000 households with an approximate population of 125,200. Taking account of 6,850 planned property developments, this option is estimated to overfly and impact a total population of 138,600. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 14,150 households with an approximate population of 26,600. Taking account of 3,050 planned property developments, this option is estimated to overfly and impact a total population of 32,300. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 51,250 households with an approximate population of 93,400. Taking account of 7,850 planned property developments, this option is estimated to overfly and impact a total population of 107,800. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 10,350 households with an approximate population of 19,100. Taking account of 3,250 planned property developments, this option is estimated to overfly and impact a total population of 25,100. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 53,050 households with an approximate population of 96,700. Taking account of 8,250 planned property developments, this option is estimated to overfly and impact a total population of 111,700. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 10,250 households with an approximate population of 18,900. Taking account of 3,650 planned property developments, this option is estimated to overfly and impact a total population of 25,600. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to EMA. In terms of AQMAs, the ROKUP 'do nothing' scenario overflies 3 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival options do not facilitate continuous descent approaches to EMA from 7,000ft. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring. Existing procedures do not support optimal aircraft performance and therefore are predicated to have greater environmental impact compared to the proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn or emissions analysis; this will be conducted in Stage 3. In order to make a comparison, track mileage is used as a proxy using the theory that the shorter the track mileage, the less greenhouse gases are emitted. The track length of the 'do nothing' scenario for Runway 27 from the North is 55.06km (29.73nm).	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 54.24 km (29.29 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a reduction in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 58.31 km (31.49 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 60.54 km (32.69 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 64.93 km (35.06 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Retaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be adversely affected, following the removal of the TNT DVOR and the requirement to adopt PBN procedures.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario does not overfly any AONBs or National Parks.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for arrivals do not facilitate continuous descent operations from 7,000ft. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length is 55.06km (29.73nm).	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 54.24 km (29.29 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 58.31 km (31.49 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 60.54 km (32.69 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 64.93 km (35.06 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids, aircraft arriving at EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
		Summary of Analysis	The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation. The existing arrival arrangements do not enable continuous descent operations from 7,000ft, which could lead to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. It is acknowledged that ATCO workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Greenhouse gas emissions - Fuel burn - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option 13 has been deemed the ACCEPTABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 14 has been deemed the REJECTED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 21 has been deemed the PREFERRED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 22 has been deemed the FAVOURABLE option within this design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	**ACCEPTABLE**	**REJECTED**	**PREFERRED**	**FAVOURABLE**

				IAF 3	IAF 3	IAF 3	IAF 3
				Indirect	Indirect	Direct	Direct
			'DO NOTHING' BASELINE	R27_A_N_O11	R27_A_N_O12	R27_A_N_O23	R27_A_N_O24
			For arrivals from the north, the 'do nothing' scenario in terms of today's operation is based around the existing ROKUP Hold. A modal track has been derived to provide an accurate representation of what occurs today. The 'do nothing' scenario for arrivals consists of modal tracks that have been created based upon current operations where most arrivals are radar vectored by air traffic controllers from the Hold. In addition to the modal track, a polygon has also been created that represents an area where current operations and approaches are dispersed due to radar vectoring and potentially may affect people on the ground. The overflight analysis conducted on this transition was based on the modal track created using Noise and Track Keeping data from an altitude of 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the start of the modal track to the Arrival end (Touchdown point) of the runway.	The IAF for this option is IAF3 and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. The option starts at IAF3 west of Alfreton from where it tracks south-east turning south between Heanor and Eastwood and routing west of Ilkeston and Nottingham. It then turns east to fly over Long Eaton and Clifton. To the south-east of Nottingham the route turns south and routes east of Keyworth before turning left to join the extended runway centreline. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 1.86° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF3 and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. It follows the same route as Option 11 but routes further east before joining the final approach. The option starts at IAF3 west of Alfreton from where it tracks south-east turning south between Heanor and Eastwood and routing west of Ilkeston and Nottingham. It then turns east to fly over Long Eaton and Clifton. It continues on this track until south west of Cotgrave to the south east of Nottingham where the route turns south and routes east of Keyworth briefly following the line of the A46, before turning left to join the extended runway centreline. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (5nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 1.71° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF3 and the style of the route is 'direct' which means the distance to the final approach has been minimised. The option starts at IAF3 west of Alfreton and initially tracks south-east over Eastwood, Kimberley, and central Nottingham. It continues on this track until south of Gamston where the route turns south and routes east of Keyworth before turning left to join the extended runway centreline. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 2.19° which is close to the optimum range for low noise approaches and is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF3 and the style of the route is 'direct' which means the distance to the final approach has been minimised. It follows the same route as Option 23 but routes further east before joining the final approach. The option starts at IAF3 west of Alfreton and initially tracks south-east over Eastwood, Kimberley, and central Nottingham. It continues on this track until overhead Cotgrave to the south east of Nottingham where the route turns south and routes east of Keyworth briefly following the line of the A46, before turning left to join the extended runway centreline. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (5nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 2° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.
Group	Impact	Level of Analysis	Runway 27	Runway 27	Runway 27	Runway 27	Runway 27
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes in the IOA, in terms of potential noise impact, initial quantitive analysis has identified that the ROKUP 'do nothing' scenario for Runway 27 is estimated to overfly the following. From 7,000ft: is estimated to overfly approximately 221,550 households with an approximate population of 436,600. Taking account of 18,000 planned property developments, this option is estimated to overfly and impact a total population of 472,100. From 4,000ft: is estimated to overfly approximately 58,550 households with an approximate population of 122,600. Taking account of 7,500 planned property developments, this option is estimated to overfly and impact a total population of 138,300.	From 7,000ft, this option is estimated to overfly approximately 49,550 households with an approximate population of 90,900. Taking account of 7,500 planned property developments, this option is estimated to overfly and impact a total population of 104,700. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 11,100 households with an approximate population of 20,500. Taking account of 3,200 planned property developments, this option is estimated to overfly and impact a total population of 26,400. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 51,250 households with an approximate population of 93,900. Taking account of 7,900 planned property developments, this option is estimated to overfly and impact a total population of 108,400. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 10,150 households with an approximate population of 18,800. Taking account of 3,600 planned property developments, this option is estimated to overfly and impact a total population of 25,400. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 79,000 households with an approximate population of 160,600. Taking account of 3,500 planned property developments, this option is estimated to overfly and impact a total population of 167,700. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 20,100 households with an approximate population of 38,000. Taking account of 2,300 planned property developments, this option is estimated to overfly and impact a total population of 42,300. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 82,150 households with an approximate population of 167,800. Taking account of 5,150 planned property developments, this option is estimated to overfly and impact a total population of 178,400. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 12,350 households with an approximate population of 23,700. Taking account of 3,900 planned property developments, this option is estimated to overfly and impact a total population of 31,200. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to EMA. In terms of AQMAs, the ROKUP 'do nothing' scenario overflies 3 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival options do not facilitate continuous descent approaches to EMA from 7,000ft. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring. Existing procedures do not support optimal aircraft performance and therefore are predicated to have greater environmental impact compared to the proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn or emissions analysis; this will be conducted in Stage 3. In order to make a comparison, track mileage is used as a proxy using the theory that the shorter the track mileage, the less greenhouse gases are emitted. The track length of the 'do nothing' scenario for Runway 27 from the North is 55.06km (29.73nm).	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 61.07 km (32.97 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 65.46 km (35.34 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 54.10 km (29.21 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a reduction in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 57.93 km (31.28 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Retaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be adversely affected, following the removal of the TNT DVOR and the requirement to adopt PBN procedures.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario does not overfly any AONBs or National Parks.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for arrivals do not facilitate continuous descent operations from 7,000ft. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length is 55.06km (29.73nm).	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 61.07 km (32.97 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 65.46 km (35.34 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 54.10 km (29.21 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 57.93 km (31.28 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids, aircraft arriving at EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
		Summary of Analysis	The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation. The existing arrival arrangements do not enable continuous descent operations from 7,000ft, which could lead to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. It is acknowledged that ATCO workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Greenhouse gas emissions - Fuel burn - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option 11 has been deemed the FAVOURABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 12 has been deemed the PREFERRED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 23 has been deemed the REJECTED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 24 has been deemed the ACCEPTABLE option within this design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	FAVOURABLE	PREFERRED	REJECTED	ACCEPTABLE

Group	Impact	Level of Analysis	'DO NOTHING' BASELINE	IAF 4 Direct R27_A_N_O9	IAF 4 Direct R27_A_N_O10	IAF 4 Indirect R27_A_N_O25	IAF 4 Indirect R27_A_N_O26
			For arrivals from the north, the 'do nothing' scenario in terms of today's operation is based around the existing ROKUP Hold. A modal track has been derived to provide an accurate representation of what occurs today. The 'do nothing' scenario for arrivals consists of modal tracks that have been created based upon current operations where most arrivals are radar vectored by air traffic controllers from the Hold. In addition to the modal track, a polygon has also been created that represents an area where current operations and approaches are dispersed due to radar vectoring and potentially may affect people on the ground. The overflight analysis conducted on this transition was based on the modal track created using Noise and Track Keeping data from an altitude of 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the start of the modal track to the Arrival end (Touchdown point) of the runway.	The IAF for this option is IAF4 and the style of the route is 'direct' which means the distance to the final approach has been minimised. This option starts at IAF4 north of Belper from where it tracks south-east passing between Belper and Ripley, turning slightly left over Ilkeston to over fly south-west Nottingham. Once south-east of Nottingham at a point south of Gamston the route turns south and routes east of Keyworth before turning left to join the extended runway centreline. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 2.17° which is close to the optimum range for low noise approaches and is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF4 and the style of the route is 'direct' which means the distance to the final approach has been minimised. It follows a similar route to Option 9 but routes further east before joining the final approach. This option starts at IAF4 north of Belper from where it tracks south-east passing between Belper and Ripley, turning slightly left over Ilkeston to over fly south-west Nottingham. It continues on this track until overhead Cotgrave to the south east of Nottingham where the route turns south and routes east of Keyworth briefly following the line of the A46, before turning left to join the extended runway centreline. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (5nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 1.97° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF4 and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. The option starts at IAF4 north of Belper and tracks south-east between Belper and Ripley before turning south just west of Ilkeston and routing to the west of Nottingham. It then turns east to fly over Long Eaton and Clifton. To the south-east of Nottingham the route turns south and routes east of Keyworth before turning left to join the extended runway centreline. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 1.95° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF4 and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. It follows the same route as Option 25 but routes further east before joining the final approach. The option starts at IAF4 north of Belper and tracks south-east between Belper and Ripley before turning south just west of Ilkeston and routing to the west of Nottingham. It then turns east to fly over Long Eaton and Clifton. It continues on this track until south west of Cotgrave to the south east of Nottingham where the route turns south and routes east of Keyworth briefly following the line of the A46, before turning left to join the extended runway centreline. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (5nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 1.78° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.
Group	**Impact**	**Level of Analysis**	**Runway 27**	**Runway 27**	**Runway 27**	**Runway 27**	**Runway 27**
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes in the IOA, in terms of potential noise impact, initial quantitive analysis has identified that the ROKUP 'do nothing' scenario for Runway 27 is estimated to overfly the following. From 7,000ft: is estimated to overfly approximately 221,550 households with an approximate population of 436,600. Taking account of 18,000 planned property developments, this option is estimated to overfly and impact a total population of 472,100. From 4,000ft: is estimated to overfly approximately 58,550 households with an approximate population of 122,600. Taking account of 7,500 planned property developments, this option is estimated to overfly and impact a total population of 138,300.	From 7,000ft, this option is estimated to overfly approximately 48,150 households with an approximate population of 94,900. Taking account of 3,650 planned property developments, this option is estimated to overfly and impact a total population of 102,100. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 11,950 households with an approximate population of 22,500. Taking account of 1,650 planned property developments, this option is estimated to overfly and impact a total population of 25,700. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 57,150 households with an approximate population of 114,100. Taking account of 4,800 planned property developments, this option is estimated to overfly and impact a total population of 123,600. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 14,200 households with an approximate population of 26,700. Taking account of 3,050 planned property developments, this option is estimated to overfly and impact a total population of 32,400. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 38,600 households with an approximate population of 71,100. Taking account of 5,450 planned property developments, this option is estimated to overfly and impact a total population of 81,200. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 10,050 households with an approximate population of 18,500. Taking account of 3,400 planned property developments, this option is estimated to overfly and impact a total population of 24,800. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 40,050 households with an approximate population of 73,700. Taking account of 5,850 planned property developments, this option is estimated to overfly and impact a total population of 84,400. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 10,350 households with an approximate population of 19,100. Taking account of 3,750 planned property developments, this option is estimated to overfly and impact a total population of 26,000. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to EMA. In terms of AQMAs, the ROKUP 'do nothing' scenario overflies 3 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival options do not facilitate continuous descent approaches to EMA from 7,000ft. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring. Existing procedures do not support optimal aircraft performance and therefore are predicated to have greater environmental impact compared to the proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn or emissions analysis; this will be conducted in Stage 3. In order to make a comparison, track mileage is used as a proxy using the theory that the shorter the track mileage, the less greenhouse gases are emitted. The track length of the 'do nothing' scenario for Runway 27 from the North is 55.06km (29.73nm).	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 54.46 km (29.40 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a reduction in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 58.53 km (31.60 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 58.97 km (31.84 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 63.36 km (34.21 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Retaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be adversely affected, following the removal of the TNT DVOR and the requirement to adopt PBN procedures.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario does not overfly any AONBs or National Parks.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for arrivals do not facilitate continuous descent operations from 7,000ft. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length is 55.06km (29.73nm).	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 54.46 km (29.40 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 58.53 km (31.60 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 58.97 km (31.84 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 63.36 km (34.21 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids, aircraft arriving at EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
		Summary of Analysis	The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation. The existing arrival arrangements do not enable continuous descent operations from 7,000ft, which could lead to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. It is acknowledged that ATCO workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Greenhouse gas emissions - Fuel burn - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option O9 has been deemed the FAVOURABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 10 has been deemed the REJECTED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 25 has been deemed the PREFERRED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 26 has been deemed the ACCEPTABLE option within this design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	**FAVOURABLE**	**REJECTED**	**PREFERRED**	**ACCEPTABLE**

