Initial Options Appraisal Appendix A – Full Analysis Table V2

CAP1616 Stage 2 Develop and Assess

Departures

MAG Manchester Airport

MAG MAN ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TABLE

Departure Envelope: SID Runway 05 North

			'DO NOTHING' BASELINE		OPTION 1		OPTION 4	
			For the north design envelope, the 'do nothing' scenario for departures in terms of today's operation is based around the existing conventional POL 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 based on current aircraft performance data. 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 areas 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 an RNAV1 replication of the current departure to POL and uses fly-by waypoints to create a replication of the existing conventional POL 4S/1Z departure. As a replicated route it follows a similar track over the ground as the current published departure. The routes combine shortly after departure and fly straight ahead overflying Stockport where they commence a left turn to the north. This takes the routes west of Ashton-under-Lyne and close to Oldham and they terminate at 7,000ft to the east of Rochdale. The design speed will permit a large number of aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise. There would be no speed restrictions applied to the procedure; therefore, the maximum speed of 250 KIAS below FL100 would apply. Due to the track-to-fix coding and simplicity of the route, dispersion is likely to be low even with maximum speeds.		This is an RNAV1 option that has a turn mid-way between options 1 and 3. It has been created in line with the Design Principle Noise N1 by following the course of the M60 motorway which already generates a level of ambient noise. This option has a direct routing to the north following the initial turn, which due to the track-to-fix coding and a fly-by waypoint, would result in repeatable ground tracks and a low level of dispersal. The design speed will permit a large number of aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise. The route has been designed using fly-by waypoints. •05L: After departure this route combines with the option for 05R and flies straight ahead and commences a left turn just to the east of Stockport. It continues north, broadly following the route of the M60 motorway which takes it over Audenshaw reservoir and west of Ashton-under-Lyne. It passes overhead Oldham and terminates at 7,000ft just to the east of Rochdale. •05R: After departure this route combines with the option for 05L and flies straight ahead overflying Heald Green and commences a left turn just to the east of Stockport. It continues north, broadly following the route of the M60 motorway which takes it over Audenshaw reservoir and west of Ashton-under-Lyne. It passes overhead Oldham and terminates at 7,000ft just to the east of Rochdale There would be no speed restrictions applied to the procedure; therefore, the maximum speed of 250 KIAS below FL100 would apply. Due to the track-to-fix coding however, and simplicity of the route, dispersion is likely to be low even with maximum speeds.	
Group	Impact	Level of Analysis	Runway 05L	Runway 05R	Runway 05L	Runway 05R	Runway 05L	Runway 05R
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 POL 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 21,400 households with an approximate population of 46,700. Taking account of 100 planned property developments, this option is estimated to overfly and impact a total population of 46,900. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 80,750 households with an approximate population of 192,900. Taking account of 1,250 planned property developments, this option is estimated to overfly and impact a total population of 195,900.	For comparison purposes within the IOA, the 'do nothing' scenario was based upon the existing POL 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 23,600 households with an approximate population of 51,700. Taking account of 100 planned property developments, this option is estimated to overfly and impact a total population of 51,900. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 91,350 households with an approximate population of 219,800. Taking account of 1,900 planned property developments, this option is estimated to overfly and impact a total population of 224,300.	Up to 4,000ft, this option is estimated to overfly approximately 36,750 households with an approximate population of 79,900. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 79,900. 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 87,100 households with an approximate population of 206,600. Taking account of 2,950 planned property developments, this option is estimated to overfly and impact total population of 213,600. 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 37,050 households with an approximate population of 80,700. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 80,700. 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 91,100 households with an approximate population of 216,300. Taking account of 2,950 planned property developments, this option is estimated to overfly and impact total population of 223,300. 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 24,900 households with an approximate population of 55,200. Taking account of 250 planned property developments, this option is estimated to overfly and impact a total population of 55,800. 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 84,550 households with an approximate population of 208,100. Taking account of 2,100 planned property developments, this option is estimated to overfly and impact total population of 213,200. 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.	Up to 4,000ft, this option is estimated to overfly approximately 27,650 households with an approximate population of 61,200. Taking account of 100 planned property developments, this option is estimated to overfly and impact a total population of 61,400. 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 88,850 households with an approximate population of 218,000. Taking account of 2,100 planned property developments, this option is estimated to overfly and impact total population of 223,200. 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.
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 05L POL SID overflies four AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	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 05R POL SID overflies four AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	Option 1 L overflies five AQMAs; however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of dis-benefit as it overflies more AQMAs.	Option 1 R overflies five AQMAs; however, as per CAP1616 para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of dis-benefit as it overflies more AQMAs.	Option 4 L overflies five AQMAs; however, as per CAP1616 para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of dis-benefit as it overflies more AQMAs.	Option 4 R overflies five AQMAs; however, as per CAP1616 para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, 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. 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 fuel burn or 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 40.71km (21.98nm).	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. 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 fuel burn or 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 42.47km (22.93nm).	Option 1 L 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 Option 1 L is 40.10km (21.65nm). When compared to the 'do nothing' scenario, Option 1 L is shorter and is therefore expected to emit less greenhouse gases. This option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 1 R 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 Option 1 R is 41.81km (22.57nm). When compared to the 'do nothing' scenario, Option 1 R is shorter and is therefore expected to emit less greenhouse gases. This option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 4 L 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 Option 4L is 39.31km (21.22nm). When compared to the 'do nothing' scenario, Option 4 L is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of dis-benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 4 R 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 Option 4 R is 41.01km (22.14nm). When compared to the 'do nothing' scenario, Option 4 R is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of 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 DVOR in December 2022.	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 DVOR in December 2022.	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 air or 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 air or 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 air or 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 air or 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.	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 equal/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 equal/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 equal/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 equal/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 MAN 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 MAN 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 MAN 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 MAN 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 MAN 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 MAN 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 MAN will maintain their current level of access under extant operational arrangements.	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of MAN will maintain their current level of access under extant operational arrangements.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.

			'DO NOTHING' BASELINE		OPTION 1		OPTION 4	
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.	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 MAN 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 fuel is burnt. In the case of the 'do nothing' baseline scenario, the track length to the common point is 40.71km (21.98nm).	The existing MAN 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 fuel is burnt. In the case of the 'do nothing' baseline scenario, the track length to the common point is 42.47km (22.93nm).	Option 1 L 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 40.10km (21.65nm) long. When compared to the 'do nothing' scenario, Option 1 L is shorter and at this stage it is assumed that less fuel will be burnt. This option is therefore deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 1 L 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 41.81km (22.57nm) long. When compared to the 'do nothing' scenario, Option 1 L is shorter and at this stage it is assumed that less fuel will be burnt. This option is therefore deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 4 L 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 39.31km (21.22nm) long. When compared to the 'do nothing' scenario, Option 4 L is shorter and at this stage it is assumed that less fuel will be burnt. This option is therefore deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 4 R 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 41.01km (22.14nm) long. When compared to the 'do nothing' scenario, Option 4 R is shorter and at this stage it is assumed that less fuel will be burnt. This option is therefore deemed to be of benefit in terms of fuel burn. 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.	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 for MAN 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.	It is not proportionate for MAN 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 for MAN 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 for MAN 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 for MAN 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 for MAN 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 MAN 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.	No additional infrastructure is required at MAN 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.	No change to operational costs is attributable to maintaining the extant procedures.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; 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.	No deployment costs applicable to extant procedures.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of 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 MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft departing MAN 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.	The 'do nothing' scenario assumes that current operations at MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft departing MAN 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, it was identified that the options within this envelope may conflict with Leeds Bradford IFPs and potentially with aircraft operating on the L975 Lower ATS route, both of which can be mitigated through the design process. Furthermore, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation. Again, this can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, it was identified that the options within this envelope may conflict with Leeds Bradford IFPs and potentially with aircraft operating on the L975 Lower ATS route, both of which can be mitigated through the design process. Furthermore, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation. Again, this can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, it was identified that the options within this envelope may conflict with Leeds Bradford IFPs and potentially with aircraft operating on the L975 Lower ATS route, both of which can be mitigated through the design process. Furthermore, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation. Again, this can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, it was identified that the options within this envelope may conflict with Leeds Bradford IFPs and potentially with aircraft operating on the L975 Lower ATS route, both of which can be mitigated through the design process. Furthermore, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation. Again, this can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing SIDs do 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.	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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing SIDs do 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may 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 at 4,000ft - Noise impact at 7,000ft - Air Quality **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 at 4,000ft - Air Quality **Better in the following areas:** - Noise impact at 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 at 4,000ft - Noise impact at 7,000ft - Air Quality **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 at 4,000ft - Air Quality **Better in the following areas:** - Noise impact at 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 IOA Shortlist Assessment methodology, Option 1 L has been deemed the Favourable option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 1 R has been deemed the Favourable option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 4 L has been deemed the Preferred option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 4 R has been deemed the Preferred option within this design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3		FAVOURABLE	FAVOURABLE	PREFERRED	PREFERRED

MAG MAN ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TABLE

Departure Envelope: SID Runway 05 East

			'DO NOTHING' BASELINE		OPTION 1	
			For the east design envelope, the 'do nothing' scenario for departures in terms of today's operation is based around the existing conventional DESIG 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 an RNAV1 replication of the current DESIG 1S/1Z SID and uses fly-over waypoints. As a replicated route it follows a similar track over the ground as the current published route. After departure this takes it straight ahead on a runway heading in a straight line to 7,000ft. This takes it overhead Stockport and Hyde, and to the north of Glossop and it terminates south-west of Holmfirth. There would be no speed restrictions applied to the procedure; therefore, the maximum speed of 250 KIAS below FL100 would apply. This design speed will permit many aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise. Due to the track-to-fix coding and simplicity of the route, dispersion is likely to be low even with maximum speeds.	
Group	**Impact**	**Level of Analysis**	**Runway 05L**	**Runway 05R**	**Runway 05L**	**Runway 05R**
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 DESIG 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 27,200 households with an approximate population of 61,000. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 61,000. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 46,250 households with an approximate population of 104,500. Taking account of 100 planned property developments, this option is estimated to overfly and impact a total population of 104,700.	For comparison purposes within the IOA, the 'do nothing' scenario was based upon the existing DESIG 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 26,600 households with an approximate population of 59,900. Taking account of 100 planned property developments, this option is estimated to overfly and impact a total population of 60,200. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 64,400 households with an approximate population of 145,600. Taking account of 650 planned property developments, this option is estimated to overfly and impact a total population of 147,000.	Up to 4,000ft, this option is estimated to overfly approximately 25,950 households with an approximate population of 58,200. Taking account of zero 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 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 26,100 households with an approximate population of 58,600. Taking account of zero planned property developments, this option is estimated to overfly and impact total population of 58,600. 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 28,850 households with an approximate population of 65,000. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 65,000. 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 29,150 households with an approximate population of 65,700. Taking account of zero planned property developments, this option is estimated to overfly and impact total population of 65,700. 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 05L DESIG SID overflies three AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	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 05R DESIG SID overflies three AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	Option 1 L overflies **three** AQMAs; however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be equally beneficial as it overflies the same number of AQMAs.	Option 1 R overflies **three** AQMAs; however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be equally beneficial 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. 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 fuel burn or 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	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. 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 fuel burn or 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	Option 1 L 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 Option 1 L is 42.58km (22.99nm). When compared to the 'do nothing' scenario, Option 1 L is longer and is therefore expected to emit more greenhouse gases this option is deemed to be of dis-benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 1 R 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 Option 1 R is 44.29km (23.91nm). When compared to the 'do nothing' scenario, Option 1 R is longer and is therefore expected to emit more greenhouse gases this option is deemed to be of 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 DVOR in December 2022.	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 DVOR in December 2022.	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 air or 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 air or 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 but does overfly one National Park.	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 but does overfly one National Park.	Option 1 L overflies no AONBs and one National Park. When compared to the 'do nothing' scenario, Option 1 L is considered to be equal/neutral as it overflies the same number of Tranquillity receptors.	Option 1 R overflies no AONBs and one National Park. When compared to the 'do nothing' scenario, Option 1 R is considered to be equal/neutral as it overflies the same number of Tranquillity receptors.
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 MAN 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 MAN 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 MAN 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 MAN 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 MAN will maintain their current level of access under extant operational arrangements.	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of MAN will maintain their current level of access under extant operational arrangements.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 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.	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 MAN 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 39.91km (21.55nm).	The existing MAN 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 41.23km (22.26nm).	Option 1 L 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 42.58km (22.99nm) long. When compared to the 'do nothing' scenario, Option 1 L is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 1 R 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 44.29km (23.91nm) long. When compared to the 'do nothing' scenario, Option 1 R is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. 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.	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 for MAN 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.	It is not proportionate for MAN 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 for MAN 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 for MAN 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 MAN 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.	No additional infrastructure is required at MAN 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.	No change to operational costs is attributable to maintaining the extant procedures.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; 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.	No deployment costs applicable to extant procedures.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of 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 MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft departing MAN 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.	The 'do nothing' scenario assumes that current operations at MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft departing MAN 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, it was identified that the options within this envelope may conflict with on the L975 Lower ATS route and there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation. Both of which can be mitigated through the design process or procedurally if required. Furthermore, there is the potential for aircraft to 'drop out' of CAS. The mitigation is to design the procedure to remain within CAS. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, it was identified that the options within this envelope may conflict with on the L975 Lower ATS route and there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation. Both of which can be mitigated through the design process or procedurally if required. Furthermore, there is the potential for aircraft to 'drop out' of CAS. The mitigation is to design the procedure to remain within CAS. Further assessment will be conducted at Stage 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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing SIDs do 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.	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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing SIDs do 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may 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 at 4,000ft - Noise impact at 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 at 4,000ft - Greenhouse gas emissions - Fuel burn **Better in the following areas:** - Noise impact at 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 1 L has been Rejected.	Based on the IOA Shortlist Assessment methodology, Option 1 R has been Rejected.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3		REJECTED	REJECTED