				IAF 5	IAF 5	IAF 5	IAF 5
				Direct	Direct	Indirect	Indirect
			'DO NOTHING' BASELINE	R27_A_N_O15	R27_A_N_O16	R27_A_N_O27	R27_A_N_O28
			For arrivals from the north, the 'do nothing' scenario in terms of today's operation is based around the existing ROKUP Hold. A modal track has been derived to provide an accurate representation of what occurs today. The 'do nothing' scenario for arrivals consists of modal tracks that have been created based upon current operations where most arrivals are radar vectored by air traffic controllers from the Hold. In addition to the modal track, a polygon has also been created that represents an area where current operations and approaches are dispersed due to radar vectoring and potentially may affect people on the ground. The overflight analysis conducted on this transition was based on the modal track created using Noise and Track Keeping data from an altitude of 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the start of the modal track to the Arrival end (Touchdown point) of the runway.	The IAF for this option is IAF5 and the style of the route is 'direct' which means the distance to the final approach has been minimised. This option starts at IAF5 north of Duffield and initially tracks south-east passing south of Ilkeston and routing over south west Nottingham. It continues on this track until south of Gamston where the route turns south and routes east of Keyworth before turning left to join the extended runway centreline. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 2.19° which is close to the optimum range for low noise approaches and is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF5 and the style of the route is 'direct' which means the distance to the final approach has been minimised. It follows a similar route as Option 15 but routes further east before joining the final approach. This option starts at IAF5 north of Duffield and initially tracks south-east passing south of Ilkeston and routing over south west Nottingham. It continues on this track until Cotgrave to the south east of Nottingham where the route turns south and routes east of Keyworth briefly following the line of the A46, before turning left to join the extended runway centreline. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (5nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 1.98° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF5 and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. The option starts at IAF5 north of Duffield and initially tracks south-east, just north of Derby. Close to Draycott the route turns left to head east passing over Long Eaton and Ruddington, and to the south-east of Nottingham the route turns south and routes east of Keyworth before turning left to join the extended runway centreline. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 2.09° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF5 and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. It follows the same route as Option 27 but routes further east before joining the final approach. This option starts at IAF5 north of Duffield and initially tracks south-east, just north of Derby. Close to Draycott the route turns left to head east passing over Long Eaton and Ruddington. It continues on this track until south west of Cotgrave to the south east of Nottingham where the route turns south and routes east of Keyworth briefly following the line of the A46, before turning left to join the extended runway centreline. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (5nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 1.89° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.
Group	**Impact**	**Level of Analysis**	**Runway 27**	**Runway 27**	**Runway 27**	**Runway 27**	**Runway 27**
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes in the IOA, in terms of potential noise impact, initial quantitive analysis has identified that the ROKUP 'do nothing' scenario for Runway 27 is estimated to overfly the following. From 7,000ft: is estimated to overfly approximately 221,550 households with an approximate population of 436,600. Taking account of 18,000 planned property developments, this option is estimated to overfly and impact a total population of 472,100. From 4,000ft: is estimated to overfly approximately 58,550 households with an approximate population of 122,600. Taking account of 7,500 planned property developments, this option is estimated to overfly and impact a total population of 138,300.	From 7,000ft, this option is estimated to overfly approximately 42,350 households with an approximate population of 83,800. Taking account of 8,050 planned property developments, this option is estimated to overfly and impact a total population of 99,700. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 10,500 households with an approximate population of 20,300. Taking account of 2,050 planned property developments, this option is estimated to overfly and impact a total population of 24,300. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 45,700 households with an approximate population of 91,700. Taking account of 7,750 planned property developments, this option is estimated to overfly and impact a total population of 107,200. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 12,650 households with an approximate population of 24,100. Taking account of 2,750 planned property developments, this option is estimated to overfly and impact a total population of 29,300. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 42,850 households with an approximate population of 78,600. Taking account of 5,050 planned property developments, this option is estimated to overfly and impact a total population of 87,800. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 10,350 households with an approximate population of 19,100. Taking account of 3,650 planned property developments, this option is estimated to overfly and impact a total population of 25,800. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 44,250 households with an approximate population of 81,000. Taking account of 5,400 planned property developments, this option is estimated to overfly and impact a total population of 90,900. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 9,550 households with an approximate population of 17,700. Taking account of 1,800 planned property developments, this option is estimated to overfly and impact a total population of 21,000. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to EMA. In terms of AQMAs, the ROKUP 'do nothing' scenario overflies 3 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies three AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival options do not facilitate continuous descent approaches to EMA from 7,000ft. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring. Existing procedures do not support optimal aircraft performance and therefore are predicated to have greater environmental impact compared to the proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn or emissions analysis; this will be conducted in Stage 3. In order to make a comparison, track mileage is used as a proxy using the theory that the shorter the track mileage, the less greenhouse gases are emitted. The track length of the 'do nothing' scenario for Runway 27 from the North is 55.06km (29.73nm).	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 54.13 km (29.23 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a reduction in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 58.33 km (31.50 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 56.02 km (30.25 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 60.42 km (32.62 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Retaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be adversely affected, following the removal of the TNT DVOR and the requirement to adopt PBN procedures.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario does not overfly any AONBs or National Parks.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for arrivals do not facilitate continuous descent operations from 7,000ft. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length is 55.06km (29.73nm).	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 54.13 km (29.23 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 58.33 km (31.50 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 56.02 km (30.25 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 60.42 km (32.62 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids, aircraft arriving at EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a northerly or easterly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
		Summary of Analysis	The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation. The existing arrival arrangements do not enable continuous descent operations from 7,000ft, which could lead to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. It is acknowledged that ATCO workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Greenhouse gas emissions - Fuel burn - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP1616 process to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option 15 has been deemed the FAVOURABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 16 has been deemed the REJECTED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 27 has been deemed the ACCEPTABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 28 has been deemed the PREFERRED option within this design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	**FAVOURABLE**	**REJECTED**	**ACCEPTABLE**	**PREFERRED**

				JUNCK	JUNCK	JUNCK	JUNCK	JUNCK	JUNCK
				Direct	Direct	Indirect	Direct	Direct	Indirect
			'DO NOTHING' BASELINE	R27_A_S_O1	R27_A_S_O2	R27_A_S_O4	R27_A_S_O7	R27_A_S_O8	R27_A_S_O9
			For arrivals from the south, the 'do nothing' scenario for in terms of today's operation is based around the existing PIGOT Hold. A modal track has been derived to provide an accurate representation of what occurs today. The 'do nothing' scenario for arrivals consists of modal tracks that have been created based upon current operations where most arrivals are radar vectored by air traffic controllers from the Hold to the Final Approach Fix (FAF). In addition to the modal track, a polygon has also been created that represents an area where current operations and approaches are dispersed due to radar vectoring and potentially may affect people on the ground. All data is based on current aircraft performance data. The overflight analysis conducted on this transition was based on the modal track created using Noise and Track Keeping data from an altitude of 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the start of the modal track to the Arrival end (Touchdown point) of the Runway.	The IAF for this option is JUNCK and the style of the route is 'direct' which means the distance to the final approach has been minimised. The option starts at IAF JUNCK, southwest of Leicester and initially tracks north following the M1 motorway over west Leicester before turning right to head north-east over north west Leicester, Rothley and Sileby. It turns left to head north and parallel the A46 just north of Seagrave to the east of Loughborough, before turning left to join the extended runway centreline north east of the Wymeswold solar farm. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 2.77° which is close to the optimum range for low noise approaches and is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is JUNCK and the style of the route is 'direct' which means the distance to the final approach has been minimised. It follows a similar route to Option 1 but routes further east before joining the final approach. The option starts at IAF JUNCK, southwest of Leicester and initially tracks north following the M1 motorway over west Leicester before turning right to head north-east over north west Leicester, and north west of Syston. To the west of Melton Mowbray the route turns north before turning left to join the extended runway centreline close to Upper Broughton. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (6.3nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 2.23° which is close to the optimum range for low noise approaches and is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is JUNCK and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. It follows a similar profile to Option 3 but routes further east before joining the final approach. The option starts at IAF JUNCK, southwest of Leicester and initially follows the line of the M1 over Leicester Forest East services before turning north to pass the eastern edge of Coalville. To the south-west of Shepshed the route turns east passing over Shepshed and central Loughborough and it continues on this track until west of Melton Mowbray where it turns left and then left again to join the extended runway centreline close to Upper Broughton. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (6.3nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 1.53° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is JUNCK and the style of the route is 'direct' which means the distance to the final approach has been minimised. The option starts at IAF JUNCK, southwest of Leicester and initially tracks north east over central Leicester and Syston. Just north of Syston the route turns north and continues on this heading over the A46 before turning left to join the extended runway centreline north east of the Wymeswold solar farm. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 2.78° which is close to the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is JUNCK and the style of the route is 'direct' which means the distance to the final approach has been minimised. It follows the same route as Option 7 but routes further east before joining the final approach. The option starts at IAF JUNCK, southwest of Leicester and initially tracks north east over central Leicester and Syston. It continues on this heading until a point to the west of Melton Mowbray where the route turns north before turning left to join the extended runway centreline close to Upper Broughton. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (6.3nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 2.33° which is within the optimum range for low noise approaches and is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is JUNCK and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. The option starts at IAF JUNCK, southwest of Leicester and follows the line of the M1 north, turning slightly right to the west of Ratby to remain east of Coalville. To the north-east of the M1 Junction 22 the route turns north-east, passing south of Loughborough and over Barrow upon Soar and continues on this track until just north of Seagrave to the east of Loughborough. Here it turns left and then left again to join the extended runway centreline north east of the Wymeswold solar farm. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 2.25° which is close to the optimum range for low noise approaches and is within the acceptable range for CDAs defined within ICAO guidance.
Group	**Impact**	**Level of Analysis**	**Runway 27**	**Runway 27**	**Runway 27**	**Runway 27**	**Runway 27**	**Runway 27**	**Runway 27**
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes in the IOA, in terms of potential noise impact, initial quantitive analysis has identified that the PIGOT 'do nothing' scenario for Runway 27 is estimated to overfly: From 7,000ft: is estimated to overfly approximately 166,150 households with an approximate population of 355,300. Taking account of 19,250 planned property developments, this option is estimated to overfly and impact a total population of 396,400. From 4,000ft: is estimated to overfly approximately 3,100 households with an approximate population of 6,200. Taking account of 1,750 planned property developments, this option is estimated to overfly and impact a total population of 9,700.	From 7,000ft, this option is estimated to overfly approximately 41,450 households with an approximate population of 78,500. Taking account of 11,500 planned property developments, this option is estimated to overfly and impact a total population of 100,300. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 1,650 households with an approximate population of 3,300. Taking account of 1,600 planned property developments, this option is estimated to overfly and impact a total population of 6,500. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 42,250 households with an approximate population of 80,600. Taking account of 8,650 planned property developments, this option is estimated to overfly and impact a total population of 97,100. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 1,450 households with an approximate population of 2,900. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 2,900. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 55,300 households with an approximate population of 113,200. Taking account of 10,300 planned property developments, this option is estimated to overfly and impact a total population of 134,300. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 4,550 households with an approximate population of 8,300. Taking account of 1,500 planned property developments, this option is estimated to overfly and impact a total population of 11,000. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 78,350 households with an approximate population of 168,000. Taking account of 5,950 planned property developments, this option is estimated to overfly and impact a total population of 180,700. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 1,500 households with an approximate population of 3,000. Taking account of 1,600 planned property developments, this option is estimated to overfly and impact a total population of 6,200. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 79,950 households with an approximate population of 171,500. Taking account of 4,600 planned property developments, this option is estimated to overfly and impact a total population of 181,300. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 1,450 households with an approximate population of 2,800. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 2,800. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 25,750 households with an approximate population of 48,100. Taking account of 8,750 planned property developments, this option is estimated to overfly and impact a total population of 64,500. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 5,400 households with an approximate population of 10,100. Taking account of 1,550 planned property developments, this option is estimated to overfly and impact a total population of 13,000. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to EMA. In terms of AQMAs, the PIGOT 'do nothing' scenario overflies 4 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies five AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be of dis-benefit as it overflies more AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies five AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be of dis-benefit as it overflies more AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies seven AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be of dis-benefit as it overflies more AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies five AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be of dis-benefit as it overflies more AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies five AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be of dis-benefit as it overflies more AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies four AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival options do not facilitate continuous descent approaches to EMA from 7,000ft. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring. Existing procedures do not support optimal aircraft performance and therefore are predicated to have greater environmental impact compared to the proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn or emissions analysis; this will be conducted in Stage 3. In order to make a comparison, track mileage is used as a proxy using the theory that the shorter the track mileage, the less greenhouse gases are emitted. With regards to the 'do nothing' scenario track lengths, the PIGOT 27 'do nothing' scenario track is 52.68km (28.44nm) long.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 45.81 km (24.73 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a reduction in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 53.29 km (28.78 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 71.30 km (38.50 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 45.60 km (24.62 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a reduction in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 51.66 km (27.89 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a reduction in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 53.13 km (28.69 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Retaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be adversely affected due to the requirement to adopt PBN procedures.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario does not overfly any AONBs or National Parks.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. 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The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for arrivals do not facilitate continuous descent operations. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length is 52.68km (28.44nm).	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 45.81 km (24.73 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 53.29 km (28.78 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 71.30 km (38.50 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 45.60 km (24.62 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 51.66 km (27.89 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 53.13 km (28.69 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids, aircraft arriving at EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	A hazard relating to arrivals from the south was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a southerly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a southerly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a southerly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a southerly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a southerly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a southerly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
		Summary of Analysis	The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation. The existing arrival arrangements do not enable continuous descent operations from 7,000ft, which could lead to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. It is acknowledged that ATCO workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Air Quality Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Greenhouse gas emissions - Fuel burn Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn - Air Quality Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact from 4,000ft - Greenhouse gas emissions - Fuel burn - Air Quality Better in the following areas: - Noise impact from 7,000ft Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	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When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact from 4,000ft - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 7,000ft Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option O1 has been deemed the FAVOURABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option O2 has been deemed the PREFERRED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option O4 has been deemed the ACCEPTABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option O7 has been deemed the REJECTED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option O8 has been deemed the REJECTED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option O9 has been deemed the REJECTED option within this design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	**FAVOURABLE**	**PREFERRED**	**ACCEPTABLE**	**REJECTED**	**REJECTED**	**REJECTED**

				EYEHO	EYEHO	EYEHO	EYEHO
				Indirect	Indirect	Direct	Direct
			'DO NOTHING' BASELINE	R27_A_S_O13	R27_A_S_O14	R27_A_S_O21	R27_A_S_O22
			For arrivals from the south, the 'do nothing' scenario for in terms of today's operation is based around the existing PIGOT Hold. A modal track has been derived to provide an accurate representation of what occurs today. The 'do nothing' scenario for arrivals consists of modal tracks that have been created based upon current operations where most arrivals are radar vectored by air traffic controllers from the Hold to the Final Approach Fix (FAF). In addition to the modal track, a polygon has also been created that represents an area where current operations and approaches are dispersed due to radar vectoring and potentially may affect people on the ground. All data is based on current aircraft performance data. The overflight analysis conducted on this transition was based on the modal track created using Noise and Track Keeping data from an altitude of 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the start of the modal track to the Arrival end (Touchdown point) of the Runway.	The IAF for this option is EYEHO and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. This option starts at IAF EYEHO, south east of Hinkley from where it routes east to remain south of Leicester. At a point south of Leicester Airport it turns left to head north to by-pass Leicester and Syston to the east. It continues on this heading over the A46 before turning left to join the extended runway centreline north east of the Wymeswold solar farm. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 1.72° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is EYEHO and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. It follows the same route as Option 13 initially but routes further east after the turn north at Leicester Airport. This option starts at IAF EYEHO, south east of Hinkley from where it routes east to remain south of Leicester. At a point south of Leicester Airport it turns left to head north to by-pass Leicester and Syston to the east and passing close to Gaddesby and Hoby before turning left to join the extended runway centreline close to Upper Broughton. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (6.3nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 1.57° which is below the optimum range for low noise approaches but is within the	The IAF for this option is EYEHO and the style of the route is 'direct' which means the distance to the final approach has been minimised. This option starts at IAF EYEHO, south east of Hinkley from where it heads north initially until Desford where the route turns right to head north east passing over the M1 at Groby and remaining north of Leicester and south of Loughborough. It continues on this track until just north of Seagrave to the east of Loughborough where it turns left and then left again to join the extended runway centreline north east of the Wymeswold solar farm. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 2.13° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is EYEHO and the style of the route is 'direct' which means the distance to the final approach has been minimised. It follows the same route as Option 21 initially but routes further east before joining the final approach. This option starts at IAF EYEHO, south east of Hinkley from where it heads north initially until east of Desford where the route turns right to head north east passing over the M1 at Groby and remaining north of Leicester and south of Loughborough. It continues on this heading until Mountsorrel where it makes a slight right turn and heads to a point to the west of Melton Mowbray where the route turns north. It turns left to join the extended runway centreline close to Upper Broughton. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (6.3nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 1.79° which is below the optimum range for low noise approaches but is within the
Group	**Impact**	**Level of Analysis**	**Runway 27**	**Runway 27**	**Runway 27**	**Runway 27**	**Runway 27**
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes in the IOA, in terms of potential noise impact, initial quantitive analysis has identified that the PIGOT 'do nothing' scenario for Runway 27 is estimated to overfly: From 7,000ft: is estimated to overfly approximately 166,150 households with an approximate population of 355,300. Taking account of 19,250 planned property developments, this option is estimated to overfly and impact a total population of 396,400. From 4,000ft: is estimated to overfly approximately 3,100 households with an approximate population of 6,200. Taking account of 1,750 planned property developments, this option is estimated to overfly and impact a total population of 9,700.	From 7,000ft, this option is estimated to overfly approximately 19,150 households with an approximate population of 36,200. Taking account of 4,600 planned property developments, this option is estimated to overfly and impact a total population of 44,900. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 3,500 households with an approximate population of 6,900. Taking account of 2,200 planned property developments, this option is estimated to overfly and impact a total population of 11,200. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 17,100 households with an approximate population of 32,100. Taking account of 1,950 planned property developments, this option is estimated to overfly and impact a total population of 35,700. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 1,100 households with an approximate population of 2,200. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 2,200. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 23,250 households with an approximate population of 43,100. Taking account of 4,500 planned property developments, this option is estimated to overfly and impact a total population of 51,400. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 7,850 households with an approximate population of 14,800. Taking account of 1,950 planned property developments, this option is estimated to overfly and impact a total population of 18,500. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 23,300 households with an approximate population of 43,700. Taking account of 3,300 planned property developments, this option is estimated to overfly and impact a total population of 49,900. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 2,450 households with an approximate population of 4,700. Taking account of 650 planned property developments, this option is estimated to overfly and impact a total population of 6,000. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to EMA. In terms of AQMAs, the PIGOT 'do nothing' scenario overflies 4 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival options do not facilitate continuous descent approaches to EMA from 7,000ft. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring. Existing procedures do not support optimal aircraft performance and therefore are predicated to have greater environmental impact compared to the proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn or emissions analysis; this will be conducted in Stage 3. In order to make a comparison, track mileage is used as a proxy using the theory that the shorter the track mileage, the less greenhouse gases are emitted. With regards to the 'do nothing' scenario track lengths, the PIGOT 27 'do nothing' scenario track is 52.68km (28.44nm) long.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 64.94 km (35.07 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 69.88 km (37.73 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 55.33 km (29.87 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 63.09 km (34.07 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Retaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be adversely affected due to the requirement to adopt PBN procedures.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario does not overfly any AONBs or National Parks.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for arrivals do not facilitate continuous descent operations. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length is 52.68km (28.44nm).	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 64.94 km (35.07 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 69.88 km (37.73 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 55.33 km (29.87 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 63.09 km (34.07 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids, aircraft arriving at EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	A hazard relating to arrivals from the south was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a southerly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a southerly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a southerly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a southerly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
Summary of Analysis			The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation. The existing arrival arrangements do not enable continuous descent operations from 7,000ft, which could lead to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. It is acknowledged that ATCO workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact from 4,000ft - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact from 4,000ft - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option 13 has been deemed the ACCEPTABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 14 has been deemed the PREFERRED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 21 has been deemed the REJECTED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 22 has been deemed the FAVOURABLE option within this design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	**ACCEPTABLE**	**PREFERRED**	**REJECTED**	**FAVOURABLE**