	OPTION 4		OPTION 5	
	This is an RNAV1 option to provide an initial route identical to the existing DESIG SID, but with an earlier turn towards the network joining point to the east. This has been done to align with current operational practice and routes it to the southern edge of route L975 in line with the NATS network traffic flow. The design speed will permit many aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise. The route has been designed using fly-by waypoints. 05L: After departure this route combines with the option for 05R and flies straight ahead overflying Stockport and the southern edge of Hyde. It routes to the north-west of Glossop at which point it makes a right turn to route north of Glossop and terminates at 7,000ft just to the north and east of the Woodhead reservoir. 05R: After departure this route combines with the option for 05L and flies straight ahead overflying Stockport and the southern edge of Hyde. It routes to the north-west of Glossop at which point it makes a right turn to route north of Glossop and terminates at 7,000ft just to the north and east of the Woodhead reservoir. There would be no speed restrictions applied to the procedure; therefore, the maximum speed of 250 KIAS below FL100 would apply.		This is an RNAV1 option which provides an initial 15° track adjustment from the runway heading before correcting back to the runway heading (parallel to the existing SID) before turning east north-east of Glossop and Hadfield. This track adjustment is intended to reduce the impact of noise for communities on the extended runway centreline that are also impacted by Runway 23 arrivals. This 15° initial track adjustment from the extended centreline is to a width of 2.25nm parallel to the centreline. It extends to 9nm from the DER on Runway 05L and 8.5nm for Runway 05R. The design speed will permit a large number of aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise, and the option has been designed using track to fix coding. 05L: After passing the DER this route has a 15° track adjustment to the right which routes it south of Stockport. This track continues until just to the south-west of Glossop where it combines with the option for 05R returns to a runway heading. After overflying Glossop it makes a right turn to the east and terminates at 7,000ft just east of the Woodhead reservoir. 05R: After passing the DER this route has a 15° track adjustment to the right which routes it south of Stockport. This track continues until just to the south-west of Glossop where it combines with the option for 05L and returns to a runway heading. After overflying Glossop it makes a right turn to the east and terminates at 7,000ft just east of the Woodhead reservoir. There would be no speed restrictions applied to the procedure; therefore, the maximum speed of 250 KIAS below FL100 would apply. Due to the track-to-fix coding and simplicity of the route, dispersion is likely to be low even with maximum speeds.	
Impact	**Runway 05L**	**Runway 05R**	**Runway 05L**	**Runway 05R**
Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 25,950 households with an approximate population of 58,200. Taking account of zero 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 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 25,950 households with an approximate population of 58,200. Taking account of zero planned property developments, this option is estimated to overfly and impact total population of 58,200. 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 28,850 households with an approximate population of 65,000. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 65,000. 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 29,000 households with an approximate population of 65,400. Taking account of zero planned property developments, this option is estimated to overfly and impact total population of 65,400. 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 15,100 households with an approximate population of 34,900. Taking account of 550 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 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 21,450 households with an approximate population of 49,500. Taking account of 800 planned property developments, this option is estimated to overfly and impact total population of 51,400. 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 15,800 households with an approximate population of 37,700. Taking account of 300 planned property developments, this option is estimated to overfly and impact a total population of 38,400. 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 23,550 households with an approximate population of 55,600. Taking account of 550 planned property developments, this option is estimated to overfly and impact total population of 56,900. 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.
Air Quality	Option 4 L overflies **three** AQMAs; however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be equally beneficial as it overflies the same number of AQMAs.	Option 4 R overflies **three** AQMAs; however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be equally beneficial as it overflies the same number of AQMAs.	Option 5 L overflies one AQMA; however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies less AQMAs.	Option 5 R overflies one AQMA; however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies less AQMAs.
Greenhouse Gas impact	Option 4 L 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 Option 4 L is 39.61km (21.39nm). When compared to the 'do nothing' scenario, Option 4 L shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of dis-benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 4 R 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 Option 4 R is 41.32km (22.31nm). When compared to the 'do nothing' scenario, Option 4 R is longer and is therefore expected to emit more greenhouse gases this option is deemed to be of dis-benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 5 L 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 Option 5 L is 38.38km (20.72nm). When compared to the 'do nothing' scenario, Option 5 L is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 5 R 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 Option 5 R is 40.07km (21.63nm). When compared to the 'do nothing' scenario, Option 5 R is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.
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 air or 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 air or 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 air or 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 air or on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Tranquillity	Option 4 L overflies no AONBs and one National Park. When compared to the 'do nothing' scenario, Option 4 L is considered to be equal/neutral as it overflies the same number of Tranquillity receptors.	Option 4 R overflies no AONBs and one National Park. When compared to the 'do nothing' scenario, Option 4 R is considered to be equal/neutral as it overflies the same number of Tranquillity receptors.	Option 5 L overflies no AONBs and one National Park. When compared to the 'do nothing' scenario, Option 5 L is considered to be equal/neutral as it overflies the same number of Tranquillity receptors.	Option 5 R overflies no AONBs and one National Park. When compared to the 'do nothing' scenario, Option 5 R is considered to be equal/neutral as it overflies the same number of Tranquillity receptors.
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 MAN 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 MAN 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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
Access	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.
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.
Fuel burn	Option 4 L 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 39.61km (21.39nm) long. When compared to the 'do nothing' scenario, Option 4 L is shorter and at this stage it is assumed that less fuel will be burnt. This option is therefore deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 4 R 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 41.32km (22.31nm) long. When compared to the 'do nothing' scenario, Option 4 R is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 5 L 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 38.38km (20.72nm) long. When compared to the 'do nothing' scenario, Option 5 L is shorter and at this stage it is assumed that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 5 R 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 40.07km (21.63nm) long. When compared to the 'do nothing' scenario, Option 5 R is shorter and at this stage it is assumed that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.
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.
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 for MAN 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 for MAN 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 for MAN 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 for MAN to assess the 'other costs' to commercial airlines of flying PBN procedures.
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.
Operational costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Deployment costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Possible hazards have been identified, some of which are extant. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, it was identified that the options within this envelope may conflict with on the L975 Lower ATS route and there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation. Both of which can be mitigated through the design process or procedurally if required. Furthermore, there is the potential for aircraft to 'drop out' of CAS. The mitigation is to design the procedure to remain within CAS. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, it was identified that the options within this envelope may conflict with on the L975 Lower ATS route and there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation. Both of which can be mitigated through the design process or procedurally if required. Furthermore, there is the potential for aircraft to 'drop out' of CAS. The mitigation is to design the procedure to remain within CAS. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, it was identified that the options within this envelope may conflict with on the L975 Lower ATS route and there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation. Both of which can be mitigated through the design process or procedurally if required. Furthermore, there is the potential for aircraft to 'drop out' of CAS. The mitigation is to design the procedure to remain within CAS. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, it was identified that the options within this envelope may conflict with on the L975 Lower ATS route and there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation. Both of which can be mitigated through the design process or procedurally if required. Furthermore, there is the potential for aircraft to 'drop out' of CAS. The mitigation is to design the procedure to remain within CAS. Further assessment will be conducted at Stage 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: **Better in the following areas:** - Noise impact at 4,000ft - Noise impact at 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 at 4,000ft - Greenhouse gas emissions - Fuel burn **Better in the following areas:** - Noise impact at 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: **Better in the following areas:** - Noise impact at 4,000ft - Noise impact at 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. 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: **Better in the following areas:** - Noise impact at 4,000ft - Noise impact at 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. 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 4 L has been deemed the Acceptable option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 4 R has been deemed the Acceptable option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 5 L has been deemed the Favourable option within this design envelope..	Based on IOA Shortlist Assessment methodology, Option 5 R has been deemed the Favourable option within this design envelope.
OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	ACCEPTABLE	ACCEPTABLE	FAVOURABLE	FAVOURABLE

	OPTION 6		OPTION 7	
	This is an RNAV1 option to provide an initial route identical to the existing DESIG SID, but with an earlier turn towards the network joining point to the east. This has been done to align with current operational practice and routes it to the southern edge of route L975 in line with the NATS network traffic flow. This option has a similar profile to option 4 but the right turn takes place approximately 2.5nm earlier. The design speed will permit many aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise. The route has been designed using fly-by waypoints. 05L: After departure, this route combines with the option for 05R and flies straight ahead overflying Stockport and the southern edge of Hyde. It routes to the west of Glossop at which point it makes a right turn to the east to the north of Glossop and terminates at 7,000ft overhead the Woodhead reservoir. 05R: After departure, this route combines with the option for 05L and flies straight ahead overflying Stockport and the southern edge of Hyde. It routes to the west of Glossop at which point it makes a right turn to the east to the north of Glossop and terminates at 7,000ft overhead the Woodhead reservoir. There would be no speed restrictions applied to the procedure; therefore, the maximum speed of 250 KIAS below FL100 would apply.		This is an RNAV1 option that seeks to provide the shortest (most fuel efficient) route to the network joining point by using the earliest turn to the east, taking account of the constraints created by the base of controlled airspace. It has a similar profile to options 4 and 6 except aircraft make the first right turn just north of Stockport to route to the network joining point. The position of this first turn is dictated by the dimensions of the controlled airspace to the east of Glossop which do not permit a turn and a direct route from an earlier point. The design speed will permit many aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise. The route has been designed using fly-by waypoints. 05L: After departure, this route combines with the option for 05R and flies straight ahead overflying Stockport. Upon reaching Bredbury the route turns right to route south of Hyde and routes direct to the east to terminates at 7,000ft to the east of the Woodhead reservoir. 05R: After departure, this route combines with the option for 05L and flies straight ahead overflying Stockport. Upon reaching Bredbury the route turns right to route south of Hyde and routes direct to the east to terminates at 7,000ft to the east of the Woodhead reservoir. There would be no speed restrictions applied to the procedure; therefore, the maximum speed of 250 KIAS below FL100 would apply.	
Impact	**Runway 05L**	**Runway 05R**	**Runway 05L**	**Runway 05R**
Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 25,950 households with an approximate population of 58,200. Taking account of zero 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 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 27,150 households with an approximate population of 60,900. Taking account of zero planned property developments, this option is estimated to overfly and impact 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 28,800 households with an approximate population of 65,000. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 65,000. 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 30,200 households with an approximate population of 68,000. Taking account of zero planned property developments, this option is estimated to overfly and impact total population of 68,000. 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 23,550 households with an approximate population of 51,300. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 51,300. 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 29,100 households with an approximate population of 63,900. Taking account of 100 planned property developments, this option is estimated to overfly and impact total population of 64,200. 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 26,100 households with an approximate population of 57,400. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 57,400. 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 32,150 households with an approximate population of 71,000. Taking account of 100 planned property developments, this option is estimated to overfly and impact total population of 71,200. 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.
Air Quality	Option 6 L overflies three AQMAs; however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be equally beneficial as it overflies the same number of AQMAs.	Option 6 R overflies three AQMAs; however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be equally beneficial as it overflies the same number of AQMAs.	Option 7 L overflies three AQMAs; however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be equally beneficial as it overflies the same number of AQMAs.	Option 7 R overflies three AQMAs; however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be equally beneficial as it overflies the same number of AQMAs.
Greenhouse Gas impact	Option 6 L 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 Option 6 L is 38.84km (20.97nm). When compared to the 'do nothing' scenario, Option 6 L is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 6 R 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 Option 6 R is 40.54km (21.89nm). When compared to the 'do nothing' scenario, Option 6 R is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 7 L 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 Option 7 L is 38.80km (20.95nm). When compared to the 'do nothing' scenario, Option 7 L is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 7 R 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 Option 7 R is 40.51km (21.87nm). When compared to the 'do nothing' scenario, Option 7 R is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.
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 air or 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 air or 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 air or 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 air or on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Tranquillity	Option 6 L overflies no AONBs and one National Park. When compared to the 'do nothing' scenario, Option 6 L is considered to be equal/neutral as it overflies the same number of Tranquillity receptors.	Option 6 R overflies no AONBs and one National Park. When compared to the 'do nothing' scenario, Option 6 R is considered to be equal/neutral as it overflies the same number of Tranquillity receptors.	Option 7 L overflies no AONBs and one National Park. When compared to the 'do nothing' scenario, Option 7 L is considered to be equal/neutral as it overflies the same number of Tranquillity receptors.	Option 7 R overflies no AONBs and one National Park. When compared to the 'do nothing' scenario, Option 7 R is considered to be equal/neutral as it overflies the same number of Tranquillity receptors.
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 MAN 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 MAN 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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
Access	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.
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.
Fuel burn	Option 6 L 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 38.84km (20.97nm) long. When compared to the 'do nothing' scenario, Option 6 L is shorter and at this stage it is assumed that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 6 R 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 40.54km (21.89nm) long. When compared to the 'do nothing' scenario, Option 6 R is shorter and at this stage it is assumed that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 7 L 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 38.80km (20.95nm) long. When compared to the 'do nothing' scenario, Option 7 L is shorter and at this stage it is assumed that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 7 R 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 40.51km (21.87nm) long. When compared to the 'do nothing' scenario, Option 7 R is shorter and at this stage it is assumed that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.
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.
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 for MAN 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 for MAN 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 for MAN 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 for MAN to assess the 'other costs' to commercial airlines of flying PBN procedures.
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.
Operational costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Deployment costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Possible hazards have been identified, some of which are extant. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, it was identified that the options within this envelope may conflict with on the L975 Lower ATS route and there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation. Both of which can be mitigated through the design process or procedurally if required. Furthermore, there is the potential for aircraft to 'drop out' of CAS. The mitigation is to design the procedure to remain within CAS. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, it was identified that the options within this envelope may conflict with on the L975 Lower ATS route and there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation. Both of which can be mitigated through the design process or procedurally if required. Furthermore, there is the potential for aircraft to 'drop out' of CAS. The mitigation is to design the procedure to remain within CAS. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, it was identified that the options within this envelope may conflict with on the L975 Lower ATS route and there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation. Both of which can be mitigated through the design process or procedurally if required. Furthermore, there is the potential for aircraft to 'drop out' of CAS. The mitigation is to design the procedure to remain within CAS. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, it was identified that the options within this envelope may conflict with on the L975 Lower ATS route and there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation. Both of which can be mitigated through the design process or procedurally if required. Furthermore, there is the potential for aircraft to 'drop out' of CAS. The mitigation is to design the procedure to remain within CAS. Further assessment will be conducted at Stage 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: **Better in the following areas:** - Noise impact at 4,000ft - Noise impact at 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 at 4,000ft **Better in the following areas:** - Noise impact at 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: **Better in the following areas:** - Noise impact at 4,000ft - Noise impact at 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: **Better in the following areas:** - Noise impact at 4,000ft - Noise impact at 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 6 L has been Rejected.	Based on the IOA Shortlist Assessment methodology, Option 6 R has been Rejected.	Based on the IOA Shortlist Assessment methodology, Option 7 L has been Rejected.	Based on the IOA Shortlist Assessment methodology, Option 7 R has been Rejected.
OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	REJECTED	REJECTED	REJECTED	REJECTED

	OPTION 8	
	This is an RNAV1 option created to provide a 45° track divergence from northbound departures and enable a one-minute departure separation to align with the Design Principle Capacity. This one-minute separation between north and eastbound departures is not possible on other options within this design envelope all of which will all require two minutes separation. In line with CAP493 Manual of Air Traffic Services Pt1, the minimum departure separation can be reduced to one minute provided that the aircraft fly on tracks diverging by 45° or more immediately after take-off. This right turn also has a benefit in reducing the impact of noise for communities on the extended runway centreline that are impacted by Runway 23 arrivals and Runway 05 north departures. The design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise. This option has a right turn no earlier than 1nm from DER, which is in accordance with CAP778. The route has been designed as an RNAV1 route using fly-over and fly-by waypoints. 05L: After departure, this route makes a 45° turn to the right at 1nm from the DER and combines with the option for 05R. This routes it overhead Hazel Grove after which it makes a second turn to the left to route in a north-easterly direction. It overflies Glossop before making a final right turn to the east and terminates at 7,000ft to the Woodhead reservoir. 05R After departure this route makes a 45° turn to the right at approximately 2.1nm from the DER and combines with the option for 05L. This routes it overhead Hazel Grove after which it makes a second turn to the left to route in a north-easterly direction. It overflies Glossop before making a final right turn to the east and terminates at 7,000ft to the Woodhead reservoir. A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.	
Impact	**Runway 05L**	**Runway 05R**
Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 8,750 households with an approximate population of 21,000. Taking account of 100 planned property developments, this option is estimated to overfly and impact a total population of 21,300. 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 16,900 households with an approximate population of 39,300. Taking account of 250 planned property developments, this option is estimated to overfly and impact total population of 39,800. 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 10,700 households with an approximate population of 25,900. Taking account of 100 planned property developments, this option is estimated to overfly and impact a total population of 26,100. 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 18,900 households with an approximate population of 44,100. Taking account of 250 planned property developments, this option is estimated to overfly and impact total population of 44,700. 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.
Air Quality	Option 8 L overflies two AQMAs; however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies less AQMAs.	Option 8 R overflies two AQMAs; however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies less AQMAs.
Greenhouse Gas impact	Option 8 L 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 Option 8 L is 40.93km (22.10nm). When compared to the 'do nothing' scenario, Option 8 L is longer and is therefore expected to emit more greenhouse gases this option is deemed to be of dis-benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 8 R 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 Option 8 R is 42.5km (22.95nm). When compared to the 'do nothing' scenario, Option 8 R is longer and is therefore expected to emit more greenhouse gases this option is deemed to be of dis-benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.
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 air or 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 air or on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
Tranquillity	Option 8 L overflies no AONBs and one National Park. When compared to the 'do nothing' scenario, Option 8 L is considered to be equal/neutral as it overflies the same number of Tranquillity receptors.	Option 8 R overflies no AONBs and one National Park. When compared to the 'do nothing' scenario, Option 8 R is considered to be equal/neutral as it overflies the same number of Tranquillity receptors.
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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
Access	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.
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.
Fuel burn	Option 8 L 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 40.93km (22.10nm) long. When compared to the 'do nothing' scenario, Option 8 L is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 8 R 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 42.50km (22.95nm) long. When compared to the 'do nothing' scenario, Option 8 R is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.
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.
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 for MAN 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 for MAN to assess the 'other costs' to commercial airlines of flying PBN procedures.
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.
Operational costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Deployment costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Possible hazards have been identified, some of which are extant. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, it was identified that the options within this envelope may conflict with on the L975 Lower ATS route and there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation. Both of which can be mitigated through the design process or procedurally if required. Furthermore, there is the potential for aircraft to 'drop out' of CAS. The mitigation is to design the procedure to remain within CAS. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, it was identified that the options within this envelope may conflict with on the L975 Lower ATS route and there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation. Both of which can be mitigated through the design process or procedurally if required. Furthermore, there is the potential for aircraft to 'drop out' of CAS. The mitigation is to design the procedure to remain within CAS. Further assessment will be conducted at Stage 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 at 4,000ft - Noise impact at 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 at 4,000ft - Noise impact at 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 8 L has been deemed the Preferred option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 8 R has been deemed the Preferred option within this design envelope.
OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	PREFERRED	PREFERRED

MAG MAN ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TABL

Departure Envelope: SID Runway 05 South

'DO NOTHING' BASELINE: For the south design envelope, the 'do nothing' scenario for departures in terms of today's operation is based around the existing conventional LISTO 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.

SOUTH RIGHT TURN OPTIONS

OPTION 1: Option 1 is included to provide an RNAV1 replication of the existing conventional LISTO 2S/2Z SID. As a replicated route it follows a similar track over the ground as the current route to connect to the NATS network.
The fly-over waypoints for the right turn to the south are positioned at the position of the existing markers. For Runway 05L this is at the MCT D1.2 point which less than 1nm from DER but as this replicates the turn of the current procedure it aligns to the Design Principle Safety.
After departure the routes turn right to pass overhead Cheadle Hulme at which point they combine. They then pass just to the west of Woodford and Macclesfield and overfly Congleton and terminate at 7,000ft just west of Biddulph.
An element of dispersion will be present in the right turn to the south due to the fly-over coding and the variables that affect this. This is seen currently with the conventional procedure.
A speed restriction of 185 KIAS is used for the first turn.