				LEICE	LEICE	LEICE	LEICE	LEICE	LEICE
				Indirect	Indirect	Indirect	Indirect	Direct	Direct
			'DO NOTHING' BASELINE	R27_A_S_O5	R27_A_S_O6	R27_A_S_O11	R27_A_S_O12	R27_A_S_O23	R27_A_S_O24
			For arrivals from the south, the 'do nothing' scenario for in terms of today's operation is based around the existing PIGOT Hold. A modal track has been derived to provide an accurate representation of what occurs today. The 'do nothing' scenario for arrivals consists of modal tracks that have been created based upon current operations where most arrivals are radar vectored by air traffic controllers from the Hold to the Final Approach Fix (FAF). In addition to the modal track, a polygon has also been created that represents an area where current operations and approaches are dispersed due to radar vectoring and potentially may affect people on the ground. All data is based on current aircraft performance data. The overflight analysis conducted on this transition was based on the modal track created using Noise and Track Keeping data from an altitude of 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the start of the modal track to the Arrival end (Touchdown point) of the Runway.	The IAF for this option is LEICE and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. This option starts at IAF LEICE, near the King Power Stadium from where it initially tracks north-west to pass just east of Groby where it turns to a north-east heading passing over Mountsorrel. It continues on this track until just north of Seagrave to the east of Loughborough, where it turns left and then left again to join the extended runway centreline north east of the Wymeswold solar farm. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 2.78° which is close to the optimum range for low noise approaches and is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is LEICE and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. It follows a similar profile to Option 5 but routes further east before joining the final approach. This option starts at IAF LEICE, near the King Power Stadium and initially tracks north-west to pass over Anstey where it turns right to a north-east heading and follows a line just north of the Leicester western bypass. It continues on this heading, passing between Syston and Mountsorrel and to the west of Melton Mowbray the route turns north before turning left to join the extended runway centreline close to Upper Broughton. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (6.3nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 2.29° which is within the optimum range for low noise approaches and is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is LEICE and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. The option starts at IAF LEICE, near the King Power Stadium and initially heads north-west before turning slightly right to head north to remain east of Coalville. To the north-east of the M1 Junction 22 the route turns north-east, passing south of Loughborough and over Barrow upon Soar and continues on this track until just north of Seagrave to the east of Loughborough. Here it turns left and then left again to join the extended runway centreline north east of the Wymeswold solar farm. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 2.25° which is close to the optimum range for low noise approaches and is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is LEICE and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. It follows the same route as Option 11 initially but routes further east before joining the final approach. The option starts at IAF LEICE, near the King Power Stadium and initially heads north-west before turning slightly right to head north to remain east of Coalville. To the north-east of the M1 Junction 22 the route turns north-east, passing south of Loughborough and over Barrow upon Soar. It continues on this heading until a point to the west of Melton Mowbray where the route turns north before turning left to join the extended runway centreline close to Upper Broughton. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (6.3nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 1.84° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is LEICE and the style of the route is 'direct' which means the distance to the final approach has been minimised. This option starts at IAF LEICE, near the King Power Stadium from where the route heads north east over central Leicester. At Syston the route turns slightly left to head north and continues on this track until just north of Seagrave to the east of Loughborough where it turns slightly left and then left again to join the extended runway centreline north east of the Wymeswold solar farm. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 3.22° which is above the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is LEICE and the style of the route is 'direct' which means the distance to the final approach has been minimised. This option starts at IAF LEICE, near the King Power Stadium from where the route heads north east over central Leicester. It continues on this track until a point to the west of Melton Mowbray where the route turns north. It turns left to join the extended runway centreline close to Upper Broughton. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (6.3nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 2.61° which is within the optimum range for low noise approaches and is within the acceptable range for CDAs defined within ICAO guidance.
Group	**Impact**	**Level of Analysis**	**Runway 27**	**Runway 27**	**Runway 27**	**Runway 27**	**Runway 27**	**Runway 27**	**Runway 27**
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes in the IOA, in terms of potential noise impact, initial quantitive analysis has identified that the PIGOT 'do nothing' scenario for Runway 27 is estimated to overfly: From 7,000ft: is estimated to overfly approximately 166,150 households with an approximate population of 355,300. Taking account of 19,250 planned property developments, this option is estimated to overfly and impact a total population of 396,400. From 4,000ft: is estimated to overfly approximately 3,100 households with an approximate population of 6,200. Taking account of 1,750 planned property developments, this option is estimated to overfly and impact a total population of 9,700.	From 7,000ft, this option is estimated to overfly approximately 54,250 households with an approximate population of 110,500. Taking account of 3,500 planned property developments, this option is estimated to overfly and impact a total population of 117,700. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 1,650 households with an approximate population of 3,300. Taking account of 1,600 planned property developments, this option is estimated to overfly and impact a total population of 6,500. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 54,600 households with an approximate population of 112,300. Taking account of 4,550 planned property developments, this option is estimated to overfly and impact a total population of 121,700. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 1,400 households with an approximate population of 2,800. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 2,800. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 50,300 households with an approximate population of 103,500. Taking account of 5,550 planned property developments, this option is estimated to overfly and impact a total population of 114,900. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 5,350 households with an approximate population of 10,000. Taking account of 1,550 planned property developments, this option is estimated to overfly and impact a total population of 12,900. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 49,800 households with an approximate population of 102,500. Taking account of 4,150 planned property developments, this option is estimated to overfly and impact a total population of 111,000. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 1,300 households with an approximate population of 2,600. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 2,600. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 75,750 households with an approximate population of 168,800. Taking account of 5,950 planned property developments, this option is estimated to overfly and impact a total population of 182,100. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 1,650 households with an approximate population of 3,300. Taking account of 1,600 planned property developments, this option is estimated to overfly and impact a total population of 6,500. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 78,300 households with an approximate population of 174,100. Taking account of 4,950 planned property developments, this option is estimated to overfly and impact a total population of 185,100. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 1,600 households with an approximate population of 3,200. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 3,200. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to EMA. In terms of AQMAs, the PIGOT 'do nothing' scenario overflies 4 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies four AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies three AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies four AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies three AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies three AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival options do not facilitate continuous descent approaches to EMA from 7,000ft. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring. Existing procedures do not support optimal aircraft performance and therefore are predicated to have greater environmental impact compared to the proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn or emissions analysis; this will be conducted in Stage 3. In order to make a comparison, track mileage is used as a proxy using the theory that the shorter the track mileage, the less greenhouse gases are emitted. With regards to the 'do nothing' scenario track lengths, the PIGOT 27 'do nothing' scenario track is 52.68km (28.44nm) long.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 45.66 km (24.66 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a reduction in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 52.34 km (28.26 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a reduction in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 53.11 km (28.68 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 61.82 km (33.38 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 41.38 km (22.34 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a reduction in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 47.71 km (25.76 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a reduction in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Retaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be adversely affected due to the requirement to adopt PBN procedures.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario does not overfly any AONBs or National Parks.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for arrivals do not facilitate continuous descent operations. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length is 52.68km (28.44nm).	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 45.66 km (24.66 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 52.34 km (28.26 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 53.11 km (28.68 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 61.82 km (33.38 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 41.38 km (22.34 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 47.71 km (25.76 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids, aircraft arriving at EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	A hazard relating to arrivals from the south was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a southerly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a southerly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a southerly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a southerly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a southerly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a southerly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
		Summary of Analysis	The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation. The existing arrival arrangements do not enable continuous descent operations from 7,000ft, which could lead to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. It is acknowledged that ATCO workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Greenhouse gas emissions - Fuel burn Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Greenhouse gas emissions - Fuel burn - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact from 4,000ft - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Greenhouse gas emissions - Fuel burn - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Greenhouse gas emissions - Fuel burn - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option O5 has been deemed the ACCEPTABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option O6 has been deemed the FAVOURABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 11 has been deemed the REJECTED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 12 has been deemed the PREFERRED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 23 has been deemed the REJECTED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 24 has been deemed the ALTERNATE option within this design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	**ACCEPTABLE**	**FAVOURABLE**	**REJECTED**	**PREFERRED**	**REJECTED**	**ALTERNATE**

				STAPL	STAPL	STAPL	STAPL
				Direct	Direct	Indirect	Indirect
			'DO NOTHING' BASELINE	R27_A_S_O15	R27_A_S_O16	R27_A_S_O19	R27_A_S_O20
			For arrivals from the south, the 'do nothing' scenario for in terms of today's operation is based around the existing PIGOT Hold. A modal track has been derived to provide an accurate representation of what occurs today. The 'do nothing' scenario for arrivals consists of modal tracks that have been created based upon current operations where most arrivals are radar vectored by air traffic controllers from the Hold to the Final Approach Fix (FAF). In addition to the modal track, a polygon has also been created that represents an area where current operations and approaches are dispersed due to radar vectoring and potentially may affect people on the ground. All data is based on current aircraft performance data. The overflight analysis conducted on this transition was based on the modal track created using Noise and Track Keeping data from an altitude of 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the start of the modal track to the Arrival end (Touchdown point) of the Runway.	The IAF for this option is STAPL and the style of the route is 'direct' which means the distance to the final approach has been minimised. This option starts at IAF STAPL at Stapleton north of Hinkley from where the route tracks north east passing over the M1 at Groby and remaining north of Leicester and south of Loughborough. It continues on this track until just north of Seagrave to the east of Loughborough where it turns left and then left again to join the extended runway centreline north east of the Wymeswold solar farm. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 2.32° which is within the optimum range for low noise approaches and is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is STAPL and the style of the route is 'direct' which means the distance to the final approach has been minimised. It follows the same route as Option 15 initially but routes further east after Mountsorrel before joining the final approach. The option starts at IAF STAPL at Stapleton north of Hinkley from where the route tracks north east passing over the M1 at Groby and remaining north of Leicester and south of Loughborough. It continues on this heading until Mountsorrel where it makes a slight right turn and heads to a point to the west of Melton Mowbray where the route turns north. It turns left to join the extended runway centreline close to Upper Broughton. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (6.3nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 1.91° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is STAPL and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. The option starts at IAF STAPL at Stapleton north of Hinkley from where it routes east to pass over the southern edge of Leicester. At a point south of Leicester Airport it turns left to head north to by-pass Leicester and Syston to the east. It continues on this heading over the A46 before turning left to join the extended runway centreline north east of the Wymeswold solar farm. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 1.68° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is STAPL and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. It follows the same route as Option 19 initially but routes further east after the turn north at Leicester Airport. The option starts at IAF STAPL at Stapleton north of Hinkley from where it routes east to pass over the southern edge of Leicester. At a point south of Leicester Airport it turns left to head north to by-pass Leicester and Syston to the east and passing close to Gaddesby and Hoby before turning left to join the extended runway centreline close to Upper Broughton. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (6.3nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 27 approaches. The descent gradient to the FAF is 1.51° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.
Group	Impact	Level of Analysis	Runway 27	Runway 27	Runway 27	Runway 27	Runway 27
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes in the IOA, in terms of potential noise impact, initial quantitive analysis has identified that the PIGOT 'do nothing' scenario for Runway 27 is estimated to overfly: From 7,000ft: is estimated to overfly approximately 166,150 households with an approximate population of 355,300. Taking account of 19,250 planned property developments, this option is estimated to overfly and impact a total population of 396,400. From 4,000ft: is estimated to overfly approximately 3,100 households with an approximate population of 6,200. Taking account of 1,750 planned property developments, this option is estimated to overfly and impact a total population of 9,700.	From 7,000ft, this option is estimated to overfly approximately 20,400 households with an approximate population of 38,100. Taking account of 4,200 planned property developments, this option is estimated to overfly and impact a total population of 46,000. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 4,200 households with an approximate population of 7,900. Taking account of 1,800 planned property developments, this option is estimated to overfly and impact a total population of 11,300. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 22,000 households with an approximate population of 41,300. Taking account of 3,100 planned property developments, this option is estimated to overfly and impact a total population of 47,100. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 1,200 households with an approximate population of 2,300. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 2,300. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 40,050 households with an approximate population of 75,600. Taking account of 6,350 planned property developments, this option is estimated to overfly and impact a total population of 87,600. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 3,550 households with an approximate population of 6,900. Taking account of 2,250 planned property developments, this option is estimated to overfly and impact a total population of 11,300. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 38,000 households with an approximate population of 71,000. Taking account of 3,850 planned property developments, this option is estimated to overfly and impact a total population of 78,200. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 1,050 households with an approximate population of 2,000. Taking account of 0 planned property developments, this option is estimated to overfly and impact a total population of 2,000. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to EMA. In terms of AQMAs, the PIGOT 'do nothing' scenario overflies 4 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival options do not facilitate continuous descent approaches to EMA from 7,000ft. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring. Existing procedures do not support optimal aircraft performance and therefore are predicated to have greater environmental impact compared to the proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn or emissions analysis; this will be conducted in Stage 3. In order to make a comparison, track mileage is used as a proxy using the theory that the shorter the track mileage, the less greenhouse gases are emitted. With regards to the 'do nothing' scenario track lengths, the PIGOT 27 'do nothing' scenario track is 52.68km (28.44nm) long.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 51.96 km (28.05 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a reduction in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 60.07 km (32.43 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 66.12 km (35.70 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 72.17 km (38.97 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Retaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be adversely affected due to the requirement to adopt PBN procedures.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario does not overfly any AONBs or National Parks.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for arrivals do not facilitate continuous descent operations. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length is 52.68km (28.44nm).	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 51.96 km (28.05 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 60.07 km (32.43 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 66.12 km (35.70 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 72.17 km (38.97 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids, aircraft arriving at EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	A hazard relating to arrivals from the south was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a southerly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a southerly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a southerly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for loss of horizontal and/or vertical separation between arriving aircraft conflicting with aircraft departing from EMA in a southerly direction. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
Summary of Analysis			The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation. The existing arrival arrangements do not enable continuous descent operations from 7,000ft, which could lead to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. It is acknowledged that ATCO workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact from 4,000ft Better in the following areas: - Noise impact from 7,000ft - Greenhouse gas emissions - Fuel burn - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact from 4,000ft - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option 15 has been deemed the ACCEPTABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 16 has been deemed the FAVOURABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 19 has been deemed the REJECTED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 20 has been deemed the PREFERRED option within this design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	ACCEPTABLE	FAVOURABLE	REJECTED	PREFERRED