OPTION 3: This is an RNP1 option with RF coding to provide a tight right turn then routing south-west to align with current operational practice. The track following the right turn is often used by ATC to resolve interactions between flights on the LISTO departure and MAN arrivals from the south. This option therefore re-creates common operational practice above 4,000ft.
In the case of 05L, the turn point is at a minimum distance of 1nm from the DER, in accordance with PANS-OPS and CAP778. The turn point for 05R is located at a point roughly perpendicular to 05L, to create a similar ground track in the turn and subsequent leg.
05L: After departure this route turns right shortly after Heald Green in a tight radius turn that routes it inside of Poynton. This turn is continued onto a south-west heading to take it south of Wilmslow and Alderley Edge. It makes a left turn to head south to the north of Holmes Chapel and terminates at 7,000ft east of Middlewich.
05R After departure this route turns right shortly after Heald Green in a tight radius turn that routes it inside of Poynton. This turn is continued onto a south west heading to take it south of Wilmslow and Alderley Edge. It makes a left turn to head south to the north of Holmes Chapel and terminates at 7,000ft east of Middlewich.
A speed restriction of 190 KIAS is applied to the first turn which allows the smallest radius. Although PANS-OPS compliant it should be tested for flyability as part of the procedure validation process within Stage 4 of CAP1616.

OPTION 6A: This is an RNP1 option with RF coding to provide a tight right turn to route south-west to align with current operational practice. It is similar to option 3 initially but uses a higher speed in the initial turn which allow aircraft to climb more quickly, and it then turns south earlier.
This design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.
The track following the right turn is often used by ATC to resolve interactions between flights on the LISTO departure and MAN arrivals from the south. This option therefore re-creates common operational practice above 4,000ft.
In the case of 05L, the turn point is at a minimum distance of 1nm from the DER, in accordance with PANS-OPS and CAP778. The turn point for Runway 05R is located at a point roughly perpendicular to Runway 05L, to create a similar ground track in the turn and subsequent leg.
05L: After departure, this route turns right shortly after Heald Green to route overhead Poynton. This turn is continued onto a south-west heading to take it south of Wilmslow and Alderley Edge and west of Macclesfield. It makes a left turn to head south at Chelford and terminates at 7,000ft east of Holmes Chapel.
05R: After departure, this route turns right shortly after Heald Green to route overhead Poynton. This turn is continued onto a south-west heading to take it south of Wilmslow and Alderley Edge and west of Macclesfield. It makes a left turn to head south at Chelford and terminates at 7,000ft east of Holmes Chapel.
A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.

OPTION 6B: This is an RNP1 option with RF coding to provide a tight right turn to route south-west to align with current operational practice. It is identical to option 6 in the speed and initial right turn but has a left turn to the south earlier to follow the course of the A34 which has a level of ambient noise.
This design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.
The track following the right turn is often used by ATC to resolve interactions between flights on the LISTO departure and MAN arrivals from the south. This option therefore re-creates common operational practice above 4,000ft.
In the case of 05L, the turn point is at a minimum distance of 1nm from the DER, in accordance with PANS-OPS and CAP778. The turn point for Runway 05R is located at a point roughly perpendicular to Runway 05L, to create a similar ground track in the turn and subsequent leg.
05L: After departure, this route turns right shortly after Heald Green to route overhead Poynton. This turn is continued onto a south-west heading to take it south of Wilmslow and Alderley Edge and west of Macclesfield. It makes a left turn to head south between Chelford and Macclesfield, roughly following the A34 road to terminate at 7,000ft just north of Congleton.
05R: After departure, this route turns right shortly after Heald Green to route overhead Poynton. This turn is continued onto a south-west heading to take it south of Wilmslow and Alderley Edge and west of Macclesfield. It makes a left turn to head south between Chelford and Macclesfield, roughly following the A34 road to terminate at 7,000ft just north of Congleton.
A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.
Option 6B for Runway 05L was rejected at the DPE stage and has therefore not been assessed.

SOUTH LEFT TURN OPTIONS

OPTION 8: This is an RNP1 option with RF coding that turns left after departure with the tightest radius possible to reduce track miles. This requires a speed restriction to allow the smaller turn radius.
In the case of 05L, the turn point is at a minimum distance of 1nm from the DER, in accordance with PANS-OPS and CAP778 recommendation. The turn point for Runway 05R is located at a point roughly perpendicular to Runway 05L, to create a similar ground track in the turn and subsequent leg.
Although this option creates more track miles to route to the south, it is the shortest of the left turn options. In addition, because of the large number of southbound departures it has potential to aid departure flow and achieving 1-minute splits for southbound SIDs to align to the Design Principle Capacity.
05L: After departure this route turns left shortly after Heald Green to route overhead Cheadle, West Didsbury and Sale. It then heads south-west for a straight segment and passes just north of Altrincham where it turns slightly south-east and combines with the route for 05R to pass east of Knutsford and terminate at 7,000ft.
05R: After departure this route turns left shortly after Heald Green to route overhead Cheadle, West Didsbury and Sale. It then heads south-west for a straight segment and passes just north of Altrincham where it turns slightly south-east and combines with the route for 05L to pass east of Knutsford and terminates at 7,000ft.
A speed restriction of 190 KIAS has been applied to the first turn which allows the smallest radius. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.

OPTION 9: This is an RNP1 option with RF coding that turns left after departure with the tightest radius possible to reduce track miles. It is similar to option 8 but terminates slightly further west.
In the case of 05L, the turn point is at a minimum distance of 1nm from the DER, in accordance with PANS-OPS and CAP778. The turn point for Runway 05R is located at a point roughly perpendicular to Runway 05L, to create a similar ground track in the turn and subsequent leg.
Although this option creates more track miles to route to the south, it is only slightly more track miles than option 8 which is shortest. Because of the large number of southbound departures it has potential to aid departure flow and achieving one minute splits for southbound SIDs.
05L: After departure this route turns left shortly after Heald Green to route overhead Cheadle, West Didsbury and Sale. It then heads south-west for a straight segment and passes just north of Altrincham where it turns south and combines with the route for 05R to pass west of Knutsford and terminates at 7,000ft.
05R: After departure this route turns left shortly after Heald Green to route overhead Cheadle, West Didsbury and Sale. It then heads south-west for a straight segment and passes just north of Altrincham where it turns south and combines with the route for 05L to pass west of Knutsford and terminates at 7,000ft.
A speed restriction of 190 KIAS applied to the first turn which allows the smallest radius. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.

OPTION 10: This is an RNP1 option with RF coding that turns left after departure. It routes mid-way between the other options in this envelope. Although this option creates more track miles to route to the south, because of the large number of southbound departures it has potential to aid departure flow and achieving one minute splits for southbound SIDs.
The design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.
In the case of 05L, the turn point is at a minimum distance of 1nm from the DER, in accordance with PANS-OPS and CAP778. The turn point for Runway 05R is located at a point roughly perpendicular to Runway 05L, to create a similar ground track in the turn and subsequent leg.
05L: After departure this route turns left shortly after Heald Green to route overhead Cheadle, Chorlton and Sale. It then heads south-west for a straight segment and passes just north of Altrincham where it turns south and combines with the route for 05R to pass west of Knutsford and terminates at 7,000ft.
05R: After departure this route turns left shortly after Heald Green to route overhead Cheadle, Chorlton and Sale. It then heads south-west for a straight segment and passes just north of Altrincham where it turns south and combines with the route for 05L to pass west of Knutsford and terminates at 7,000ft.
A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.

Group	Impact	Level of Analysis	'Do Nothing' Runway 05L	'Do Nothing' Runway 05R	Option 1 Runway 05L	Option 1 Runway 05R	Option 3 Runway 05L	Option 3 Runway 05R	Option 6A Runway 05L	Option 6A Runway 05R	Option 6B Runway 05L (Not Assessed)	Option 6B Runway 05R	Option 8 Runway 05L	Option 8 Runway 05R	Option 9 Runway 05L	Option 9 Runway 05R	Option 10 Runway 05L	Option 10 Runway 05R
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 LISTO 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 6,100 households with an approximate population of 14,900. Taking account of 100 planned property developments, this option is estimated to overfly and impact a total population of 15,100. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 28,550 households with an approximate population of 65,800. Taking account of 3,250 planned property developments, this option is estimated to overfly and impact a total population of 73,300.	For comparison purposes within the IOA, the 'do nothing' scenario was based upon the existing LISTO 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 9,150 households with an approximate population of 22,500. Taking account of 800 planned property developments, this option is estimated to overfly and impact a total population of 24,500. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 12,400 households with an approximate population of 30,200. Taking account of 1,250 planned property developments, this option is estimated to overfly and impact a total population of 33,200.	Up to 4,000ft, this option is estimated to overfly approximately 5,750 households with an approximate population of 13,700. Taking account of 550 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 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 17,950 households with an approximate population of 40,800. Taking account of 2,450 planned property developments, this option is estimated to overfly and impact total population of 46,400. 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 7,950 households with an approximate population of 19,400. Taking account of 650 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 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 20,150 households with an approximate population of 46,600. Taking account of 2,500 planned property developments, this option is estimated to overfly and impact total population of 52,400. 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 4,900 households with an approximate population of 11,900. Taking account of 150 planned property developments, this option is estimated to overfly and impact a total population of 12,200. 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 6,750 households with an approximate population of 16,200. Taking account of 500 planned property developments, this option is estimated to overfly and impact total population of 17,400. 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 6,950 households with an approximate population of 16,800. Taking account of 200 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. Up to 7,000ft, this option is estimated to overfly approximately 8,800 households with an approximate population of 21,200. Taking account of 600 planned property developments, this option is estimated to overfly and impact total population of 22,600. 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 8,800 households with an approximate population of 20,800. Taking account of 200 planned property developments, this option is estimated to overfly and impact a total population of 21,300. 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 10,300 households with an approximate population of 24,100. Taking account of 550 planned property developments, this option is estimated to overfly and impact total population of 25,400. 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 9,500 households with an approximate population of 22,800. Taking account of 200 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 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 11,000 households with an approximate population of 26,100. Taking account of 550 planned property developments, this option is estimated to overfly and impact total population of 27,400. 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 9,550 households with an approximate population of 22,900. Taking account of 200 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 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 16,700 households with an approximate population of 38,300. Taking account of 2,200 planned property developments, this option is estimated to overfly and impact total population of 43,400. 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 41,500 households with an approximate population of 99,500. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 99,500. 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 48,150 households with an approximate population of 115,000. Taking account of 450 planned property developments, this option is estimated to overfly and impact total population of 116,100. 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 41,800 households with an approximate population of 98,200. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 98,200. 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 49,850 households with an approximate population of 116,900. Taking account of 450 planned property developments, this option is estimated to overfly and impact total population of 118,000. 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.	Up to 4,000ft, this option is estimated to overfly approximately 41,550 households with an approximate population of 99,600. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 99,600. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affec more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 48,650 households with an approximate population of 115,700. Taking account of 550 planned property developments, this option is estimated to overfly and impact total population of 117,000. 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.	Up to 4,000ft, this option is estimated to overfly approximately 41,850 households with an approximate population of 98,500. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 98,500. 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 50,200 households with an approximate population of 117,500. Taking account of 550 planned property developments, this option is estimated to overfly and impact total population of 118,700. 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 42,800 households with an approximate population of 108,400. Taking account of zero 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 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 52,300 households with an approximate population of 130,800. Taking account of 550 planned property developments, this option is estimated to overfly and impact total population of 132,200. 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.	Up to 4,000ft, this option is estimated to overfly approximately 41,050 households with an approximate population of 101,200. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 101,200. 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 52,600 households with an approximate population of 128,600. Taking account of 550 planned property developments, this option is estimated to overfly and impact total population of 130,000. 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 05L LISTO SID overflies six AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	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 05R LISTO SID overflies three AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	Option 1 L overflies four AQMA(s); however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of a dis-benefit as it overflies fewer AQMAs.	Option 1 R overflies four AQMA(s); however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of a dis-benefit as it overflies more AQMAs.	Option 3 L overflies two AQMA(s); however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Option 3 R overflies two AQMA(s); however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Option 6A L overflies two AQMA(s); however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Option 6A R overflies two AQMA(s); however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.		Option 6B R overflies two AQMA(s); however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Option 8 L overflies four AQMA(s); however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Option 8 R overflies four AQMA(s); however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of a dis-benefit as it overflies more AQMAs.	Option 9 L overflies four AQMA(s); however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Option 9 R overflies four AQMA(s); however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of a dis-benefit as it overflies more AQMAs.	Option 10 L overflies four AQMA(s); however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Option 10 R overflies four AQMA(s); however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of a dis-benefit as it overflies more AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Wider Society	Biodiversity	Initial Options Appraisal: Qualitative	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
General Aviation	Access	Initial Options Appraisal: Qualitative	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
General Aviation / commercial airlines	Economic impact from increased effective capacity	Initial Options Appraisal: Qualitative	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Commercial airlines	Training costs	Initial Options Appraisal: Qualitative	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		Summary of Analysis	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		IOA Shortlist Assessment			Based on IOA Shortlist Assessment methodology, Option 1 L has been deemed the Favourable option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 1 R has been deemed the Favourable option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 3 L has been deemed the Preferred option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 3 R has been deemed the Preferred option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 6A L has been deemed the Acceptable option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 6A R has been deemed the Acceptable option within this design envelope.		[illegible]	Based on IOA Shortlist Assessment methodology, Option 8 L has been deemed the Preferred option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 8 R has been deemed the Preferred option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 9 L has been deemed the Favourable option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 9 R has been deemed the Favourable option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 10 L has been deemed the Acceptable option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 10 R has been deemed the Acceptable option within this design envelope.
		OPTION SHORTLIST CLASSIFICATION FOR STAGE 3			FAVOURABLE	FAVOURABLE	PREFERRED	PREFERRED	ACCEPTABLE	ACCEPTABLE		REJECTED	PREFERRED	PREFERRED	FAVOURABLE	FAVOURABLE	ACCEPTABLE	ACCEPTABLE

MAG MAN ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TABLE

Departure Envelope: SID Runway 05 West

			'DO NOTHING' BASELINE		OPTION 1		OPTION 4B		OPTION 6A		OPTION 7	
			For the west design envelope, the 'do nothing' scenario for departures in terms of today's operation is based around the existing conventional ASMIM 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 option is included to provide a RNAV1 replication of the existing conventional ASMIM 1S/1Z SID. It uses a fly-over waypoint with Course-to-Fix (CF) path terminator coding and an element of dispersion would be apparent in the turn due to this coding As a replicated route it follows a similar track over the ground as the current route. After departure this involves a right turn to pass overhead Cheadle at which point the routes combine. They then pass just to the west of Didsbury and overfly Stretford and Urmston. The routes make a left turn just north of Irlam and route west to terminate at 7,000ft to the north of Warrington at Earlestown. A speed restriction of 185 KIAS is used for the first turn to replicate the existing 298° course to XOBRO, although this can be increased if it proves flyability issues. A higher speed would result in greater track dispersal in the first turn. This flyability will be conducted as part of the procedure validation process within Stage 4 of CAP1616.		This is an RNP1 that uses RF coding to provide a single initial turn to create a fuel-efficient route to the network joining point to the west. It differs from option 4A in that the turn is at the earliest PANS-OPS compliant position from 05L to create the shortest route possible at this design speed. Because of the turn positions used, the routes are separate for their duration and do not combine until the 7,000ft which creates a small element of dispersal. 05L: After departure this route turns left at the earliest PANS-OPS compliant position (1nm from DER). This is a single left turn that takes it overhead Cheadle and West Didsbury before completing the left turn heading in a westerly direction to the south of Chorlton. It continues west to route just north of Sale and terminates at 7,000ft north of Warrington where the two routes combine. 05R: After departure this route turns left at a point that is perpendicular with the turn point for the 05L option. This is a single left turn that takes it overhead Cheadle and West Didsbury before completing the left turn heading in a westerly direction to the south of Chorlton. It continues west to route just north of Sale and terminates at 7,000ft north of Warrington where the two routes combine. A speed restriction of 190 KIAS is used for the first turn which allows the smallest radius. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.		This is an RNP1 that uses RF coding to provide a single initial turn based on the position of the current turn to create a fuel-efficient route to the network joining point to the west. It is similar to option 5A but is designed with a higher speed of 220kts speed intended to allow aircraft to use the route in a more aerodynamic configuration. The greater speed results in a wider track, which may aid vertical separation from MAN arriving traffic from the north. It will also permit a larger number of aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise. 05L: After departure this route makes a single left turn just after Cheadle which takes it east of Burnage and overhead Fallowfield. The left turn is completed heading in a westerly direction overhead Old Trafford where the routes combine and continue west to route north of Stretford, Urmston and Irlam. It terminates at 7,000ft north of Warrington to the east of Earlestown. 05R: After departure this route makes a single left turn just after Cheadle which takes it east of Burnage and overhead Rusholme. The left turn is completed heading in a westerly direction overhead Old Trafford where the routes combine and continue west to route north of Stretford, Urmston and Irlam. It terminates at 7,000ft north of Warrington to the east of Earlestown. A speed restriction of 220 KIAS is used for the first turn which allows most aircraft to fly in a clean configuration.		This is an RNP1 option that uses RF coding to provide a similar route to that of option 4B, but it uses an initial 15° track adjustment to the left from the DER for Runway 05L, and a 5° adjustment for Runway 05R. This is to provide noise relief for the Cheadle area, which lies underneath the approach path for Runways 23L/23R arrivals. After this track adjustment it has a single initial turn at the earliest PANS-OPS compliant position to create a fuel-efficient route to the network joining point to the west. 05L: After passing the DER aircraft make a 15° track adjustment to the left (north) and then turn left at the earliest PANS-OPS compliant position (1nm from DER). This is a single left turn that takes it to the west side of Cheadle and then overhead West Didsbury before completing the left turn heading in a westerly direction to the south of Chorlton where the two routes combine. It continues west to route just north of Sale and terminates at 7,000ft north-west of Warrington. 05R: After passing the DER aircraft make a 5° track adjustment to the left (north) and then turn left at a point that is abeam the turn point for 05L. This is a single left turn that takes it to the west side of Cheadle and then overhead Didsbury before completing the left turn heading in a westerly direction to the south of Chorlton where the two routes combine. It continues west to route just north of Sale and terminates at 7,000ft north-west of Warrington. A speed restriction of 190 KIAS is used for the first turn which allows the smallest radius. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.	
Group	Impact	Level of Analysis	Runway 05L	Runway 05R	Runway 05L	Runway 05R	Runway 05L	Runway 05R	Runway 05L	Runway 05R	Runway 05L	Runway 05R
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 ASMIM 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 30,650 households with an approximate population of 72,000. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 72,000. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 101,550 households with an approximate population of 241,200. Taking account of 1,800 planned property developments, this option is estimated to overfly and impact a total population of 245,500.	For comparison purposes within the IOA, the 'do nothing' scenario was based upon the existing ASMIM 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 27,000 households with an approximate population of 63,000. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 63,000. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 131,250 households with an approximate population of 316,500. Taking account of 1,350 planned property developments, this option is estimated to overfly and impact a total population of 319,700.	Up to 4,000ft, this option is estimated to overfly approximately 24,100 households with an approximate population of 57,300. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 57,300. 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 36,550 households with an approximate population of 86,100. Taking account of 1,000 planned property developments, this option is estimated to overfly and impact total population of 88,400. 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 26,400 households with an approximate population of 63,000. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 63,000. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect the same amount of people as the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 39,500 households with an approximate population of 93,300. Taking account of 1,000 planned property developments, this option is estimated to overfly and impact total population of 95,600. 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 23,950 households with an approximate population of 55,400. Taking account of 600 planned property developments, this option is estimated to overfly and impact a total population of 56,800. 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 54,250 households with an approximate population of 125,500. Taking account of 3,050 planned property developments, this option is estimated to overfly and impact total population of 132,500. 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 29,600 households with an approximate population of 67,800. Taking account of 400 planned property developments, this option is estimated to overfly and impact a total population of 68,700. 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 60,850 households with an approximate population of 140,200. Taking account of 3,150 planned property developments, this option is estimated to overfly and impact total population of 147,400. 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 45,300 households with an approximate population of 121,100. Taking account of 1,400 planned property developments, this option is estimated to overfly and impact a total population of 124,900. 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 64,700 households with an approximate population of 168,800. Taking account of 1,700 planned property developments, this option is estimated to overfly and impact total population of 173,300. 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 48,450 households with an approximate population of 130,100. Taking account of 1,400 planned property developments, this option is estimated to overfly and impact a total population of 133,800. 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 71,650 households with an approximate population of 187,000. Taking account of 1,750 planned property developments, this option is estimated to overfly and impact total population of 191,600. 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 22,800 households with an approximate population of 52,900. Taking account of 1,800 planned property developments, this option is estimated to overfly and impact a total population of 57,100. 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 52,200 households with an approximate population of 121,800. Taking account of 4,200 planned property developments, this option is estimated to overfly and impact total population of 131,600. 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 26,600 households with an approximate population of 60,600. Taking account of 1,150 planned property developments, this option is estimated to overfly and impact a total population of 63,200. 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 59,900 households with an approximate population of 138,500. Taking account of 4,200 planned property developments, this option is estimated to overfly and impact total population of 148,200. 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.
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 05L ASMIM SID overflies five AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	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 05R ASMIM SID overflies five AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	Option 1 L overflies eight AQMA(s); however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of dis-benefit as it overflies more AQMAs.	Option 1 R overflies eight AQMA(s); however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of dis-benefit as it overflies more AQMAs.	Option 4 B overflies six AQMA(s); however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of dis-benefit as it overflies more AQMAs.	Option 4B R overflies six AQMA(s); however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of dis-benefit as it overflies more AQMAs.	Option 6A L overflies five AQMA(s); however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be equally beneficial as it overflies the same number of AQMAs.	Option 6A R overflies five AQMA(s); however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be equally beneficial as it overflies the same number of AQMAs.	Option 7 L overflies six AQMA(s); however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of dis-benefit as it overflies more AQMAs.	Option 7 R overflies six AQMA(s); however, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, 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 40.47km (21.85nm).	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 fuel burn or 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 42.26km (22.82nm).	Option 1 L 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 Option 1 L is 39.23km (21.18nm). When compared to the 'do nothing' scenario, Option 7 L is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 1 R 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 Option 1 R is 41.37km (22.34nm). When compared to the 'do nothing' scenario, Option 1 R is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 4 B L 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 Option 4B L is 38.38km (20.72nm). When compared to the 'do nothing' scenario, Option 4 B L is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 4B R 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 Option 4B R is 40.34km (21.78nm). When compared to the 'do nothing' scenario, Option 4B R is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 6A L 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 Option 6A L is 42.63km (23.02nm). When compared to the do nothing' scenario, Option 6A L is longer and is therefore expected to emit more greenhouse gases this option is deemed to be of dis-benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 6A R 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 Option 6A R is 44.87km (24.23nm). When compared to the do nothing' scenario, Option 6A R is longer and is therefore expected to emit more greenhouse gases this option is deemed to be of dis-benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 7 L 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 Option 7 L is 36.37km (19.64nm). When compared to the do nothing' scenario, Option 7 L is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 7 R 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 Option 7 R is 39.57km (21.36nm). When compared to the do nothing' scenario, Option 7 R is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of 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 DVOR in December 2022.	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 DVOR in December 2022.	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 air or on the ground). The reduction of the reliance on outdated ground based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground based navigational aid 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 air or 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 air or on the ground). The reduction of the reliance on outdated ground based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground based navigational aid 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.	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.	Option 1 L overflies no AONBs and no National Parks. When compared to the 'do nothing' scenario, Option 1 L is considered to be equally beneficial as it overflies no Tranquillity receptors.	Option 1 R overflies no AONBs and National Parks. When compared to the 'do nothing' scenario, Option 1 R is considered to be equally beneficial as it overflies no Tranquillity receptors.	Option 1 R overflies no AONBs and National Parks. When compared to the 'do nothing' scenario, Option 1 R is considered to be equally beneficial as it overflies no Tranquillity receptors.	Option 4B R overflies no AONBs and National Parks. When compared to the 'do nothing' scenario, Option 1 R is considered to be equally beneficial as it overflies no Tranquillity receptors.	Option 6A L overflies no AONBs and no National Parks. When compared to the 'do nothing' scenario, Option 1 L is considered to be equally beneficial as it overflies no Tranquillity receptors.	Option 6A R overflies no AONBs and no National Parks. When compared to the 'do nothing' scenario, Option 1 R is considered to be equally beneficial as it overflies no Tranquillity receptors.	Option 7 L overflies no AONBs and no National Parks. When compared to the 'do nothing' scenario, Option 1 L is considered to be equally beneficial as it overflies no Tranquillity receptors.	Option 7 R overflies no AONBs and no National Parks. When compared to the 'do nothing' scenario, Option 1 R is considered to be equally beneficial as it overflies no Tranquillity receptors.
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 MAN 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 MAN 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 MAN 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 MAN 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 MAN 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 MAN 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 MAN 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 MAN 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 MAN 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 MAN 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 MAN will maintain their current level of access under extant operational arrangements.	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of MAN will maintain their current level of access under extant operational arrangements.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 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.	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.	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 MAN 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 40.47km (21.85nm).	The existing MAN 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 42.26km (22.82nm).	Option 1 L 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 39.23km (21.18nm) long. When compared to the 'do nothing' scenario, Option 1 L is shorter and at this stage it is assumed that that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 1 R 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 41.37km (22.34nm) long. When compared to the 'do nothing' scenario, Option 1 R is shorter and at this stage it is assumed that that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 4B L 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 38.38km (20.72nm) long. When compared to the 'do nothing' scenario, Option 1 L is shorter and at this stage it is assumed that that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 4B R 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 40.34km (21.78nm) long. When compared to the 'do nothing' scenario, Option 4B R is shorter and at this stage it is assumed that that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 6A L 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 42.63km (23.02nm) long. When compared to the 'do nothing' scenario, Option 6A L is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 6A R 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 44.87km (24.23nm) long. When compared to the 'do nothing' scenario, Option 6A R is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 7 L 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 36.37km (19.64nm) long. When compared to the 'do nothing' scenario, Option 7 L is shorter and at this stage it is assumed that that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 7 R 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 39.57km (21.36nm) long. When compared to the 'do nothing' scenario, Option 7 R is shorter and at this stage it is assumed that that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. 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.	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.	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 for MAN 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.	It is not proportionate for MAN 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 for MAN 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 for MAN 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 for MAN 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 for MAN 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 for MAN 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 for MAN 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 for MAN 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 for MAN 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 MAN 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.	No additional infrastructure is required at MAN 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.	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.	No change to operational costs is attributable to maintaining the extant procedures.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; 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.	No deployment costs applicable to extant procedures.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of 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 MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft departing MAN 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.	The 'do nothing' scenario assumes that current operations at MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft departing MAN 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with MAN arrivals/transitions and aircraft inbound to Liverpool. In some cases, ATC intervention is required to mitigate this, but it is expected that the introduction of PBN IFPs and the application of the design process will reduce the need for ATC intervention in the future. Additionally, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation, which can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with MAN arrivals/transitions and aircraft inbound to Liverpool. In some cases, ATC intervention is required to mitigate this, but it is expected that the introduction of PBN IFPs and the application of the design process will reduce the need for ATC intervention in the future. Additionally, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation, which can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with MAN arrivals/transitions and aircraft inbound to Liverpool. In some cases, ATC intervention is required to mitigate this, but it is expected that the introduction of PBN IFPs and the application of the design process will reduce the need for ATC intervention in the future. Additionally, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation, which can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with MAN arrivals/transitions and aircraft inbound to Liverpool. 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In some cases, ATC intervention is required to mitigate this, but it is expected that the introduction of PBN IFPs and the application of the design process will reduce the need for ATC intervention in the future. Additionally, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation, which can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with MAN arrivals/transitions and aircraft inbound to Liverpool. In some cases, ATC intervention is required to mitigate this, but it is expected that the introduction of PBN IFPs and the application of the design process will reduce the need for ATC intervention in the future. Additionally, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation, which can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing SIDs do 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.	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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing SIDs do 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may 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 at 4,000ft - Noise impact at 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 at 4,000ft - Air Quality **Better in the following areas:** - Noise impact at 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:** - Air Quality **Better in the following areas:** - Noise impact at 4,000ft - Noise impact at 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 at 4,000ft - Air Quality **Better in the following areas:** - Noise impact at 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 at 4,000ft - Greenhouse gas emissions - Fuel burn **Better in the following areas:** - Noise impact at 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 at 4,000ft - Greenhouse gas emissions - Fuel burn **Better in the following areas:** - Noise impact at 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:** - Air Quality **Better in the following areas:** - Noise impact at 4,000ft - Noise impact at 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 at 4,000ft - Air Quality **Better in the following areas:** - Noise impact at 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 IOA Shortlist Assessment methodology, Option 1 L has been deemed the Accepted option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 1 R has been deemed the Preferred option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 4B L has been deemed the Preferred option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 4B R has been deemed the Accepted option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 6A L has been Rejected.	Based on IOA Shortlist Assessment methodology, Option 6A R has been Rejected.	Based on IOA Shortlist Assessment methodology, Option 7 L has been deemed the Favourable option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 7 R has been deemed the Favourable option within this design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3		ACCEPTED	PREFERRED	PREFERRED	ACCEPTED	REJECTED	REJECTED	FAVOURABLE	FAVOURABLE