Group	Impact	Level of Analysis	'DO NOTHING' BASELINE	ROKUP Direct R09 A N O1	ROKUP Direct R09 A N O2	ROKUP Indirect R09 A N O3	ROKUP Indirect R09 A N O4	ROKUP Direct R09 A N O4A
			For arrivals from the north, the 'do nothing' scenario in terms of today's operation is based around the existing ROKUP Hold. A modal track has been derived to provide an accurate representation of what occurs today. The 'do nothing' scenario for arrivals consists of modal tracks that have been created based upon current operations where most arrivals are radar vectored by air traffic controllers from the Hold to the Final Approach Fix (FAF). In addition to the modal track, a polygon has also been created that represents an area where current operations and approaches are dispersed due to radar vectoring and potentially may affect people on the ground. The overflight analysis conducted on this transition was based on the modal track created using Noise and Track Keeping data from an altitude of 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the start of the modal track to the Arrival end (Touchdown point) of the runway.	This option starts at IAF ROKUP which is the hold currently used for arrivals from the north. The style of the route is 'direct' which means the distance to the final approach has been minimised. The option starts at IAF ROKUP which is situated to the south west of Belper and the route initially tracks south-west turning to a southerly heading just north of the A52 and passing west of Derby. The route turns to join the extended runway centreline east of Burton upon Trent. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 3.45° which is above the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	Option 2 starts at IAF ROKUP which is the hold currently used for arrivals from the north. The style of the route is 'direct' which means the distance to the final approach has been minimised. It is similar to Option 1 but has a longer final approach. The option starts at IAF ROKUP which is situated to the south west of Belper and the route tracks west of Derby before turning onto a southerly heading just north of Hatton before turning to join the extended runway centreline and over flying Burton upon Trent. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (6.9nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 2.7° which is within the optimum range for low noise approaches and the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is ROKUP and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. The option starts at IAF ROKUP which is situated to the south west of Belper and the route tracks south-east between Derby and Nottingham, turning south over West Hallam, before turning west between Derby and Long Eaton. To the south-west of Derby the route turns south before turning to join the extended runway centreline east of Burton upon Trent. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 1.96° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is ROKUP and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. It is similar to Option 3 but has a longer final approach. The option starts at IAF ROKUP which is situated to the south west of Belper and the route tracks south-east between Derby and Nottingham, turning south to the west of Stapleford, before turning west between Derby and Long Eaton. To the north of Burton upon Trent and Hatton the route turns south before turning to join the extended runway centreline and over flying Burton upon Trent. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (6.9nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 1.57° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is ROKUP and the style of the route is 'direct' which means the distance to the final approach has been minimised. This option has an IF at 2,500ft which is at a point 5nm from the FAF, thereby falling mid-way between the 3.85nm and 6.9nm utilised by other arrival options to Runway 09 from the North. The option starts at IAF ROKUP which is situated to the south west of Belper and the route tracks south-west from ROKUP before turning onto a southerly heading as the track crosses the A52 mid-way between Ashbourne and Derby. The option routes directly south, over Hilton, and turns to join the extended runway centreline at a point north-east of Burton upon Trent. This RNAV 1 arrival connects the IAF to the IF, at 2,500ft, which is placed as close as possible to the FAF (5nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 3.06° which is above the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.
Group	Impact	Level of Analysis	Runway 09	Runway 09	Runway 09	Runway 09	Runway 09	Runway 09
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes in the IOA, in terms of potential noise impact, initial quantitive analysis has identified that the ROKUP 'do nothing' scenario for Runway 09 is estimated to overfly: From 7,000ft: is estimated to overfly approximately 87,200 households with an approximate population of 166,500. Taking account of 11,100 planned property developments, this option is estimated to overfly and impact a total population of 187,700. From 4,000ft: is estimated to overfly approximately 18,250 households with an approximate population of 33,900. Taking account of 4,500 planned property developments, this option is estimated to overfly and impact a total population of 42,300.	From 7,000ft, this option is estimated to overfly approximately 3,700 households with an approximate population of 6,900. Taking account of 300 planned property developments, this option is estimated to overfly and impact a total population of 7,400. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 2,500 households with an approximate population of 4,600. Taking account of 300 planned property developments, this option is estimated to overfly and impact a total population of 5,200. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 12,500 households with an approximate population of 22,500. Taking account of 2,400 planned property developments, this option is estimated to overfly and impact a total population of 26,800. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 11,300 households with an approximate population of 20,200. Taking account of 2,150 planned property developments, this option is estimated to overfly and impact a total population of 24,100. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 38,050 households with an approximate population of 71,200. Taking account of 4,700 planned property developments, this option is estimated to overfly and impact a total population of 80,000. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 21,550 households with an approximate population of 41,000. Taking account of 2,550 planned property developments, this option is estimated to overfly and impact a total population of 45,800. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 45,850 households with an approximate population of 85,600. Taking account of 7,050 planned property developments, this option is estimated to overfly and impact a total population of 98,700. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 14,000 households with an approximate population of 26,400. Taking account of 4,250 planned property developments, this option is estimated to overfly and impact a total population of 34,400. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 8,050 households with an approximate population of 15,100. Taking account of 1,250 planned property developments, this option is estimated to overfly and impact a total population of 17,400. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 6,700 households with an approximate population of 12,500. Taking account of 1,250 planned property developments, this option is estimated to overfly and impact a total population of 14,900. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to EMA. In terms of AQMAs, the ROKUP 'do nothing' scenario overflies 3 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival options do not facilitate continuous descent approaches to EMA from 7,000ft. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring. Existing procedures do not support optimal aircraft performance and therefore are predicated to have greater environmental impact compared to the proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn or emissions analysis; this will be conducted in Stage 3. In order to make a comparison, track mileage is used as a proxy using the theory that the shorter the track mileage, the less greenhouse gases are emitted. With regards to the 'do nothing' scenario track lengths, the ROKUP 09 'do nothing' scenario track is 37.64km (20.33nm) long.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 39.59 km (21.38 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 46.59 km (25.16 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 58.86 km (31.78 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 69.67 km (37.62 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 43.04 km (23.24 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Retaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be adversely affected, following the removal of the TNT DVOR and the requirement to adopt PBN procedures.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario does not overfly any AONBs or National Parks.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for arrivals do not facilitate continuous descent operations. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length is 37.64km (20.33nm).	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 39.59 km (21.38 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 46.59 km (25.16 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 58.86 km (31.78 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 69.67 km (37.62 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 43.04 km (23.24 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids, aircraft arriving at EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
		Summary of Analysis	The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation. The existing arrival arrangements do not enable continuous descent operations from 7,000ft, which could lead to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. It is acknowledged that ATCO workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact from 4,000ft - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option 01 has been deemed the PREFERRED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 02 has been deemed the ACCEPTABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 03 has been deemed the REJECTED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 04 has been deemed the ALTERNATE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 4A has been deemed the FAVOURABLE option within this design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	PREFERRED	ACCEPTABLE	REJECTED	ALTERNATE	FAVOURABLE

				DIPSO	DIPSO	DIPSO	DIPSO	DIPSO	DIPSO	DIPSO
				Indirect	Indirect	Direct	Direct	Direct	Indirect	Indirect
			'DO NOTHING' BASELINE	R09_A_N_O5	R09_A_N_O6	R09_A_N_O7	R09_A_N_O8	R09_A_N_O8A	R09_A_N_O29	R09_A_N_O30
			For arrivals from the north, the 'do nothing' scenario in terms of today's operation is based around the existing ROKUP Hold. A modal track has been derived to provide an accurate representation of what occurs today. The 'do nothing' scenario for arrivals consists of modal tracks that have been created based upon current operations where most arrivals are radar vectored by air traffic controllers from the Hold to the Final Approach Fix (FAF). In addition to the modal track, a polygon has also been created that represents an area where current operations and approaches are dispersed due to radar vectoring and potentially may affect people on the ground. The overflight analysis conducted on this transition was based on the modal track created using Noise and Track Keeping data from an altitude of 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the start of the modal track to the Arrival end (Touchdown point) of the runway.	The IAF for this option is DIPSO and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. The option starts at IAF DIPSO which is east of Ripley and tracks south-east towards Nottingham turning south over Hucknall, before turning before turning west parallel to the final approach path at Beeston. It overflies southern Derby and to the south-west of Derby the route turns south before turning to join the extended runway centreline east of Burton upon Trent. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 1.77° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is DIPSO and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. It is similar to Option 5 but has a longer final approach. The option starts at IAF DIPSO which is east of Ripley and tracks south-east towards Nottingham turning south over Hucknall, before turning before turning west parallel to the final approach path at Beeston. It overflies southern Derby and to the north-west of Burton upon Trent it turns south before turning to join the extended runway centreline. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (6.9nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 1.5° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is DIPSO and the style of the route is 'direct' which means the distance to the final approach has been minimised. The option starts at IAF DIPSO which is east of Ripley and tracks south-west avoiding Belper. After passing Duffield it turns south and tracks west of Derby before turning over Etwall onto a southerly heading before turning to join the extended runway centreline east of Burton upon Trent. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 2.56° which is within the optimum range for low noise approaches and the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is DIPSO and the style of the route is 'direct' which means the distance to the final approach has been minimised. It is initially similar to Option 7 but diverges south of Belper to give a longer final approach. The option starts at IAF DIPSO which is east of Ripley and tracks south-west avoiding Belper. It continues on this heading beyond Duffield and until Church Broughton where it turns onto a southerly heading before turning to join the extended runway centreline west of Burton upon Trent. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (6.9nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 2° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is DIPSO and the style of the route is 'direct' which means the distance to the final approach has been minimised. This option has an IF at 2,500ft which is at a point 5nm from the FAF, thereby falling mid-way between the 3.85nm and 6.9nm utilised by other arrival options to Runway 09 from the North. The option starts at IAF DIPSO which is east of Ripley and tracks south west similar to Options 7 and 8, staying to the south-west of Belper before turning onto a southerly heading as the track crosses the A52 mid-way between Ashbourne and Derby. The option routes directly south over Hilton and turns to join the extended runway centreline at a point north-east of Burton upon Trent. This RNAV 1 arrival connects the IAF to the IF, at 2,500ft, which is placed as close as possible to the FAF (5nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 2.16° which is close to the optimum range for low noise approaches and is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is DIPSO and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. This option starts at IAF DIPSO, east of Ripley and initially tracks directly south from the IAF passing over the western side of Langley Mill and between West Hallam and Ilkeston. It continues south until it passes over the A52 near Risley where it turns west to track across the southern suburbs of Derby. It turns south close to Etwall before turning to join the extended runway centreline east of Burton upon Trent. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS-OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for runway 09 approaches. The descent gradient to the FAF is 2.12° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is DIPSO and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. It follows the same track as Option 29 but routes further west before joining the final approach. This option starts at IAF DIPSO, east of Ripley and initially tracks directly south from the IAF passing over the western side of Langley Mill and between West Hallam and Ilkeston. It continues south until it passes over the A52 near Risley where it turns west to track across the southern suburbs of Derby. It continues on this heading until Church Broughton where it turns onto a southerly heading before turning left to join the extended runway centreline west of Burton upon Trent. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (6.9nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 1.66° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.
Group	**Impact**	**Level of Analysis**	**Runway 09**	**Runway 09**	**Runway 09**	**Runway 09**	**Runway 09**	**Runway 09**	**Runway 09**	**Runway 09**
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes in the IOA, in terms of potential noise impact, initial quantitive analysis has identified that the ROKUP 'do nothing' scenario for Runway 09 is estimated to overfly: From 7,000ft: is estimated to overfly approximately 87,200 households with an approximate population of 166,500. Taking account of 11,100 planned property developments, this option is estimated to overfly and impact a total population of 187,700. From 4,000ft: is estimated to overfly approximately 18,250 households with an approximate population of 33,900. Taking account of 4,500 planned property developments, this option is estimated to overfly and impact a total population of 42,300.	From 7,000ft, this option is estimated to overfly approximately 81,300 households with an approximate population of 153,900. Taking account of 2,350 planned property developments, this option is estimated to overfly and impact a total population of 158,300. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 24,250 households with an approximate population of 46,600. Taking account of 1,800 planned property developments, this option is estimated to overfly and impact a total population of 50,100. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 94,950 households with an approximate population of 180,000. Taking account of 4,100 planned property developments, this option is estimated to overfly and impact a total population of 187,800. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect more people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 27,550 households with an approximate population of 54,300. Taking account of 3,350 planned property developments, this option is estimated to overfly and impact a total population of 60,900. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 15,600 households with an approximate population of 29,300. Taking account of 2,600 planned property developments, this option is estimated to overfly and impact a total population of 34,200. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 2,250 households with an approximate population of 4,200. Taking account of 300 planned property developments, this option is estimated to overfly and impact a total population of 4,800. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 20,200 households with an approximate population of 37,300. Taking account of 2,900 planned property developments, this option is estimated to overfly and impact a total population of 42,700. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 6,800 households with an approximate population of 12,300. Taking account of 1,600 planned property developments, this option is estimated to overfly and impact a total population of 15,200. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 20,100 households with an approximate population of 37,600. Taking account of 2,500 planned property developments, this option is estimated to overfly and impact a total population of 42,300. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 6,250 households with an approximate population of 11,700. Taking account of 1,050 planned property developments, this option is estimated to overfly and impact a total population of 13,700. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 45,700 households with an approximate population of 85,800. Taking account of 6,200 planned property developments, this option is estimated to overfly and impact a total population of 97,400. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 15,250 households with an approximate population of 29,400. Taking account of 2,600 planned property developments, this option is estimated to overfly and impact a total population of 34,400. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 57,550 households with an approximate population of 107,300. Taking account of 8,650 planned property developments, this option is estimated to overfly and impact a total population of 123,400. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 11,550 households with an approximate population of 21,100. Taking account of 3,950 planned property developments, this option is estimated to overfly and impact a total population of 28,300. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to EMA. In terms of AQMAs, the ROKUP 'do nothing' scenario overflies 3 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies four AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be of dis-benefit as it overflies more AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival options do not facilitate continuous descent approaches to EMA from 7,000ft. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring. Existing procedures do not support optimal aircraft performance and therefore are predicated to have greater environmental impact compared to the proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn or emissions analysis; this will be conducted in Stage 3. In order to make a comparison, track mileage is used as a proxy using the theory that the shorter the track mileage, the less greenhouse gases are emitted. With regards to the 'do nothing' scenario track lengths, the ROKUP 09 'do nothing' scenario track is 37.64km (20.33nm) long.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 63.59 km (34.34 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 74.97 km (40.48 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 48.39 km (26.13 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 48.19 km (26.02 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 54.98 km (29.69 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 55.39 km (29.91 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 66.91 km (36.13 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Retaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be adversely affected, following the removal of the TNT DVOR and the requirement to adopt PBN procedures.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario does not overfly any AONBs or National Parks.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. 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The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for arrivals do not facilitate continuous descent operations. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length is 37.64km (20.33nm).	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 63.59 km (34.34 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 74.97 km (40.48 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 48.39 km (26.13 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 48.19 km (26.02 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 54.98 km (29.69 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 55.39 km (29.91 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 66.91 km (36.13 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids, aircraft arriving at EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
		Summary of Analysis	The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation. The existing arrival arrangements do not enable continuous descent operations from 7,000ft, which could lead to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. It is acknowledged that ATCO workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact from 4,000ft - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Greenhouse gas emissions - Fuel burn - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option 05 has been deemed the REJECTED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 06 has been deemed the REJECTED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 07 has been deemed the PREFERRED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 08 has been deemed the ACCEPTABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 8A has been deemed the FAVOURABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 29 has been deemed the REJECTED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 30 has been deemed the ALTERNATE option within this design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	REJECTED	REJECTED	PREFERRED	ACCEPTABLE	FAVOURABLE	REJECTED	ALTERNATE

				IAF 1	IAF 1	IAF 1	IAF 1	IAF 1
				Indirect	Indirect	Direct	Direct	Direct
			'DO NOTHING' BASELINE	R09_A_N_O17	R09_A_N_O18	R09_A_N_O19	R09_A_N_O20	R09_A_N_O20A
			For arrivals from the north, the 'do nothing' scenario in terms of today's operation is based around the existing ROKUP Hold. A modal track has been derived to provide an accurate representation of what occurs today. The 'do nothing' scenario for arrivals consists of modal tracks that have been created based upon current operations where most arrivals are radar vectored by air traffic controllers from the Hold to the Final Approach Fix (FAF). In addition to the modal track, a polygon has also been created that represents an area where current operations and approaches are dispersed due to radar vectoring and potentially may affect people on the ground. The overflight analysis conducted on this transition was based on the modal track created using Noise and Track Keeping data from an altitude of 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the start of the modal track to the Arrival end (Touchdown point) of the runway.	The IAF for this option is IAF1 and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. The option starts at IAF1, west of Sutton-in-Ashfield and initially tracks south-east before turning south-west and routing between Heanor and Ripley and south of Belper. North of Duffield the route turns south by south-west and tracks west of Derby before turning over Etwall onto a southerly heading and turning to join the extended runway centreline east of Burton upon Trent. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 2.03° which is below the optimum range for low noise approaches but within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF1 and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. It initially routes on the same track as Option 17 but takes a more westerly track after passing Duffield. The option starts at IAF1, west of Sutton-in-Ashfield and initially tracks south-east before turning south-west and routing between Heanor and Ripley and south of Belper. North of Duffield the route turns slightly south and continues on this heading until Church Broughton where it turns onto a southerly heading before turning left to join the extended runway centreline west of Burton upon Trent. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (6.9nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 1.67° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF1 and the style of the route is 'direct' which means the distance to the final approach has been minimised. The option starts at IAF1, west of Sutton-in-Ashfield and tracks south-west over Alfreton passing north of Ripley and west of Belper. It then turns slightly left onto a south-west heading to route to the west of Derby. The route turns over Etwall onto a southerly heading before turning to join the extended runway centreline east of Burton upon Trent. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 2.17° which is close to the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF1 and the style of the route is 'direct' which means the distance to the final approach has been minimised. It initially routes on the same track as Option 19 but takes a more westerly track after passing Duffield. The option starts at IAF1, west of Sutton-in-Ashfield and tracks south-west over Alfreton passing north of Ripley and west of Belper. It then turns slightly left onto a south-west heading to route north west of Derby and continues on this heading until Church Broughton. Here it turns onto a southerly heading before turning left to join the extended runway centreline west of Burton upon Trent. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (6.9nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 1.79° which is below the optimum range for low noise approaches but within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF1 and the style of the route is 'direct' which means the distance to the final approach has been minimised. This option has an IF at 2,500ft which is at a point 5nm from the FAF, thereby falling between the 3.85nm and 6.9nm utilised by other arrival options to Runway 09 from the North. It initially routes on the same track as Option 20 but the slightly more easterly track helps avoid the overflight of Burton upon Trent. The option starts at IAF1, west of Sutton-in-Ashfield and tracks south-west over Alfreton passing north of Ripley and west of Belper. It then turns slightly left onto a south-west heading to route north west of Derby. Once west of Derby it turns directly south and overflies Hilton before turning left to join the extended runway centreline and passing just north east of Burton upon Trent. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (5nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 2° which is below the optimum range for low noise approaches but within the acceptable range for CDAs defined within ICAO guidance.
Group	**Impact**	**Level of Analysis**	**Runway 09**	**Runway 09**	**Runway 09**	**Runway 09**	**Runway 09**	**Runway 09**
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes in the IOA, in terms of potential noise impact, initial quantitive analysis has identified that the ROKUP 'do nothing' scenario for Runway 09 is estimated to overfly: From 7,000ft: is estimated to overfly approximately 87,200 households with an approximate population of 166,500. Taking account of 11,100 planned property developments, this option is estimated to overfly and impact a total population of 187,700. From 4,000ft: is estimated to overfly approximately 18,250 households with an approximate population of 33,900. Taking account of 4,500 planned property developments, this option is estimated to overfly and impact a total population of 42,300.	From 7,000ft, this option is estimated to overfly approximately 25,150 households with an approximate population of 46,900. Taking account of 2,500 planned property developments, this option is estimated to overfly and impact a total population of 51,500. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 2,150 households with an approximate population of 4,100. Taking account of 1,050 planned property developments, this option is estimated to overfly and impact a total population of 6,100. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 32,900 households with an approximate population of 60,800. Taking account of 3,550 planned property developments, this option is estimated to overfly and impact a total population of 67,300. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 8,950 households with an approximate population of 16,100. Taking account of 2,000 planned property developments, this option is estimated to overfly and impact a total population of 19,700. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 18,750 households with an approximate population of 34,700. Taking account of 2,050 planned property developments, this option is estimated to overfly and impact a total population of 38,500. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 2,300 households with an approximate population of 4,300. Taking account of 300 planned property developments, this option is estimated to overfly and impact a total population of 4,900. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 26,300 households with an approximate population of 48,100. Taking account of 3,800 planned property developments, this option is estimated to overfly and impact a total population of 55,100. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 9,400 households with an approximate population of 16,900. Taking account of 2,050 planned property developments, this option is estimated to overfly and impact a total population of 20,600. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 22,550 households with an approximate population of 41,900. Taking account of 2,750 planned property developments, this option is estimated to overfly and impact a total population of 47,000. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 5,950 households with an approximate population of 11,300. Taking account of 1,050 planned property developments, this option is estimated to overfly and impact a total population of 13,300. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to EMA. In terms of AQMAs, the ROKUP 'do nothing' scenario overflies 3 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival options do not facilitate continuous descent approaches to EMA from 7,000ft. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring. Existing procedures do not support optimal aircraft performance and therefore are predicated to have greater environmental impact compared to the proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn or emissions analysis; this will be conducted in Stage 3. In order to make a comparison, track mileage is used as a proxy using the theory that the shorter the track mileage, the less greenhouse gases are emitted. With regards to the 'do nothing' scenario track lengths, the ROKUP 09 'do nothing' scenario track is 37.64km (20.33nm) long.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 57.58 km (31.09 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 66.64 km (35.98 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 54.39 km (29.37 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 62.91 km (33.97 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 57.83 km (31.22 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Retaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be adversely affected, following the removal of the TNT DVOR and the requirement to adopt PBN procedures.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario does not overfly any AONBs or National Parks.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for arrivals do not facilitate continuous descent operations. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length is 37.64km (20.33nm).	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 57.58 km (31.09 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 66.64 km (35.98 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 54.39 km (29.37 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 62.91 km (33.97 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 57.83 km (31.22 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids, aircraft arriving at EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
		Summary of Analysis	The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation. The existing arrival arrangements do not enable continuous descent operations from 7,000ft, which could lead to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. It is acknowledged that ATCO workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option 17 has been deemed the FAVOURABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 18 has been deemed the REJECTED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 19 has been deemed the PREFERRED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 20 has been deemed the REJECTED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 20A has been deemed the ACCEPTABLE option within this design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	FAVOURABLE	REJECTED	PREFERRED	REJECTED	ACCEPTABLE

				IAF 2 Indirect	IAF 2 Indirect	IAF 2 Direct	IAF 2 Direct	IAF 2 Direct
			'DO NOTHING' BASELINE	R09_A_N_O13	R09_A_N_O14	R09_A_N_O21	R09_A_N_O22	R09_A_N_O22A
			For arrivals from the north, the 'do nothing' scenario in terms of today's operation is based around the existing ROKUP Hold. A modal track has been derived to provide an accurate representation of what occurs today. The 'do nothing' scenario for arrivals consists of modal tracks that have been created based upon current operations where most arrivals are radar vectored by air traffic controllers from the Hold to the Final Approach Fix (FAF). In addition to the modal track, a polygon has also been created that represents an area where current operations and approaches are dispersed due to radar vectoring and potentially may affect people on the ground. The overflight analysis conducted on this transition was based on the modal track created using Noise and Track Keeping data from an altitude of 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the start of the modal track to the Arrival end (Touchdown point) of the runway.	The IAF for this option is IAF2 and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. This option starts at IAF2 near Alfreton and track south towards Heanor prior to turning south by south west to pass north of West Hallam. At the north-east edge of Derby it route turns to a south-west heading and overflies central Derby and once over Etwall it turns left onto a southerly heading before turning to join the extended runway centreline east of Burton upon Trent. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 2.17° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF2 and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. It initially routes on the same track as Option 13 but takes a more westerly track after passing Derby. This option starts at IAF2 near Alfreton and track south towards Heanor prior to turning south by south west to pass north of West Hallam. At the north-east edge of Derby it route turns to a south-west heading and overflies north Derby. It continues on this heading until Church Broughton where it turns onto a southerly heading before turning to join the extended runway centreline west of Burton upon Trent. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (6.9nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 1.71° which is within the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF2 and the style of the route is 'direct' which means the distance to the final approach has been minimised. The option starts at IAF2 near Alfreton and initially follows the line of the A38 south to pass over Ripley and south of Belper where it turns slightly south west to track to the west of Derby. The option turns, over Etwall, onto a southerly heading before turning to join the extended runway centreline east of Burton upon Trent. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 2.46° which is within the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF2 and the style of the route is 'direct' which means the distance to the final approach has been minimised. It initially routes on the same track as Option 21 but takes a more westerly track after passing Duffield. The option starts at IAF2 near Alfreton and initially follows the line of the A38 south to pass over Ripley and south of Belper where it turns slightly south west to track to the west of Derby. It continues on this heading until Church Broughton where it turns onto a southerly heading before turning left to join the extended runway centreline west of Burton upon Trent. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (6.9nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 1.95° which is within the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF2 and the style of the route is 'direct' which means the distance to the final approach has been minimised. This option has an IF at 2,500ft which is at a point 5nm from the FAF, thereby falling between the 3.85nm and 6.9nm utilised by other arrival options to Runway 09 from the North. It initially routes on the same track as Option 22 but the slightly more easterly track helps avoid the overflight of Burton upon Trent. The option starts at IAF2 near Alfreton and initially follows the line of the A38 south to pass over Ripley and south of Belper where it turns slightly south west to track to the west of Derby. It continues on this heading until north of Hilton where it makes a left turn south and overflies Hilton before turning to join the extended runway centreline over north-east Burton upon Trent. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (5nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 2.21° which is close to the optimum range for low noise approaches and is within the acceptable range for CDAs defined within ICAO guidance.
Group	**Impact**	**Level of Analysis**	**Runway 09**	**Runway 09**	**Runway 09**	**Runway 09**	**Runway 09**	**Runway 09**
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes in the IOA, in terms of potential noise impact, initial quantitive analysis has identified that the ROKUP 'do nothing' scenario for Runway 09 is estimated to overfly: From 7,000ft: is estimated to overfly approximately 87,200 households with an approximate population of 166,500. Taking account of 11,100 planned property developments, this option is estimated to overfly and impact a total population of 187,700. From 4,000ft: is estimated to overfly approximately 18,250 households with an approximate population of 33,900. Taking account of 4,500 planned property developments, this option is estimated to overfly and impact a total population of 42,300.	From 7,000ft, this option is estimated to overfly approximately 59,850 households with an approximate population of 111,700. Taking account of 5,950 planned property developments, this option is estimated to overfly and impact a total population of 122,800. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 19,950 households with an approximate population of 38,400. Taking account of 2,300 planned property developments, this option is estimated to overfly and impact a total population of 42,800. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 64,800 households with an approximate population of 120,500. Taking account of 8,900 planned property developments, this option is estimated to overfly and impact a total population of 137,000. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 9,200 households with an approximate population of 16,600. Taking account of 3,700 planned property developments, this option is estimated to overfly and impact a total population of 23,300. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 26,050 households with an approximate population of 47,800. Taking account of 3,250 planned property developments, this option is estimated to overfly and impact a total population of 53,800. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 2,350 households with an approximate population of 4,400. Taking account of 550 planned property developments, this option is estimated to overfly and impact a total population of 5,400. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 34,250 households with an approximate population of 62,400. Taking account of 4,250 planned property developments, this option is estimated to overfly and impact a total population of 70,200. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 9,800 households with an approximate population of 17,700. Taking account of 2,150 planned property developments, this option is estimated to overfly and impact a total population of 21,500. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 30,350 households with an approximate population of 55,800. Taking account of 3,150 planned property developments, this option is estimated to overfly and impact a total population of 61,600. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 6,350 households with an approximate population of 11,900. Taking account of 1,050 planned property developments, this option is estimated to overfly and impact a total population of 13,900. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to EMA. In terms of AQMAs, the ROKUP 'do nothing' scenario overflies 3 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival options do not facilitate continuous descent approaches to EMA from 7,000ft. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring. Existing procedures do not support optimal aircraft performance and therefore are predicated to have greater environmental impact compared to the proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn or emissions analysis; this will be conducted in Stage 3. In order to make a comparison, track mileage is used as a proxy using the theory that the shorter the track mileage, the less greenhouse gases are emitted. With regards to the 'do nothing' scenario track lengths, the ROKUP 09 'do nothing' scenario track is 37.64km (20.33nm) long.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 54.49 km (29.42 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 65.40 km (35.31 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 49.73 km (26.85 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 59.14 km (31.93 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 53.71 km (29.00 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Retaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be adversely affected, following the removal of the TNT DVOR and the requirement to adopt PBN procedures.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario does not overfly any AONBs or National Parks.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for arrivals do not facilitate continuous descent operations. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length is 37.64km (20.33nm).	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 54.49 km (29.42 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 65.40 km (35.31 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 49.73 km (26.85 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 59.14 km (31.93 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 53.71 km (29.00 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids, aircraft arriving at EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
		Summary of Analysis	The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation. The existing arrival arrangements do not enable continuous descent operations from 7,000ft, which could lead to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. It is acknowledged that ATCO workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact from 4,000ft - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option 13 has been deemed the REJECTED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 14 has been deemed the ALTERNATE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 21 has been deemed the PREFERRED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 22 has been deemed the ACCEPTABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 22A has been deemed the FAVOURABLE option within this design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	REJECTED	ALTERNATE	PREFERRED	ACCEPTABLE	FAVOURABLE

				IAF 3	IAF 3	IAF 3	IAF 3	IAF 3
				Direct	Direct	Direct	Indirect	Indirect
			'DO NOTHING' BASELINE	R09_A_N_O11	R09_A_N_O12	R09_A_N_O12A	R09_A_N_O23	R09_A_N_O24
			For arrivals from the north, the 'do nothing' scenario in terms of today's operation is based around the existing ROKUP Hold. A modal track has been derived to provide an accurate representation of what occurs today. The 'do nothing' scenario for arrivals consists of modal tracks that have been created based upon current operations where most arrivals are radar vectored by air traffic controllers from the Hold to the Final Approach Fix (FAF). In addition to the modal track, a polygon has also been created that represents an area where current operations and approaches are dispersed due to radar vectoring and potentially may affect people on the ground. The overflight analysis conducted on this transition was based on the modal track created using Noise and Track Keeping data from an altitude of 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the start of the modal track to the Arrival end (Touchdown point) of the runway.	The IAF for this option is IAF3 and the style of the route is 'direct' which means the distance to the final approach has been minimised. This option starts at IAF3 which is west of Alfreton and from this point it routes between Ripley and Belper and turns south west passing overhead Duffield. It then turns slightly left to pass to the west of Derby, turning onto a southerly heading over Etwall, before turning to join the extended runway centreline north east of Burton upon Trent. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (3.85nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 2.56° which is within the optimum range for low noise approaches and the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF3 and the style of the route is 'direct' which means the distance to the final approach has been minimised. It is initially the same as option 11 but takes a more westerly track after Duffield. The option starts at IAF3 west of Alfreton and from this point and from this point it routes between Ripley and Belper and turns south west passing overhead Duffield. It continues on this heading until Church Broughton where it turns onto a southerly heading before turning to join the extended runway centreline west of Burton upon Trent. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (6.9nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 2.01° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF3 and the style of the route is 'direct' which means the distance to the final approach has been minimised. This option has an IF at 2,500ft which is at a point 5nm from the FAF, thereby falling between the 3.85nm and 6.9nm utilised by other arrival options to Runway 09 from the North. It initially routes on the same track as Option 12 but the slightly more easterly track helps avoid the overflight of Burton upon Trent The option starts at IAF3 west of Alfreton and from this point it routes between Ripley and Belper and turns south west passing north of Duffield. It continues on this heading until the track crosses the A52 mid-way between Ashbourne and Derby. The option routes directly south and overflies Hilton before turning left to join the extended runway centreline and passing just north east of Burton upon Trent. This RNAV 1 arrival connects the IAF to the IF, at 2,500ft, which is placed as close as possible to the FAF (5nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 2.16° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF3 and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. This option starts at IAF IAF3 west of Alfreton and tracks almost direct south from the IAF, overflying west Ripley. On the north-east boundary of Derby the route turns to a south-west heading and overflies Derby. It turns left over Etwall, onto a southerly heading before turning to join the extended runway centreline east of Burton upon Trent. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 2.35° which is within the optimum range for low noise approaches and the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF3 and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. It follows the same track as Option 23 but routes further west on reaching Derby. This option starts at IAF3 west of Alfreton and tracks almost direct south from the IAF, overflying west Ripley. On the north-east boundary of Derby the route turns to a south-west heading and overflies Derby. It continues on this heading until Church Broughton where it turns onto a southerly heading before turning left to join the extended runway centreline west of Burton upon Trent. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (6.9nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 1.83° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.
Group	Impact	Level of Analysis	Runway 09	Runway 09	Runway 09	Runway 09	Runway 09	Runway 09
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes in the IOA, in terms of potential noise impact, initial quantitive analysis has identified that the ROKUP 'do nothing' scenario for Runway 09 is estimated to overfly: From 7,000ft: is estimated to overfly approximately 87,200 households with an approximate population of 166,500. Taking account of 11,100 planned property developments, this option is estimated to overfly and impact a total population of 187,700. From 4,000ft: is estimated to overfly approximately 18,250 households with an approximate population of 33,900. Taking account of 4,500 planned property developments, this option is estimated to overfly and impact a total population of 42,300.	From 7,000ft, this option is estimated to overfly approximately 16,250 households with an approximate population of 30,200. Taking account of 2,700 planned property developments, this option is estimated to overfly and impact a total population of 35,200. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 2,300 households with an approximate population of 4,400. Taking account of 300 planned property developments, this option is estimated to overfly and impact a total population of 4,900. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 24,850 households with an approximate population of 45,500. Taking account of 3,650 planned property developments, this option is estimated to overfly and impact a total population of 52,200. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 9,900 households with an approximate population of 17,800. Taking account of 2,150 planned property developments, this option is estimated to overfly and impact a total population of 21,700. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 20,500 households with an approximate population of 38,100. Taking account of 2,500 planned property developments, this option is estimated to overfly and impact a total population of 42,700. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 6,250 households with an approximate population of 11,700. Taking account of 1,050 planned property developments, this option is estimated to overfly and impact a total population of 13,700. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 50,500 households with an approximate population of 94,800. Taking account of 4,850 planned property developments, this option is estimated to overfly and impact a total population of 103,900. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 10,250 households with an approximate population of 19,600. Taking account of 2,450 planned property developments, this option is estimated to overfly and impact a total population of 24,300. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 55,050 households with an approximate population of 102,800. Taking account of 7,800 planned property developments, this option is estimated to overfly and impact a total population of 117,400. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 9,300 households with an approximate population of 16,800. Taking account of 2,100 planned property developments, this option is estimated to overfly and impact a total population of 20,600. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to EMA. In terms of AQMAs, the ROKUP 'do nothing' scenario overflies 3 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival options do not facilitate continuous descent approaches to EMA from 7,000ft. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring. Existing procedures do not support optimal aircraft performance and therefore are predicated to have greater environmental impact compared to the proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn or emissions analysis; this will be conducted in Stage 3. In order to make a comparison, track mileage is used as a proxy using the theory that the shorter the track mileage, the less greenhouse gases are emitted. With regards to the 'do nothing' scenario track lengths, the ROKUP 09 'do nothing' scenario track is 37.64km (20.33nm) long.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 48.31 km (26.08 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 57.72 km (31.16 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 55.00 km (29.70 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 51.34 km (27.72 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 62.09 km (33.53 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Retaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be adversely affected, following the removal of the TNT DVOR and the requirement to adopt PBN procedures.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario does not overfly any AONBs or National Parks.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for arrivals do not facilitate continuous descent operations. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length is 37.64km (20.33nm).	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 48.31 km (26.08 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 57.72 km (31.16 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 55.00 km (29.70 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 51.34 km (27.72 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 62.09 km (33.53 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids, aircraft arriving at EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
Summary of Analysis			The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation. The existing arrival arrangements do not enable continuous descent operations from 7,000ft, which could lead to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. It is acknowledged that ATCO workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option 11 has been deemed the PREFERRED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 12 has been deemed the ACCEPTABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 12A has been deemed the FAVOURABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 23 has been deemed the REJECTED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 24 has been deemed the ALTERNATE option within this design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	PREFERRED	ACCEPTABLE	FAVOURABLE	REJECTED	ALTERNATE