MAG MAN ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TABLE

Departure Envelope: SID Runway 05 South West

'DO NOTHING' BASELINE

Group	Impact	Level of Analysis	Runway 05L	Runway 05R
		Description	For the south-west design envelope, the 'do nothing' scenario for departures in terms of today's operation is based around the existing conventional ASMIM 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.	
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 ASMIM 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 30,650 households with an approximate population of 72,000. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 72,000. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 101,550 households with an approximate population of 241,200. Taking account of 1,800 planned property developments, this option is estimated to overfly and impact a total population of 245,500.	For comparison purposes within the IOA, the 'do nothing' scenario was based upon the existing ASMIM 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 27,000 households with an approximate population of 63,000. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 63,000. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 131,250 households with an approximate population of 316,500. Taking account of 1,350 planned property developments, this option is estimated to overfly and impact a total population of 319,700.
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 05L ASMIM SID overflies five AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	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 05R ASMIM SID overflies five AQMAs. Overflight of these AQMAs occurs 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 40.47km (21.85nm).	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 fuel burn or 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 42.26km (22.82nm).
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 DVOR in December 2022.	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 DVOR in December 2022.
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.	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.
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 MAN 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 MAN 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 MAN will maintain their current level of access under extant operational arrangements.	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of MAN 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.	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 MAN 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 40.47km (21.85nm).	The existing MAN 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 42.26km (22.82nm).
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.	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 for MAN 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.	It is not proportionate for MAN 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 MAN 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.	No additional infrastructure is required at MAN 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.	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.	No deployment costs applicable to extant procedures.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft departing MAN 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.	The 'do nothing' scenario assumes that current operations at MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft departing MAN 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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing SIDs do 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.	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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing SIDs do 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.
			IOA Shortlist Assessment	
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	

OPTION 1 and OPTION 2A

Impact	Option 1 – Runway 05L (Not Assessed)	Option 1 – Runway 05R	Option 2A – Runway 05L (Not Assessed)	Option 2A – Runway 05R
Description	This is an RNAV1 option that provides two left turns and then a track to join the NATS network to the south-west. The initial course is similar to the current ASMIM 1S/1Z SID, but it turns off this to the north of MAN. It has an initial turn at 1nm DER (05L) followed by a 117° left turn to head south-west. The design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise. The procedure uses fly-by waypoints. 05L: After departure this route turns left at the earliest PANS-OPS compliant position (1nm from DER). This takes it overhead Cheadle and West Didsbury where it combines with the option for 05R. There is then a short straight segment before a second turn is made over Stretford and it heads in a south-westerly direction over sparsely populated areas to terminate at 7,000ft south of the Lymm interchange between the M56 and the M6. 05R: After departure this route turns left at a point that is perpendicular with the turn point for the 05L option. This takes it overhead Cheadle and West Didsbury where it combines with the option for 05L. There is then a short straight segment before a second turn is made over Stretford and it heads in a south westerly direction over sparsely populated areas to terminate at 7,000ft south of the Lymm interchange between the M56 and the M6. A speed restriction of 210 KIAS is used for the first turn and second turn, which is the CAP778 recommended speed. Option 1 for Runway 05L was rejected at the DPE stage and has therefore not been assessed.		This is an RNP1 option that uses RF coding to provide a single left turn starting at the position of the current turn to create a fuel-efficient route. The design speed results in a tight radius turn to create a short track length to join the NATS network to the south-west. 05L: After departure this route makes a single left turn just after Cheadle which takes it overhead Burnage and Withington where it combines with the option for 05R. The left turn is completed heading in a south-westerly direction in the vicinity of Chorlton and it continues in this direction to terminate at 7,000ft south of the Lymm interchange between the M56 and the M6. 05R: After departure this route makes a single left turn just after Cheadle which takes it overhead Burnage and Withington where it combines with the option for 05L. The left turn is completed heading in a south-westerly direction in the vicinity of Sale and it continues in this direction to terminate at 7,000ft south of the Lymm interchange between the M56 and the M6. A speed restriction of 190 KIAS is used for the first turn which allows the smallest radius. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616. Option 2A for Runway 05L was rejected at the DPE stage and has therefore not been assessed.	
Noise impact on health and quality of life		Up to 4,000ft, this option is estimated to overfly approximately 38,250 households with an approximate population of 90,100. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 90,100. 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 40,800 households with an approximate population of 96,100. Taking account of 500 planned property developments, this option is estimated to overfly and impact total population of 97,300. 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 46,450 households with an approximate population of 118,500. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 118,500. 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 57,700 households with an approximate population of 145,600. Taking account of zero planned property developments, this option is estimated to overfly and impact total population of 145,600. 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.
Air Quality		Option 1 R overflies three AQMA(s); however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.		Option 2A R overflies four AQMA(s); however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Greenhouse Gas impact		Option 1 R 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 Option 1 R is 42.66km (23.03nm). When compared to the 'do nothing' scenario, Option 1 R is longer and is therefore expected to emit more greenhouse gases this option is deemed to be of dis-benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.		Option 2A R 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 Option 2A R is 42.71km (23.06nm). When compared to the 'do nothing' scenario, Option 2A R is longer and is therefore expected to emit more greenhouse gases this option is deemed to be of dis-benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.
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 air or 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 air or on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
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 / equal.		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 / equal.
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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
Access		No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.		No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.
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.
Fuel burn		Option 1 R 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 42.66km (23.03nm) long. When compared to the 'do nothing' scenario, Option 1 R is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.		Option 2A R 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 42.71km (23.06nm) long. When compared to the 'do nothing' scenario, Option 2A R is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.
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.
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 for MAN 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 for MAN to assess the 'other costs' to commercial airlines of flying PBN procedures.
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.
Operational costs		ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.		ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Deployment costs		ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.		ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment		Possible hazards have been identified, some of which are extant. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with MAN arrivals/transitions and aircraft inbound to Liverpool. In some cases, ATC intervention is required to mitigate this, but it is expected that the introduction of PBN IFPs and the application of the design process will reduce the need for ATC intervention in the future. Additionally, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation, which can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with MAN arrivals/transitions and aircraft inbound to Liverpool. In some cases, ATC intervention is required to mitigate this, but it is expected that the introduction of PBN IFPs and the application of the design process will reduce the need for ATC intervention in the future. Additionally, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation, which can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 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 at 4,000ft - Greenhouse gas emissions - Fuel burn **Better in the following areas:** - Noise impact at 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 at 4,000ft - Greenhouse gas emissions - Fuel burn **Better in the following areas:** - Noise impact at 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 IOA Shortlist Assessment methodology, Option 1 R has been deemed the Favourable option within this design envelope.		Based on IOA Shortlist Assessment methodology, Option 2A R has been Rejected.
OPTION SHORTLIST CLASSIFICATION FOR STAGE 3		FAVOURABLE		REJECTED

OPTION 2B and OPTION 3A

Impact	Option 2B – Runway 05L (Not Assessed)	Option 2B – Runway 05R	Option 3A – Runway 05L (Not Assessed)	Option 3A – Runway 05R
Description	This is an RNP1 that uses RF coding to provide a single initial turn to create a fuel-efficient route to the network joining point to the south-west. It differs from option 2A in that the turn is at the earliest PANS-OPS compliant position from Runway 05L to create the shortest route possible at this design speed. 05L: After departure this route turns left at the earliest PANS-OPS compliant position (1nm from DER). This is a single left turn that takes it overhead Cheadle and West Didsbury before completing the left turn heading in a south-westerly direction to the south of Sale where it combines with the option for 05R. It continues south-west to route just north of Altrincham and terminates at 7,000ft south of Warrington. 05R: After departure this route turns left at a point that is perpendicular with the turn point for the 05L option. This is a single left turn that takes it overhead Cheadle and West Didsbury before completing the left turn heading in a south-westerly direction to the south of Sale where it combines with the option for 05L. It continues south-west to route just north of Altrincham and terminates at 7,000ft south of Warrington. A speed restriction of 190 KIAS is used for the first turn which allows the smallest radius. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616. Option 2B for Runway 05L was rejected at the DPE stage and has therefore not been assessed.		This is an RNP1 that uses RF coding to provide a single initial turn starting at the position of the current turn to create a fuel-efficient route to the south-west. It is similar to option 2A but is designed with a higher design speed of 210kts. The greater speed results in a wider track, which may aid vertical separation from MAN arriving traffic from the north. The design speed may also permit some aircraft to be in a clean configuration (without the use of flaps) which has potential benefits in terms of noise. 05L: After departure this route makes a single left turn just after Cheadle which takes it overhead Burnage and Fallowfield where it combines with the option for 05R. The left turn is completed heading in a south-westerly direction between Chorlton and Stretford and it continues in this direction to terminate at 7,000ft south of the Lymm interchange between the M56 and the M6. 05R: After departure this route makes a single left turn just after Cheadle which takes it overhead Burnage and Fallowfield where it combines with the option for 05L. The left turn is completed heading in a south-westerly direction between Chorlton and Stretford and it continues in this direction to terminate at 7,000ft south of the Lymm interchange between the M56 and the M6. A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed. Option 3A for Runway 05L was rejected at the DPE stage and has therefore not been assessed.	
Noise impact on health and quality of life		Up to 4,000ft, this option is estimated to overfly approximately 42,650 households with an approximate population of 101,400. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 101,400. 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 45,800 households with an approximate population of 109,200 Taking account of zero planned property developments, this option is estimated to overfly and impact total population of 109,200. 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 50,650 households with an approximate population of 135.500. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 135,500. 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 66,350 households with an approximate population of 172,200. Taking account of zero planned property developments, this option is estimated to overfly and impact total population of 172,200. 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.
Air Quality		Option 2B R overflies four AQMA(s); however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.		Option 3A R overflies four AQMA(s); however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Greenhouse Gas impact		Option 2B R 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 Option 2B R is 40.71km (21.98nm). When compared to the 'do nothing' scenario, Option 2B R is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.		Option 3A R 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 Option 3A R is 45.14km (24.37nm). When compared to the 'do nothing' scenario, Option 3A R is longer and is therefore expected to emit more greenhouse gases this option is deemed to be of dis-benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.
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 air or 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 air or on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
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 / equal.		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 / equal.
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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
Access		No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.		No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.
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.
Fuel burn		Option 2B R 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 40.71km (21.98nm) long. When compared to the 'do nothing' scenario, Option 2B R is shorter and at this stage it is assumed that that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.		Option 3A R 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 45.14km (24.37nm) long. When compared to the 'do nothing' scenario, Option 3A R is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.
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.
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 for MAN 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 for MAN to assess the 'other costs' to commercial airlines of flying PBN procedures.
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.
Operational costs		ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.		ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Deployment costs		ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.		ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment		Possible hazards have been identified, some of which are extant. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with MAN arrivals/transitions and aircraft inbound to Liverpool. In some cases, ATC intervention is required to mitigate this, but it is expected that the introduction of PBN IFPs and the application of the design process will reduce the need for ATC intervention in the future. Additionally, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation, which can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with MAN arrivals/transitions and aircraft inbound to Liverpool. In some cases, ATC intervention is required to mitigate this, but it is expected that the introduction of PBN IFPs and the application of the design process will reduce the need for ATC intervention in the future. Additionally, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation, which can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 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 at 4,000ft **Better in the following areas:** - Noise impact at 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. 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 at 4,000ft - Greenhouse gas emissions - Fuel burn **Better in the following areas:** - Noise impact at 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 IOA Shortlist Assessment methodology, Option 2B R has been deemed the Acceptable option within this design envelope.		Based on IOA Shortlist Assessment methodology, Option 3A R has been Rejected.
OPTION SHORTLIST CLASSIFICATION FOR STAGE 3		ACCEPTABLE		REJECTED

OPTION 3B and OPTION 4B

Impact	Option 3B – Runway 05L (Not Assessed)	Option 3B – Runway 05R	Option 4B – Runway 05L	Option 4B – Runway 05R
Description	This is an RNP1 option that uses RF coding to provide a single initial turn to create a fuel-efficient route to the network joining point to the west. It differs from option 3A in that the turn is at the earliest PANS-OPS compliant position from 05L to create a shorter route for this design speed. It is similar to option 2B but is designed with a higher speed of 210kts. The greater speed results in a wider track, which may aid vertical separation from MAN arriving traffic from the north. It may also permit some aircraft to be in a clean configuration (without the use of flaps) which has potential benefits in terms of noise. 05L: After departure this route turns left at the earliest PANS-OPS compliant position (1nm from DER). This is a single left turn that takes it overhead Cheadle and Withington before completing the left turn heading in a south-westerly direction to the south of Stretford where it combines with the option for 05R. It continues south-west to route to avoid Altrincham and terminates at 7,000ft west of the Lymm interchange between the M56 and the M6. 05R: After departure this route turns left at a point that is perpendicular with the turn point for the 05L option. This is a single left turn that takes it overhead Cheadle and Withington before completing the left turn heading in a south-westerly direction to the south of Stretford where it combines with the option for 05L. It continues south-west to route to avoid Altrincham and terminates at 7,000ft west of the Lymm interchange between the M56 and the M6. A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed. Option 3B for Runway 05L was rejected at the DPE stage and has therefore not been assessed.		This is an RNP1 option that uses RF coding to provide a single initial turn at the earliest PANS-OPS compliant position to create a route to the south-west. It differs from option 4A in that the turn is at the earliest PANS-OPS compliant position from Runway 05L to create a shorter route for this design speed. It is similar to options 2B and 3B but is designed with a higher speed of 220kts. The design speed results in a wider track, which may aid vertical separation from MAN arriving traffic from the north. It will also permit a larger number of aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise. 05L: After departure this route turns left at the earliest PANS-OPS compliant position (1nm from DER). This is a single left turn that takes it overhead Cheadle, Burnage and Fallowfield before completing the left turn heading in a south-westerly direction at Stretford where it combines with the option for 05R. It continues in this direction to terminate at 7,000ft west of the Lymm interchange between the M56 and the M6. 05R: After departure this route turns left at a point that is perpendicular with the turn point for the 05L option. This single left turn takes it overhead Cheadle, Burnage and Fallowfield before completing the left turn heading in a south-westerly direction at Stretford where it combines with the option for 05L. It continues in this direction to terminate at 7,000ft west of the Lymm interchange between the M56 and the M6. A speed restriction of 220 KIAS is used for the first turn which allows most aircraft to fly in a clean configuration.	
Noise impact on health and quality of life		Up to 4,000ft, this option is estimated to overfly approximately 44,250 households with an approximate population of 112,500. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 112,500. 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 50,950 households with an approximate population of 128,500. Taking account of zero planned property developments, this option is estimated to overfly and impact total population of 128,500. 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 44,300 households with an approximate population of 114,300. Taking account of 50 planned property developments, this option is estimated to overfly and impact a total population of 114,400. 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 50,700 households with an approximate population of 129,000. Taking account of 300 planned property developments, this option is estimated to overfly and impact total population of 129,700. 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 47,300 households with an approximate population of 126,300. Taking account of 150 planned property developments, this option is estimated to overfly and impact a total population of 126,700. 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 56,600 households with an approximate population of 147,900. Taking account of 500 planned property developments, this option is estimated to overfly and impact total population of 149,200. 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.
Air Quality		Option 3B R overflies four AQMA(s); however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Option 4B L overflies four AQMA(s); however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Option 4B R overflies four AQMA(s); however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Greenhouse Gas impact		Option 3B R 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 Option 3B R is 43.11km (23.28nm). When compared to the 'do nothing' scenario, Option 3B R is longer and is therefore expected to emit more greenhouse gases this option is deemed to be of dis-benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 4B L 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 Option 4B L is 42.44km (22.92nm). When compared to the 'do nothing' scenario, Option 4B L is longer and is therefore expected to emit more greenhouse gases this option is deemed to be of dis-benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 4B R 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 Option 4B R is 44.77km (24.17nm). When compared to the 'do nothing' scenario, Option 4B R is longer and is therefore expected to emit more greenhouse gases this option is deemed to be of dis-benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.
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 air or 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 air or 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 air or on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
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 / equal.	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 / equal.	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 / equal.
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 MAN 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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
Access		No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.
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.
Fuel burn		Option 3B R 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 43.11km (23.28nm) long. When compared to the 'do nothing' scenario, Option 3B R is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 4B L 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 42.44km (22.92nm) long. When compared to the 'do nothing' scenario, Option 4B L is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 4B R 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 44.77km (24.17nm) long. When compared to the 'do nothing' scenario, Option 4B R is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.
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.
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 for MAN 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 for MAN 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 for MAN to assess the 'other costs' to commercial airlines of flying PBN procedures.
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.
Operational costs		ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Deployment costs		ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment		Possible hazards have been identified, some of which are extant. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with MAN arrivals/transitions and aircraft inbound to Liverpool. In some cases, ATC intervention is required to mitigate this, but it is expected that the introduction of PBN IFPs and the application of the design process will reduce the need for ATC intervention in the future. Additionally, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation, which can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with MAN arrivals/transitions and aircraft inbound to Liverpool. In some cases, ATC intervention is required to mitigate this, but it is expected that the introduction of PBN IFPs and the application of the design process will reduce the need for ATC intervention in the future. Additionally, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation, which can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with MAN arrivals/transitions and aircraft inbound to Liverpool. In some cases, ATC intervention is required to mitigate this, but it is expected that the introduction of PBN IFPs and the application of the design process will reduce the need for ATC intervention in the future. Additionally, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation, which can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 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 at 4,000ft - Greenhouse gas emissions - Fuel burn **Better in the following areas:** - Noise impact at 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 at 4,000ft - Greenhouse gas emissions - Fuel burn **Better in the following areas:** - Noise impact at 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 at 4,000ft - Greenhouse gas emissions - Fuel burn **Better in the following areas:** - Noise impact at 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 IOA Shortlist Assessment methodology, Option 3B R has been Rejected.	Based on IOA Shortlist Assessment methodology, Option 4B L has been deemed the Favourable option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 4B R has been Rejected.
OPTION SHORTLIST CLASSIFICATION FOR STAGE 3		REJECTED	FAVOURABLE	REJECTED