			'DO NOTHING' BASELINE	IAF 4 Direct R09_A_N_O9	IAF 4 Direct R09_A_N_O10	IAF 4 Direct R09_A_N_O10A	IAF 4 Indirect R09_A_N_O25	IAF 4 Indirect R09_A_N_O26
			For arrivals from the north, the 'do nothing' scenario in terms of today's operation is based around the existing ROKUP Hold. A modal track has been derived to provide an accurate representation of what occurs today. The 'do nothing' scenario for arrivals consists of modal tracks that have been created based upon current operations where most arrivals are radar vectored by air traffic controllers from the Hold to the Final Approach Fix (FAF). In addition to the modal track, a polygon has also been created that represents an area where current operations and approaches are dispersed due to radar vectoring and potentially may affect people on the ground. The overflight analysis conducted on this transition was based on the modal track created using Noise and Track Keeping data from an altitude of 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the start of the modal track to the Arrival end (Touchdown point) of the runway.	The IAF for this option is IAF4 and the style of the route is 'direct' which means the distance to the final approach has been minimised. The option starts at IAF4 which is north of Belper and from this point it tracks around Belper to the east and then south passing just north of Duffield and routing to the west of Derby. The option turns over Etwall, onto a southerly heading before turning to join the extended runway centreline east of Burton upon Trent. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 2.87° which is close to the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF4 and the style of the route is 'direct' which means the distance to the final approach has been minimised. It is initially the same as option 9 but takes a more westerly track after Duffield to take the same track as Option 8. The option starts at IAF4 which is north of Belper and from this point it tracks around Belper to the east and then south passing just north of Duffield. It continues on this heading until Church Broughton where it turns onto a southerly heading before turning to join the extended runway centreline west of Burton upon Trent. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (6.9nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 2.19° which is close to the optimum range for low noise approaches and is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF4 and the style of the route is 'direct' which means the distance to the final approach has been minimised. This option has an IF at 2,500ft which is at a point 5nm from the FAF, thereby falling mid-way between the 3.85nm and 6.9nm utilised by other arrival options to Runway 09 from the North. It initially routes on the same track as Option 10 but the slightly more easterly track helps avoid the overflight of Burton upon Trent The option starts at IAF4 which is north of Belper and from this point it tracks around Belper to the east and then south passing just north of Duffield. It continues on heading until north of Hilton and then overflies Hilton before turning left to join the extended runway centreline and passing just north east of Burton upon Trent. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (5nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 2.5° which is within the optimum range for low noise approaches and the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF4 and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. The option starts at IAF4 north of Belper and initially tracks south-east between Belper and Ripley until West Hallam where the route turns to a southerly heading and passes between West Hallam and Ilkeston. It continues south until it passes over the A52 near Risley where it turns west to track across the southern suburbs of Derby. It turns south close to Etwall before turning to join the extended runway centreline east of Burton upon Trent. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 1.95° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF4 and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. It follows the same track as Option 25 but routes further west before joining the final approach. The option starts at IAF4 north of Belper and initially tracks south-east between Belper and Ripley until West Hallam where the route turns to a southerly heading and passes between West Hallam and Ilkeston. It continues south until it passes over the A52 near Risley where it turns west to track across the southern suburbs of Derby. It continues on this heading until Church Broughton where it turns onto a southerly heading before turning left to join the extended runway centreline west of Burton upon Trent. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (6.9nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 1.55° which is not the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.
Group	**Impact**	**Level of Analysis**	**Runway 09**	**Runway 09**	**Runway 09**	**Runway 09**	**Runway 09**	**Runway 09**
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes in the IOA, in terms of potential noise impact, initial quantitive analysis has identified that the ROKUP 'do nothing' scenario for Runway 09 is estimated to overfly: From 7,000ft: is estimated to overfly approximately 87,200 households with an approximate population of 166,500. Taking account of 11,100 planned property developments, this option is estimated to overfly and impact a total population of 187,700. From 4,000ft: is estimated to overfly approximately 18,250 households with an approximate population of 33,900. Taking account of 4,500 planned property developments, this option is estimated to overfly and impact a total population of 42,300.	From 7,000ft, this option is estimated to overfly approximately 15,450 households with an approximate population of 29,100. Taking account of 2,450 planned property developments, this option is estimated to overfly and impact a total population of 33,700. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 2,400 households with an approximate population of 4,500. Taking account of 300 planned property developments, this option is estimated to overfly and impact a total population of 5,100. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 23,550 households with an approximate population of 43,500. Taking account of 3,150 planned property developments, this option is estimated to overfly and impact a total population of 49,300. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 10,100 households with an approximate population of 18,100. Taking account of 2,250 planned property developments, this option is estimated to overfly and impact a total population of 22,200. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 19,850 households with an approximate population of 37,300. Taking account of 2,000 planned property developments, this option is estimated to overfly and impact a total population of 41,100. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 6,500 households with an approximate population of 12,200. Taking account of 1,150 planned property developments, this option is estimated to overfly and impact a total population of 14,400. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 40,250 households with an approximate population of 76,100. Taking account of 5,100 planned property developments, this option is estimated to overfly and impact a total population of 85,800. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 22,000 households with an approximate population of 41,700. Taking account of 2,550 planned property developments, this option is estimated to overfly and impact a total population of 46,500. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect more people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 51,950 households with an approximate population of 97,600. Taking account of 7,350 planned property developments, this option is estimated to overfly and impact a total population of 111,400. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 15,400 households with an approximate population of 29,200. Taking account of 4,350 planned property developments, this option is estimated to overfly and impact a total population of 37,400. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to EMA. In terms of AQMAs, the ROKUP 'do nothing' scenario overflies 3 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival options do not facilitate continuous descent approaches to EMA from 7,000ft. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring. Existing procedures do not support optimal aircraft performance and therefore are predicated to have greater environmental impact compared to the proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn or emissions analysis; this will be conducted in Stage 3. In order to make a comparison, track mileage is used as a proxy using the theory that the shorter the track mileage, the less greenhouse gases are emitted. With regards to the 'do nothing' scenario track lengths, the ROKUP 09 'do nothing' scenario track is 37.64km (20.33nm) long.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 44.67 km (24.12 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 54.11 km (29.22 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 48.78 km (26.34 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 66.91 km (36.13 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 70.43 km (38.05 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Retaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be adversely affected, following the removal of the TNT DVOR and the requirement to adopt PBN procedures.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario does not overfly any AONBs or National Parks.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for arrivals do not facilitate continuous descent operations. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length is 37.64km (20.33nm).	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 44.67 km (24.12 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 54.11 km (29.22 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 48.78 km (26.34 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 58.98 km (31.85 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 70.47 km (38.05 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids, aircraft arriving at EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
		Summary of Analysis	The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation. The existing arrival arrangements do not enable continuous descent operations from 7,000ft, which could lead to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. It is acknowledged that ATCO workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Noise impact from 4,000ft - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option 09 has been deemed the PREFERRED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 10 has been deemed the ACCEPTABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 10A has been deemed the FAVOURABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 25 has been deemed the REJECTED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 26 has been deemed the ALTERNATE option within this design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	PREFERRED	ACCEPTABLE	FAVOURABLE	REJECTED	ALTERNATE

				IAF 5	IAF 5	IAF 5	IAF 5
				Direct	Direct	Indirect	Indirect
			'DO NOTHING' BASELINE	R09_A_N_O15	R09_A_N_O16	R09_A_N_O27	R09_A_N_O28
			For arrivals from the north, the 'do nothing' scenario in terms of today's operation is based around the existing ROKUP Hold. A modal track has been derived to provide an accurate representation of what occurs today. The 'do nothing' scenario for arrivals consists of modal tracks that have been created based upon current operations where most arrivals are radar vectored by air traffic controllers from the Hold to the Final Approach Fix (FAF). In addition to the modal track, a polygon has also been created that represents an area where current operations and approaches are dispersed due to radar vectoring and potentially may affect people on the ground. The overflight analysis conducted on this transition was based on the modal track created using Noise and Track Keeping data from an altitude of 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the start of the modal track to the Arrival end (Touchdown point) of the runway.	The IAF for this option is IAF5 and the style of the route is 'direct' which means the distance to the final approach has been minimised. The option starts at IAF5 north of Duffield and initially routes south-west, crossing the A52 close to Ednaston, where it turns to track south and to the west of Derby and over flying Hilton. South of Hilton the route turns to join the extended runway centreline east of Burton upon Trent. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (5nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 3.15° which is above the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF5 and the style of the route is 'direct' which means the distance to the final approach has been minimised. The option starts at IAF5 north of Duffield and heads in a south west direction to route west of Derby before turning onto a southerly heading just north of Hatton and joining the extended runway centreline west of Burton upon Trent. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (6.9nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 2.8° which is close to the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF5 and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. This option starts at IAF5 north of Duffield and tracks south-east until West Hallam where the route turns to a southerly heading and passes between West Hallam and Ilkeston. It continues south until it passes over the A52 near Risley where it turns west to track across the southern suburbs of Derby. It turns south close to Etwall before turning to join the extended runway centreline east of Burton upon Trent. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 2.02° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is IAF5 and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. It follows the same track as Option 27 but routes further west before joining the final approach. This option starts at IAF5 north of Duffield and tracks south-east until West Hallam where the route turns to a southerly heading and passes between West Hallam and Ilkeston. It continues south until it passes over the A52 near Risley where it turns west to track across the southern suburbs of Derby. It continues on this heading until Church Broughton where it turns onto a southerly heading before turning left to join the extended runway centreline west of Burton upon Trent. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (6.9nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 1.59° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.
Group	Impact	Level of Analysis	Runway 09	Runway 09	Runway 09	Runway 09	Runway 09
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes in the IOA, in terms of potential noise impact, initial quantitive analysis has identified that the ROKUP 'do nothing' scenario for Runway 09 is estimated to overfly: From 7,000ft: is estimated to overfly approximately 87,200 households with an approximate population of 166,500. Taking account of 11,100 planned property developments, this option is estimated to overfly and impact a total population of 187,700. From 4,000ft: is estimated to overfly approximately 18,250 households with an approximate population of 33,900. Taking account of 4,500 planned property developments, this option is estimated to overfly and impact a total population of 42,300.	From 7,000ft, this option is estimated to overfly approximately 8,450 households with an approximate population of 15,900. Taking account of 1,250 planned property developments, this option is estimated to overfly and impact a total population of 18,300. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 6,650 households with an approximate population of 12,500. Taking account of 1,250 planned property developments, this option is estimated to overfly and impact a total population of 14,800. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 13,250 households with an approximate population of 23,900. Taking account of 2,500 planned property developments, this option is estimated to overfly and impact a total population of 28,400. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 10,550 households with an approximate population of 18,900. Taking account of 2,050 planned property developments, this option is estimated to overfly and impact a total population of 22,500. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 35,900 households with an approximate population of 67,400. Taking account of 4,550 planned property developments, this option is estimated to overfly and impact a total population of 75,900. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 19,150 households with an approximate population of 36,200. Taking account of 2,600 planned property developments, this option is estimated to overfly and impact a total population of 41,200. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 47,550 households with an approximate population of 88,700. Taking account of 6,850 planned property developments, this option is estimated to overfly and impact a total population of 101,500. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 13,000 households with an approximate population of 24,400. Taking account of 4,050 planned property developments, this option is estimated to overfly and impact a total population of 32,000. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to EMA. In terms of AQMAs, the ROKUP 'do nothing' scenario overflies 3 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies one AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMA. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival options do not facilitate continuous descent approaches to EMA from 7,000ft. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring. Existing procedures do not support optimal aircraft performance and therefore are predicated to have greater environmental impact compared to the proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn or emissions analysis; this will be conducted in Stage 3. In order to make a comparison, track mileage is used as a proxy using the theory that the shorter the track mileage, the less greenhouse gases are emitted. With regards to the 'do nothing' scenario track lengths, the ROKUP 09 'do nothing' scenario track is 37.64km (20.33nm) long.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 41.94 km (22.64 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 45.44 km (24.54 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 57.56 km (31.08 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 69.04 km (37.28 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Retaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be adversely affected, following the removal of the TNT DVOR and the requirement to adopt PBN procedures.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario does not overfly any AONBs or National Parks.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for arrivals do not facilitate continuous descent operations. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length is 37.64km (20.33nm).	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 41.94 km (22.64 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 45.44 km (24.54 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 57.56 km (31.08 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 69.04 km (37.28 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids, aircraft arriving at EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the north was identified where there is the potential for confliction with the new EMA proposed SIDs to the north and north west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
		Summary of Analysis	The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation. The existing arrival arrangements do not enable continuous descent operations from 7,000ft, which could lead to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. It is acknowledged that ATCO workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option 15 has been deemed the PREFERRED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 16 has been deemed the FAVOURABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 27 has been deemed the REJECTED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 28 has been deemed the ACCEPTABLE option within this design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	PREFERRED	FAVOURABLE	REJECTED	ACCEPTABLE

Group	Impact	Level of Analysis	'DO NOTHING' BASELINE	JUNCK Direct R09_A_S_O1	JUNCK Direct R09_A_S_O2	JUNCK Indirect R09_A_S_O3
			For arrivals from the south, the 'do nothing' scenario for in terms of today's operation is based around the existing PIGOT Hold. A modal track has been derived to provide an accurate representation of what occurs today. The 'do nothing' scenario for arrivals consists of modal tracks that have been created based upon current operations where most arrivals are radar vectored by air traffic controllers from the Hold to the Final Approach Fix (FAF). In addition to the modal track, a polygon has also been created that represents an area where current operations and approaches are dispersed due to radar vectoring and potentially may affect people on the ground. All data is based on current aircraft performance data. he overflight analysis conducted on this transition was based on the modal track created using Noise and Track Keeping data from an altitude of 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the start of the modal track to the Arrival end (Touchdown point) of the Runway.	The IAF for this option is JUNCK and the style of the route is 'direct' which means the distance to the final approach has been minimised. This option starts at IAF JUNCK, southwest of Leicester from where the route tracks north-west overflying the south-western edge of Ibstock and turning north just to the west of Swadlincote before turning right to join the extended runway centreline east of Burton upon Trent. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 2.11° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is JUNCK and the style of the route is 'direct' which means the distance to the final approach has been minimised. It follows a near identical track as option 1 but routes further west before joining the final approach. This option starts at IAF JUNCK, southwest of Leicester from where the route tracks north-west overflying the south-western edge of Ibstock. The route turns north to the west of Swadlincote and overflies the edge of Burton upon Trent before turning right to join the extended runway centreline. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (5.1nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 1.93° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is JUNCK and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. The option starts at IAF JUNCK, southwest of Leicester from where it tracks north-west before turning north to pass east of Coalville. The route then turns west and passes to the north of Ashby-de-la-Zouch and over the southern portion of Swadlincote, before turning right to join the extended runway centreline. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 1.84° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.
			Runway 09	Runway 09	Runway 09	Runway 09
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes in the IOA, in terms of potential noise impact, initial quantitive analysis has identified that the PIGOT 'do nothing' scenario for Runway 09 is estimated to overfly: From 7,000ft: is estimated to overfly approximately 136,800 households with an approximate population of 265,200. Taking account of 24,800 planned property developments, this option is estimated to overfly and impact a total population of 313,300. From 4,000ft: is estimated to overfly approximately 45,350 households with an approximate population of 82,000. Taking account of 4,500 planned property developments, this option is estimated to overfly and impact a total population of 90,100.	From 7,000ft, this option is estimated to overfly approximately 19,400 households with an approximate population of 35,900. Taking account of 5,850 planned property developments, this option is estimated to overfly and impact a total population of 46,700. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 7,400 households with an approximate population of 13,700. Taking account of 400 planned property developments, this option is estimated to overfly and impact a total population of 14,500. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 21,950 households with an approximate population of 39,800. Taking account of 6,700 planned property developments, this option is estimated to overfly and impact a total population of 52,000. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 10,500 households with an approximate population of 18,600. Taking account of 950 planned property developments, this option is estimated to overfly and impact a total population of 20,300. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 24,150 households with an approximate population of 44,500. Taking account of 7,800 planned property developments, this option is estimated to overfly and impact a total population of 58,800. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 11,100 households with an approximate population of 20,200. Taking account of 2,150 planned property developments, this option is estimated to overfly and impact a total population of 24,100. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to EMA. In terms of AQMAs, the PIGOT 'do nothing' scenario overflies 7 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies three AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies five AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies three AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival options do not facilitate continuous descent approaches to EMA from 7,000ft. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring. Existing procedures do not support optimal aircraft performance and therefore are predicated to have greater environmental impact compared to the proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn or emissions analysis; this will be conducted in Stage 3. In order to make a comparison, track mileage is used as a proxy using the theory that the shorter the track mileage, the less greenhouse gases are emitted. With regards to the 'do nothing' scenario track lengths, the PIGOT 27 'do nothing' scenario track is 57.36km (30.97nm) long.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 55.66 km (30.05 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a reduction in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 59.44 km (32.09 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 61.61 km (33.27 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Retaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be significantly affected, following the removal of the DTY DVOR and the requirement to adopt PBN procedures as part of the FASI-N Programme.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario does not overfly any AONBs or National Parks.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for arrivals do not facilitate continuous descent operations. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length is 57.36km (30.97nm).	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 55.66 km (30.05 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 59.44 km (32.09 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 61.61 km (33.27 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids, aircraft arriving at EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	A hazard relating to arrivals from the south was identified where there is the potential for confliction with the new EMA proposed SIDs to the south and south west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for confliction with the new EMA proposed SIDs to the south and south west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for confliction with the new EMA proposed SIDs to the south and south west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
		Summary of Analysis	The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation. The existing arrival arrangements do not enable continuous descent operations from 7,000ft, which could lead to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. It is acknowledged that ATCO workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Greenhouse gas emissions - Fuel burn - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option 01 has been deemed the PREFERRED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 02 has been deemed the ACCEPTABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 03 has been deemed the REJECTED option within this design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	PREFERRED	ACCEPTABLE	REJECTED

Group	Impact	Level of Analysis	JUNCK Indirect R09_A_S_O4	JUNCK Indirect R09_A_S_O7	JUNCK Indirect R09_A_S_O8
			The IAF for this option is JUNCK and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. It follows the same route as Option 3 but routes further west before joining the final approach. The option starts at IAF JUNCK, southwest of Leicester from where it tracks north-west before turning north to pass east of Coalville. The route then turns west and passes to the north of Ashby-de-la-Zouch and over the southern portion of Swadlincote, before turning right over the eastern edge of Burton upon Trent to join the extended runway centreline. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (5.1nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 1.67° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is JUNCK and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. The option starts at IAF JUNCK, southwest of Leicester and initially tracks north-east and overflies the western portion of Leicester. To the north of Leicester the route turns north-west passing over Coalville and the southern edge of Ashby-de-la-Zouch. The route turns north just to the west of Swadlincote before turning right to join the extended runway centreline east of Burton upon Trent. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 1.76° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is JUNCK and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. It follows an identical initial track as Option 7 but routes further west before joining the final approach. The option starts at IAF JUNCK, southwest of Leicester and initially tracks north-east and overflies the western portion of Leicester. To the north of Leicester the route turns north-west passing over Coalville and the southern edge of Ashby-de-la-Zouch. The route turns north to the west of Swadlincote and overflies the edge of Burton upon Trent before turning right to join the extended runway centreline. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (5.1nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 1.62° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.
			Runway 09	Runway 09	Runway 09
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	From 7,000ft, this option is estimated to overfly approximately 29,150 households with an approximate population of 52,600. Taking account of 8,200 planned property developments, this option is estimated to overfly and impact a total population of 67,400. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 15,400 households with an approximate population of 27,000. Taking account of 2,600 planned property developments, this option is estimated to overfly and impact a total population of 31,600. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 69,050 households with an approximate population of 132,700. Taking account of 5,500 planned property developments, this option is estimated to overfly and impact a total population of 143,300. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 11,300 households with an approximate population of 20,600. Taking account of 450 planned property developments, this option is estimated to overfly and impact a total population of 21,400. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 72,300 households with an approximate population of 138,000. Taking account of 6,100 planned property developments, this option is estimated to overfly and impact a total population of 149,700. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 13,500 households with an approximate population of 23,900. Taking account of 950 planned property developments, this option is estimated to overfly and impact a total population of 25,600. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies five AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies six AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies eight AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be of dis-benefit as it overflies more AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 66.28 km (35.79 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 63.90 km (34.50 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 68.03 km (36.73 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 66.28 km (35.79 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 63.90 km (34.50 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 68.03 km (36.73 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	A hazard relating to arrivals from the south was identified where there is the potential for confliction with the new EMA proposed SIDs to the south and south west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for confliction with the new EMA proposed SIDs to the south and south west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for confliction with the new EMA proposed SIDs to the south and south west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
		Summary of Analysis	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn - Air Quality Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.
		IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option 04 has been deemed the REJECTED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 07 has been deemed the ALTERNATE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 08 has been deemed the REJECTED option within this design envelope.
		OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	REJECTED	ALTERNATE	REJECTED

Group	Impact	Level of Analysis	JUNCK Direct R09_A_S_O9	JUNCK Direct R09_A_S_O10	JUNCK Direct R09_A_S_O18
			The IAF for this option is JUNCK and the style of the route is 'direct' which means the distance to the final approach has been minimised. The option starts at IAF JUNCK, southwest of Leicester and tracks north following the line of the M1 and overflying the western edge of Leicester. The route turns north-west at Ratby and continues to follow the M1 initially but continuing on this heading to track south of Coalville until south west of Swadlincote. The route turns north just to the west of Swadlincote before turning right to join the extended runway centreline east of Burton upon Trent. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 2.03° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is JUNCK and the style of the route is 'direct' which means the distance to the final approach has been minimised. It follows an identical initial track as Option 9 but routes further west before joining the final approach. The option starts at IAF JUNCK, southwest of Leicester and tracks north following the line of the M1 and overflying the western edge of Leicester. The route turns north-west at Ratby and continues to follow the M1 initially but continuing on this heading to track south of Coalville until west of Swadlincote. It then turns north and overflies the edge of Burton upon Trent before turning right to join the extended runway centreline. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (5.1nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 1.86° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is JUNCK and the style of the route is 'direct' which means the distance to the final approach has been minimised. It follows an identical initial track as Option 17 but routes further west before joining the final approach. The option starts at IAF JUNCK, southwest of Leicester from where the route tracks north-west passing south of Ibstock and Ashby-de-la-Zouch until west of Swadlincote. At this point the route turns north and overflies the edge of Burton upon Trent before turning right to join the extended runway centreline. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (5.1nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 1.91° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.
			Runway 09	Runway 09	Runway 09
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	From 7,000ft, this option is estimated to overfly approximately 39,500 households with an approximate population of 73,300. Taking account of 5,700 planned property developments, this option is estimated to overfly and impact a total population of 83,900. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 7,800 households with an approximate population of 14,400. Taking account of 450 planned property developments, this option is estimated to overfly and impact a total population of 15,200. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 43,050 households with an approximate population of 79,000. Taking account of 6,400 planned property developments, this option is estimated to overfly and impact a total population of 90,700. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 10,550 households with an approximate population of 18,500. Taking account of 1,000 planned property developments, this option is estimated to overfly and impact a total population of 20,200. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 22,200 households with an approximate population of 40,300. Taking account of 6,900 planned property developments, this option is estimated to overfly and impact a total population of 52,800. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 10,400 households with an approximate population of 18,400. Taking account of 1,000 planned property developments, this option is estimated to overfly and impact a total population of 20,200. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies five AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies seven AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be equal as it overflies the same number of AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies five AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 57.37 km (30.98 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 61.20 km (33.05 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 59.85 km (32.32 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 57.37 km (30.98 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 61.20 km (33.05 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 59.85 km (32.32 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	A hazard relating to arrivals from the south was identified where there is the potential for confliction with the new EMA proposed SIDs to the south and south west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for confliction with the new EMA proposed SIDs to the south and south west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for confliction with the new EMA proposed SIDs to the south and south west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
		Summary of Analysis	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.
		IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option 09 has been deemed the REJECTED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 10 has been deemed the REJECTED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 18 has been deemed the FAVOURABLE option within this design envelope.
		OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	REJECTED	REJECTED	FAVOURABLE

				EYEHO	EYEHO	EYEHO	EYEHO
				Direct	Direct	Indirect	Indirect
			'DO NOTHING' BASELINE	R09_A_S_O13	R09_A_S_O14	R09_A_S_O23	R09_A_S_O24
			For arrivals from the south, the 'do nothing' scenario for in terms of today's operation is based around the existing PIGOT Hold. A modal track has been derived to provide an accurate representation of what occurs today. The 'do nothing' scenario for arrivals consists of modal tracks that have been created based upon current operations where most arrivals are radar vectored by air traffic controllers from the Hold to the Final Approach Fix (FAF). In addition to the modal track, a polygon has also been created that represents an area where current operations and approaches are dispersed due to radar vectoring and potentially may affect people on the ground. All data is based on current aircraft performance data. he overflight analysis conducted on this transition was based on the modal track created using Noise and Track Keeping data from an altitude of 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the start of the modal track to the Arrival end (Touchdown point) of the Runway.	The IAF for this option is EYEHO and the style of the route is 'direct' which means the distance to the final approach has been minimised. The option starts at IAF EYEHO, south east of Hinkley from where the route heads north-west passing between Earl Shilton and Hinckley. It continues on this heading until just south of Swadlincote where it turns north and passes between Swadlincote and Burton upon Trent before turning right to join the extended runway centreline. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 2.15° which is close to the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is EYEHO and the style of the route is 'direct' which means the distance to the final approach has been minimised. It follows an identical initial track as Option 13 but routes further west before joining the final approach. The option starts at IAF EYEHO, south east of Hinkley from where the route heads north-west passing between Earl Shilton and Hinckley. It continues on this heading until south west of Swadlincote where it turns north and overflies the edge of Burton upon Trent before turning right to join the extended runway centreline. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (5.1nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 2° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is EYEHO and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. The option starts at IAF EYEHO, south east of Hinkley from where the route tracks north to pass east of Coalville. It then turns west and passes to the north of Coalville and Ashby-de-la-Zouch and over the southern portion of Swadlincote, before turning right to join the extended runway centreline east of Burton upon Trent. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 1.75° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is EYEHO and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. The option starts at IAF EYEHO, south east of Hinkley from where the route tracks north to pass east of Coalville. It then turns west and passes to the north of Coalville and Ashby-de-la-Zouch and over the southern portion of Swadlincote, before turning right over the eastern edge of Burton upon Trent to join the extended runway centreline. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (5.1nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 1.6° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.
Group	Impact	Level of Analysis	Runway 09	Runway 09	Runway 09	Runway 09	Runway 09
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes in the IOA, in terms of potential noise impact, initial quantitive analysis has identified that the PIGOT 'do nothing' scenario for Runway 09 is estimated to overfly: From 7,000ft: is estimated to overfly approximately 136,800 households with an approximate population of 265,200. Taking account of 24,800 planned property developments, this option is estimated to overfly and impact a total population of 313,300. From 4,000ft: is estimated to overfly approximately 45,350 households with an approximate population of 82,000. Taking account of 4,500 planned property developments, this option is estimated to overfly and impact a total population of 90,100.	From 7,000ft, this option is estimated to overfly approximately 15,550 households with an approximate population of 28,800. Taking account of 2,200 planned property developments, this option is estimated to overfly and impact a total population of 32,900. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 6,000 households with an approximate population of 11,200. Taking account of 300 planned property developments, this option is estimated to overfly and impact a total population of 11,800. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 17,350 households with an approximate population of 31,200. Taking account of 2,750 planned property developments, this option is estimated to overfly and impact a total population of 36,100. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 7,650 households with an approximate population of 13,400. Taking account of 900 planned property developments, this option is estimated to overfly and impact a total population of 15,000. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 23,500 households with an approximate population of 42,600. Taking account of 3,800 planned property developments, this option is estimated to overfly and impact a total population of 49,500. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 10,550 households with an approximate population of 19,300. Taking account of 2,050 planned property developments, this option is estimated to overfly and impact a total population of 23,000. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 28,350 households with an approximate population of 50,600. Taking account of 4,250 planned property developments, this option is estimated to overfly and impact a total population of 58,200. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 15,350 households with an approximate population of 27,000. Taking account of 2,450 planned property developments, this option is estimated to overfly and impact a total population of 31,300. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to EMA. In terms of AQMAs, the PIGOT 'do nothing' scenario overflies 7 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival options do not facilitate continuous descent approaches to EMA from 7,000ft. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring. Existing procedures do not support optimal aircraft performance and therefore are predicated to have greater environmental impact compared to the proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn or emissions analysis; this will be conducted in Stage 3. In order to make a comparison, track mileage is used as a proxy using the theory that the shorter the track mileage, the less greenhouse gases are emitted. With regards to the 'do nothing' scenario track lengths, the PIGOT 27 'do nothing' scenario track is 57.36km (30.97nm) long.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 54.84 km (29.61 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a reduction in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 57.98 km (31.31 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 64.42 km (34.78 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 69.08 km (37.30 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Retaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be significantly affected, following the removal of the DTY DVOR and the requirement to adopt PBN procedures as part of the FASI-N Programme.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario does not overfly any AONBs or National Parks.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for arrivals do not facilitate continuous descent operations. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length is 57.36km (30.97nm).	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 54.84 km (29.61 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 57.98 km (31.31 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 64.42 km (34.78 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 69.08 km (37.30 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids, aircraft arriving at EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	A hazard relating to arrivals from the south was identified where there is the potential for confliction with the new EMA proposed SIDs to the south and south west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for confliction with the new EMA proposed SIDs to the south and south west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for confliction with the new EMA proposed SIDs to the south and south west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for confliction with the new EMA proposed SIDs to the south and south west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
		Summary of Analysis	The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation. The existing arrival arrangements do not enable continuous descent operations from 7,000ft, which could lead to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. It is acknowledged that ATCO workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Greenhouse gas emissions - Fuel burn - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option 13 has been deemed the PREFERRED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 14 has been deemed the FAVOURABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 23 has been deemed the ACCEPTABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 24 has been deemed the REJECTED option within this design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	PREFERRED	FAVOURABLE	ACCEPTABLE	REJECTED

Group	Impact	Level of Analysis	'DO NOTHING' BASELINE	LEICE Direct R09_A_S_O5	LEICE Direct R09_A_S_O6	LEICE Indirect R09_A_S_O11	LEICE Indirect R09_A_S_O12
			For arrivals from the south, the 'do nothing' scenario for in terms of today's operation is based around the existing PIGOT Hold. A modal track has been derived to provide an accurate representation of what occurs today. The 'do nothing' scenario for arrivals consists of modal tracks that have been created based upon current operations where most arrivals are radar vectored by air traffic controllers from the Hold to the Final Approach Fix (FAF). In addition to the modal track, a polygon has also been created that represents an area where current operations and approaches are dispersed due to radar vectoring and potentially may affect people on the ground. All data is based on current aircraft performance data. he overflight analysis conducted on this transition was based on the modal track created using Noise and Track Keeping data from an altitude of 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the start of the modal track to the Arrival end (Touchdown point) of the Runway.	The IAF for this option is LEICE and the style of the route is ‘direct’ which means the distance to the final approach has been minimised. This option starts at IAF LEICE, near the King Power Stadium in Leicester from where the route tracks north-west over the junction between the M1 and the A46 and passes the northern edge of Ibstock. The route turns north just to the west of Swadlincote before turning right to join the extended runway centreline east of Burton upon Trent. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 2.08° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is LEICE and the style of the route is ‘direct’ which means the distance to the final approach has been minimised. It follows a near identical track as Option 5 but routes further west before joining the final approach. The option starts at IAF LEICE, near the King Power Stadium in Leicester from where the route tracks north-west over the junction between the M1 and the A46 and passes the northern edge of Ibstock. The route turns north to the west of Swadlincote and overflies the edge of Burton upon Trent before turning right to join the extended runway centreline. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (5.1nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 1.91° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is LEICE and the style of the route is ‘indirect’ which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a ‘direct’ route. The option starts at IAF LEICE, near the King Power Stadium in Leicester from where the route tracks directly north over Leicester to Mountsorrel where the route turns west. It overflies the southern part of Loughborough, passing south of Shepshed and just north of Ashby-de-la-Zouch until south west of Swadlincote. The route turns north just to the west of Swadlincote before turning right to join the extended runway centreline east of Burton upon Trent. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 1.7° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is LEICE and the style of the route is ‘indirect’ which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a ‘direct’ route. It follows an identical initial track as Option 11 but routes further west before joining the final approach. The option starts at IAF LEICE, near the King Power Stadium in Leicester from where the route tracks directly north over Leicester to Mountsorrel where the route turns west. It overflies the southern part of Loughborough, passing south of Shepshed and just north of Ashby-de-la-Zouch until west of Swadlincote. It then turns north and overflies the edge of Burton upon Trent before turning right to join the extended runway centreline. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (5.1nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 1.57° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.
Group	Impact	Level of Analysis	Runway 09	Runway 09	Runway 09	Runway 09	Runway 09
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes in the IOA, in terms of potential noise impact, initial quantitive analysis has identified that the PIGOT 'do nothing' scenario for Runway 09 is estimated to overfly: From 7,000ft: is estimated to overfly approximately 136,800 households with an approximate population of 265,200. Taking account of 24,800 planned property developments, this option is estimated to overfly and impact a total population of 313,300. From 4,000ft: is estimated to overfly approximately 45,350 households with an approximate population of 82,000. Taking account of 4,500 planned property developments, this option is estimated to overfly and impact a total population of 90,100.	From 7,000ft, this option is estimated to overfly approximately 54,350 households with an approximate population of 110,500. Taking account of 1,300 planned property developments, this option is estimated to overfly and impact a total population of 113,200. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 7,150 households with an approximate population of 13,200. Taking account of 350 planned property developments, this option is estimated to overfly and impact a total population of 13,900. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 57,900 households with an approximate population of 116,100. Taking account of 1,900 planned property developments, this option is estimated to overfly and impact a total population of 119,900. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 10,300 households with an approximate population of 18,100. Taking account of 1,000 planned property developments, this option is estimated to overfly and impact a total population of 19,900. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 87,900 households with an approximate population of 181,000. Taking account of 11,150 planned property developments, this option is estimated to overfly and impact a total population of 203,900. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 11,850 households with an approximate population of 21,700. Taking account of 3,550 planned property developments, this option is estimated to overfly and impact a total population of 28,200. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 92,800 households with an approximate population of 189,100. Taking account of 11,750 planned property developments, this option is estimated to overfly and impact a total population of 213,000. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 14,650 households with an approximate population of 25,800. Taking account of 4,050 planned property developments, this option is estimated to overfly and impact a total population of 32,900. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to EMA. In terms of AQMAs, the PIGOT 'do nothing' scenario overflies 7 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies three AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies five AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies three AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies six AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival options do not facilitate continuous descent approaches to EMA from 7,000ft. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring. Existing procedures do not support optimal aircraft performance and therefore are predicated to have greater environmental impact compared to the proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn or emissions analysis; this will be conducted in Stage 3. In order to make a comparison, track mileage is used as a proxy using the theory that the shorter the track mileage, the less greenhouse gases are emitted. With regards to the 'do nothing' scenario track lengths, the PIGOT 27 'do nothing' scenario track is 57.36km (30.97nm) long.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 56.27 km (30.38 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a reduction in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 59.97 km (32.38 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 65.48 km (35.36 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 69.97 km (37.78 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Retaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be significantly affected, following the removal of the DTY DVOR and the requirement to adopt PBN procedures as part of the FASI-N Programme.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario does not overfly any AONBs or National Parks.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for arrivals do not facilitate continuous descent operations. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length is 57.36km (30.97nm).	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 56.27 km (30.38 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 59.97 km (32.38 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 65.48 km (35.36 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 69.97 km (37.78 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids, aircraft arriving at EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	A hazard relating to arrivals from the south was identified where there is the potential for confliction with the new EMA proposed SIDs to the south and south west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for confliction with the new EMA proposed SIDs to the south and south west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for confliction with the new EMA proposed SIDs to the south and south west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for confliction with the new EMA proposed SIDs to the south and south west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
		Summary of Analysis	The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation. The existing arrival arrangements do not enable continuous descent operations from 7,000ft, which could lead to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. It is acknowledged that ATCO workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Greenhouse gas emissions - Fuel burn - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Greenhouse gas emissions - Fuel burn - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option 05 has been deemed the PREFERRED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 06 has been deemed the FAVOURABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 11 has been deemed the ACCEPTABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 12 has been deemed the REJECTED option within this design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	PREFERRED	FAVOURABLE	ACCEPTABLE	REJECTED

				STAPL	STAPL	STAPL	STAPL
				Direct	Direct	Indirect	Indirect
			'DO NOTHING' BASELINE	R09_A_S_O15	R09_A_S_O16	R09_A_S_O21	R09_A_S_O22
			For arrivals from the south, the 'do nothing' scenario for in terms of today's operation is based around the existing PIGOT Hold. A modal track has been derived to provide an accurate representation of what occurs today. The 'do nothing' scenario for arrivals consists of modal tracks that have been created based upon current operations where most arrivals are radar vectored by air traffic controllers from the Hold to the Final Approach Fix (FAF). In addition to the modal track, a polygon has also been created that represents an area where current operations and approaches are dispersed due to radar vectoring and potentially may affect people on the ground. All data is based on current aircraft performance data. he overflight analysis conducted on this transition was based on the modal track created using Noise and Track Keeping data from an altitude of 7,000ft with the addition of a radar vectoring area where appropriate. The track length has been calculated on the distance from the start of the modal track to the Arrival end (Touchdown point) of the Runway.	The IAF for this option is STAPL and the style of the route is 'direct' which means the distance to the final approach has been minimised. The option starts at IAF STAPL at Stapleton north of Hinkley from where it tracks north, turning north-west to over fly Ibstock but remaining south of Coalville. It continues on this track to fly south of Ashby-de-la-Zouch until south west of Swadlincote where the route turns north before turning right to join the extended runway centreline east of Burton upon Trent. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 2.39° which is within the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is STAPL and the style of the route is 'direct' which means the distance to the final approach has been minimised. It follows an identical initial track as Option 15 but routes further west before joining the final approach. The option starts at IAF STAPL at Stapleton north of Hinkley from where it tracks north, turning north-west to over fly Ibstock but remaining south of Coalville. It continues on this track to fly south of Ashby-de-la-Zouch until west of Swadlincote where it turns north and overflies the edge of Burton upon Trent before turning right to join the extended runway centreline. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (5.1nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 2.18° which is close to the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is STAPL and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. The option starts at IAF STAPL at Stapleton north of Hinkley from where the route initially tracks north-east until close to Thornton where the route turns north to pass east of Coalville. The route then turns west and passes to the north of Coalville and Ashby-de-la-Zouch and over the southern portion of Swadlincote, before turning right to join the extended runway centreline east of Burton upon Trent. This RNAV 1 route connects the IAF to the IF which is placed as close as possible to the FAF (3.85nm) when PANS OPS criteria and MSD for a 90° turn is taken into consideration. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 1.95° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.	The IAF for this option is STAPL and the style of the route is 'indirect' which means the distance to the final approach has not been minimised but has been designed to provide an alternative respite option to a 'direct' route. It follows the same route as Option 21 but routes further west before joining the final approach. The option starts at IAF STAPL at Stapleton north of Hinkley from where the route initially tracks north-east until close to Thornton where the route turns north to pass east of Coalville. The route then turns west and passes to the north of Coalville and Ashby-de-la-Zouch and over the southern portion of Swadlincote, before turning right over the eastern edge of Burton upon Trent to join the extended runway centreline. This RNAV 1 arrival connects the IAF to the IF which is placed as far as possible from the FAF (5.1nm) whilst keeping the route within existing controlled airspace. The FAF is at 2,000ft, which is the platform altitude for the existing FAF for Runway 09 approaches. The descent gradient to the FAF is 1.76° which is below the optimum range for low noise approaches but is within the acceptable range for CDAs defined within ICAO guidance.
Group	**Impact**	**Level of Analysis**	**Runway 09**	**Runway 09**	**Runway 09**	**Runway 09**	**Runway 09**
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes in the IOA, in terms of potential noise impact, initial quantitive analysis has identified that the PIGOT 'do nothing' scenario for Runway 09 is estimated to overfly: From 7,000ft: is estimated to overfly approximately 136,800 households with an approximate population of 265,200. Taking account of 24,800 planned property developments, this option is estimated to overfly and impact a total population of 313,300. From 4,000ft: is estimated to overfly approximately 45,350 households with an approximate population of 82,000. Taking account of 4,500 planned property developments, this option is estimated to overfly and impact a total population of 90,100.	From 7,000ft, this option is estimated to overfly approximately 16,450 households with an approximate population of 30,600. Taking account of 1,850 planned property developments, this option is estimated to overfly and impact a total population of 34,000. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 7,800 households with an approximate population of 14,500. Taking account of 350 planned property developments, this option is estimated to overfly and impact a total population of 15,100. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 19,650 households with an approximate population of 35,600. Taking account of 2,650 planned property developments, this option is estimated to overfly and impact a total population of 40,400. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 10,500 households with an approximate population of 18,400. Taking account of 1,150 planned property developments, this option is estimated to overfly and impact a total population of 20,400. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 19,850 households with an approximate population of 36,300. Taking account of 3,850 planned property developments, this option is estimated to overfly and impact a total population of 43,400. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 11,200 households with an approximate population of 20,300. Taking account of 2,300 planned property developments, this option is estimated to overfly and impact a total population of 24,500. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.	From 7,000ft, this option is estimated to overfly approximately 24,900 households with an approximate population of 44,600. Taking account of 4,300 planned property developments, this option is estimated to overfly and impact a total population of 52,300. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 16,150 households with an approximate population of 28,400. Taking account of 2,800 planned property developments, this option is estimated to overfly and impact a total population of 33,300. The potential noise impact on health and quality of life from 4,000ft is assessed as likely to affect fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions. The majority of the extant procedure involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to EMA. In terms of AQMAs, the PIGOT 'do nothing' scenario overflies 7 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies no AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	There is not likely to be a change in aviation emissions by location below 1,000 feet. As per CAP1616, para B72 a full Air Quality Assessment is deemed not required. This option overflies two AQMAs. When compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival options do not facilitate continuous descent approaches to EMA from 7,000ft. It must be noted that the exact track length flown by aircraft may vary slightly due to the nature of radar vectoring. Existing procedures do not support optimal aircraft performance and therefore are predicated to have greater environmental impact compared to the proposed options. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn or emissions analysis; this will be conducted in Stage 3. In order to make a comparison, track mileage is used as a proxy using the theory that the shorter the track mileage, the less greenhouse gases are emitted. With regards to the 'do nothing' scenario track lengths, the PIGOT 27 'do nothing' scenario track is 57.36km (30.97nm) long.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 50.72 km (27.38 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a reduction in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 54.33 km (29.33 nm). When compared to the 'do nothing' scenario, this option is shorter and is therefore expected to result in a reduction in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 59.40 km (32.07 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.	This option has been designed to support continuous descent approaches to EMA. An element of radar vectoring may still be required to manage aircraft separation distances. The track mileage of this option is 64.07 km (34.60 nm). When compared to the 'do nothing' scenario, this option is longer and is therefore expected to result in an increase in greenhouse gas emissions compared to the 'do nothing' scenario and is deemed to be of environmental dis-benefit. More in-depth analysis will take place at Stage 3 to confirm the exact volumes of greenhouse gases released.
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Retaining extant procedures would maintain current capacity; however, due to the reliance upon ground-based navigational aids, resilience could be significantly affected, following the removal of the DTY DVOR and the requirement to adopt PBN procedures as part of the FASI-N Programme.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.	The introduction of PBN routes is expected to deliver benefits by increasing airspace capacity which subsequently leads to more predictable flight paths and fewer delays (both in the air and on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	As per CAP1616, Appendix B, para B76, change sponsors are required to consider Tranquillity with specific reference to AONBs and National Parks only, unless other areas have been identified through community engagement. No additional specific areas were identified by community engagement. The 'do nothing' scenario does not overfly any AONBs or National Parks.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore comparable to the 'do nothing' scenario and assessed as neutral.
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map. CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposal will not have an impact on biodiversity as they do not involve ground-based infrastructure. However, the change sponsor acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.	CAP1616, Appendix B, para B74, states that because of dispersion and mixing, there is unlikely to be an impact on local air quality from aircraft above 1,000ft. Furthermore, CAP1616, Appendix B, para B80, states that in general, airspace change proposals will not have an impact on biodiversity as they do not involve ground-based infrastructure. The change sponsor has mapped the designated Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and RAMSAR sites, as identified on the DEFRA MAGiC Map and acknowledges that any potential impact to the designated sites around EMA will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of EMA will maintain their current level of access under extant operational arrangements.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.	Impact to General Aviation access is anticipated to be minimal as a consequence of this ACP. All Visual Reference Points and existing Letters of Agreement pertaining to General Aviation access will be reviewed and updated (where applicable) prior to implementation to ensure their continued validity. Airspace classification requirements and any additional airspace requirements will be reviewed as part of Stage 3 activities.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for GA/airlines.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.	The introduction of PBN is expected to deliver benefits by increasing airspace capacity which in turn will lead to more predictable flight paths and fewer delays (both in the air or on the ground). This is expected to facilitate economic benefit by potentially increasing the frequency of air transport movements, increasing passenger numbers and increasing cargo tonnage carried.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing EMA procedures for arrivals do not facilitate continuous descent operations. Within Stage 2 of the CAP1616 process, there is no requirement for a change sponsor to conduct quantitative fuel burn analysis. This will be covered in Stage 3. In order to make a comparison in Stage 2, track mileage is used, based on the theory that the shorter the track mileage, the less greenhouse gases are emitted. In the case of the 'do nothing' baseline scenario, the track length is 57.36km (30.97nm).	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 50.72 km (27.38 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 54.33 km (29.33 nm) long. When compared to the 'do nothing' scenario, this option is shorter and at this stage, it is assumed that it will be of economic benefit as less fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 59.40 km (32.07 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.	This option supports continuous descent operations, reducing the overall amount of fuel burnt. There is no requirement within Stage 2 of the CAP1616 process to quantify fuel burn, this will be conducted in Stage 3. Therefore, to enable a comparison, the logic applied is that the shorter the track length, the less fuel is burnt. With regards to this option, it is 64.07 km (34.60 nm) long. When compared to the 'do nothing' scenario, this option is longer and at this stage, it is assumed that it will be of economic dis-benefit as more fuel will be burnt. More in-depth analysis will be carried out in Stage 3 to confirm.
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.	It is anticipated that no extra pilot/crew training will be required to enable pilots to fly the new PBN procedures as PBN has become a common navigation standard across the world.
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate at this stage for EMA to assess potential other costs for commercial airlines - there may be costs associated with maintaining legacy systems to continue flying conventional navigation but there are too many variables (e.g. aircraft types, on-board system capability etc.) to consider these effectively.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.	Other costs to commercial airlines may include updates to Flight Management Systems (FMS), navigation databases and operating procedures, increased pilot hire costs versus training etc. It is not proportionate at this stage of the ACP for EMA to assess the 'other costs' to commercial airlines of flying PBN procedures.
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at EMA to maintain extant conventional procedures; however, maintaining accessibility to current ground-based equipment (operated by NERL) may become prohibitively expensive should a CAP1781 RNAV substitution not be implemented prior to the proposed removal date.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the extant procedures.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.	Some operational costs are anticipated with respect to the implementation of new procedures and training of air traffic controlling staff at EMA; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.	Some deployment costs are anticipated with respect to the implementation of the new departure procedures and training of air traffic controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at EMA are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids, aircraft arriving at EMA would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a possible increase in ATCO workload.	A hazard relating to arrivals from the south was identified where there is the potential for confliction with the new EMA proposed SIDs to the south and south west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for confliction with the new EMA proposed SIDs to the south and south west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for confliction with the new EMA proposed SIDs to the south and south west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	A hazard relating to arrivals from the south was identified where there is the potential for confliction with the new EMA proposed SIDs to the south and south west causing a loss of horizontal and/or vertical separation. This would require ATC tactical intervention and could result in an increase in ATCO workload. This hazard could be further mitigated through the design process or procedurally if required. Further assessment will be conducted during Stages 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.
		Summary of Analysis	The 'do nothing' scenario in relation to this ACP is not a viable option as it does not provide a sustainable solution in terms of airspace modernisation. The existing arrival arrangements do not enable continuous descent operations from 7,000ft, which could lead to a greater volume of fuel burn, emissions and noise at lower levels. In terms of Tranquillity, Biodiversity, General Aviation access and Economic impact, the 'do nothing' baseline provides minimal/no change to today's operations. Furthermore, there are very limited costs incurred as a result of this scenario. From a safety perspective, it is assumed that current EMA operations are safe. It is acknowledged that ATCO workload is likely to increase due to the enduring requirement for radar vectoring.	When compared to the 'do nothing' scenario, this option performs: Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Greenhouse gas emissions - Fuel burn - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.	When compared to the 'do nothing' scenario, this option performs: Worse in the following areas: - Greenhouse gas emissions - Fuel burn Better in the following areas: - Noise impact from 4,000ft - Noise impact from 7,000ft - Air Quality Equal/neutral in terms of the remaining criteria because there is no change when compared to today's operation. At this time, it is not possible to fully determine the safety implications of this specific option as this option has been assessed in isolation rather than as a set of design options as part of a wider system. Additional analysis will be required in Stage 3 and 4 of the CAP 1616 process to determine the cumulative impact of this option when compared to all the other options.
			IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option 15 has been deemed the PREFERRED option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 16 has been deemed the FAVOURABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 21 has been deemed the ACCEPTABLE option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 22 has been deemed the REJECTED option within this design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	PREFERRED	FAVOURABLE	ACCEPTABLE	REJECTED