OPTION 5

Impact	Option 5 – Runway 05L	Option 5 – Runway 05R
Description	This is an RNAV1 option that provides two turns to the left to route south-west similar option 1 but uses an initial 15° track adjustment to the left from the DER for Runway 05L, and a 5° adjustment for Runway 05R. This is to provide noise relief for the Cheadle area, which lies underneath the approach path for Runways 23L/23R arrivals. The design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise. The procedure uses fly-by waypoints. 05L: After passing the DER aircraft make a 15° track adjustment to the left (north) followed by a left turn that routes aircraft to the west of Cheadle. There is then a short straight segment where the routes combine before a second turn is made over Stretford and it heads in a south-westerly direction over sparsely populated areas to terminate at 7,000ft to the south-west of the junction between the M56 and M6. 05R: After passing the DER aircraft make a 5° track adjustment to the left (north) followed by a left turn that routes aircraft to the west of Cheadle. There is then a short straight segment where the routes combine before a second turn is made over Stretford and it heads in a south-westerly direction over sparsely populated areas to terminate at 7,000ft to the south-west of the junction between the M56 and M6. A speed restriction of 210 KIAS is used for the first turn which is the CAP778 recommended speed.	
Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 31,500 households with an approximate population of 73,700. Taking account of 200 planned property developments, this option is estimated to overfly and impact a total population of 74,100. 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 33,800 households with an approximate population of 79,100. Taking account of 400 planned property developments, this option is estimated to overfly and impact total population of 80,000. 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 36,800 households with an approximate population of 86,500. Taking account of 200 planned property developments, this option is estimated to overfly and impact a total population of 86,900. 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 39,200 households with an approximate population of 92,100. Taking account of 450 planned property developments, this option is estimated to overfly and impact total population of 93,200. 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.
Air Quality	Option 5 L overflies three AQMA(s); however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Option 5 R overflies three AQMA(s); however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Greenhouse Gas impact	Option 5 L 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 Option 5 L is 39.47km (21.31nm). When compared to the 'do nothing' scenario, Option 5 L is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 5 R 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 Option 5 R is 42.06km (22.71nm). When compared to the 'do nothing' scenario, Option 5 R is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.
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 air or 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 air or on the ground). The reduction of the reliance on outdated ground based navigational aids will significantly increase operational resilience through the introduction of PBN.
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 / equal.	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 / equal.
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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
Access	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.
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.
Fuel burn	Option 5 L 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 39.47km (21.31nm) long. When compared to the 'do nothing' scenario, Option 5 L is shorter and at this stage it is assumed that that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 5 R 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 42.06km (22.71nm) long. When compared to the 'do nothing' scenario, Option 5 R is shorter and at this stage it is assumed that that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.
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.
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 for MAN 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 for MAN to assess the 'other costs' to commercial airlines of flying PBN procedures.
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.
Operational costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Deployment costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Possible hazards have been identified, some of which are extant. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with MAN arrivals/transitions and aircraft inbound to Liverpool. In some cases, ATC intervention is required to mitigate this, but it is expected that the introduction of PBN IFPs and the application of the design process will reduce the need for ATC intervention in the future. Additionally, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation, which can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with MAN arrivals/transitions and aircraft inbound to Liverpool. In some cases, ATC intervention is required to mitigate this, but it is expected that the introduction of PBN IFPs and the application of the design process will reduce the need for ATC intervention in the future. Additionally, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation, which can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 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 at 4,000ft **Better in the following areas:** - Noise impact at 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. 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 at 4,000ft **Better in the following areas:** - Noise impact at 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. 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 IOA Shortlist Assessment methodology, Option 5 L has been deemed the Preferred option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 5 R has been deemed the Preferred option within this design envelope.
OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	PREFERRED	PREFERRED

MAG MAN ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TABLE

Departure Envelope: SID Runway 23 North

'DO NOTHING' BASELINE

For the north design envelope, the 'do nothing' scenario for departures in terms of todays operation is based around the existing conventional POL 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.

Group	Impact	Level of Analysis	Runway 23L	Runway 23R
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 POL 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 6,400. Taking account of 450 planned property developments, this option is estimated to overfly and impact a total population of 7,500. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 45,650 households with an approximate population of 109,400. Taking account of 2,400 planned property developments, this option is estimated to overfly and impact a total population of 115,200.	For comparison purposes within the IOA, the 'do nothing' scenario was based upon the existing POL 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 1,450 households with an approximate population of 3,600. Taking account of 100 planned property developments, this option is estimated to overfly and impact a total population of 3,900. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 91,100 households with an approximate population of 217,400. Taking account of 2,100 planned property developments, this option is estimated to overfly and impact a total population of 222,400.
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 23L POL SID overflies four AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	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 23R POL SID overflies four AQMAs. Overflight of these AQMAs occurs 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 39.45km (21.30nm).	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 40.75km (22.0nm).
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 DVOR in December 2022.	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 DVOR in December 2022.
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.	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.
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 MAN 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 MAN 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 MAN will maintain their current level of access under extant operational arrangements.	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of MAN 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.	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 MAN 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 39.45km (21.30nm).	The existing MAN 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 40.75km (22.00nm).
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.	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 for MAN 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.	It is not proportionate for MAN 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 MAN 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.	No additional infrastructure is required at MAN 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.	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.	No deployment costs applicable to extant procedures.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft departing MAN 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.	The 'do nothing' scenario assumes that current operations at MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft departing MAN 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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing SIDs do 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.	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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing SIDs do 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.

OPTION 1A

Option 1A is an RNAV 1 replication of the current departure to POL and uses fly-over waypoints with CF path terminator coding to create an approximate replication of the existing conventional POL 5R 1Y SID. An element of dispersion would be apparent in the turns due to the fly-over waypoint and CF coding.
The fly-over waypoints are positioned at the existing markers.
•For Runway 23R this first turn is at MCT D3.
•For Runway 23L, this is at D3.2 which is less than 1nm from DER but replicates the current procedure.
As a replicated route it follows a similar track over the ground as the current published route. This takes both routes to the north of Knutsford at which point the tracks of the SIDs converge. The route heads north until turning right to the north-west of Irlam to head in a north-east direction and terminates at 7,000ft just east of Farnworth.
A speed restriction of 200 KIAS is used for the first turn.

Impact	Runway 23L	Runway 23R
Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 4,450 households with an approximate population of 10,800. Taking account of 650 planned property developments, this option is estimated to overfly and impact a total population of 12,400. 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 38,850 households with an approximate population of 89,300. Taking account of 1,150 planned property developments, this option is estimated to overfly and impact total population of 91,900. 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 4,650 households with an approximate population of 11,300. Taking account of 500 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 39,200 households with an approximate population of 90,100. Taking account of 1,000 planned property developments, this option is estimated to overfly and impact total population of 92,400. 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.
Air Quality	Option 1A L overflies five AQMAs; however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of dis-benefit as it overflies more AQMAs.	Option 1A R overflies five AQMAs; however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of dis-benefit as it overflies more AQMAs.
Greenhouse Gas impact	Option 1A L 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 Option 1A L is 39.60km (21.38nm). When compared to the 'do nothing' scenario, Option 1A L is longer and is therefore expected to emit more greenhouse gases and this option is deemed to be of dis-benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 1A R 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 Option 1A R is 40.86km (22.06nm). When compared to the 'do nothing' scenario, Option 1A R is longer and is therefore expected to emit more greenhouse gases and this option is deemed to be of dis-benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.
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.
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.
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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
Access	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.
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.
Fuel burn	Option 1A L 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 39.60km (21.38nm) long. When compared to the 'do nothing' scenario, Option 1A L is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 1A R 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 40.86km (22.06nm) long. When compared to the 'do nothing' scenario, Option 1A R is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.
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.
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 for MAN 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 for MAN to assess the 'other costs' to commercial airlines of flying PBN procedures.
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.
Operational costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
deployment costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Possible hazards have been identified, some of which are extant. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with the L975 Lower ATS route, MAN arrivals/transitions, aircraft inbound to Liverpool and some GA aircraft operating at low level. Furthermore, there is the potential for 'drop out' of CAS. These hazards can be mitigated through the design process. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with the L975 Lower ATS route, MAN arrivals/transitions, aircraft inbound to Liverpool and some GA aircraft operating at low level. Furthermore, there is the potential for 'drop out' of CAS. These hazards can be mitigated through the design process. Further assessment will be conducted at Stage 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 at 4,000ft - Greenhouse gas emissions - Fuel burn - Air Quality **Better in the following areas:** - Noise impact at 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 at 4,000ft - Greenhouse gas emissions - Fuel burn - Air Quality **Better in the following areas:** - Noise impact at 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.

OPTION 1B

Option 1B is an RNAV1 option, similar to option 1A, using fly-over waypoints with CF path terminator coding. However, aircraft make a second right turn earlier to provide a more direct and fuel-efficient route.
The fly-over waypoints are positioned at the existing markers:
•For Runway 23R this first turn is at MCT D3.
•For Runway 23L, this is at D3.2 which is less than 1nm from DER, but this replicates the turn of the current procedure and therefore aligns to the Design Principle Safety.
23L: This route commences the RF turn to the north of Knutsford. This turn continues until Mere where it combines with the option for 23R and continues north until west of Partington at which point the route heads north-east following the line of the M62 initially and terminates at 7,000ft north of Prestwich.
23R: This route commences the RF turn to the north of Knutsford. This turn continues until Mere where it combines with the option for 23L and continues north until west of Partington at which point the route heads north-east following the line of the M62 initially and terminates at 7,000ft north of Prestwich.
An element of dispersion would be apparent in the turn due to the fly-over waypoint and CF coding. To create replication with the existing procedure, a speed restriction of 200 KIAS is used for the first turn.

Option 1B for Runway 23L was rejected at the DPE stage and has therefore not been assessed.

Impact	Runway 23L (Not Assessed)	Runway 23R
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 13,000. Taking account of 550 planned property developments, this option is estimated to overfly and impact a total population of 14,300. 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 52,050 households with an approximate population of 119,200. Taking account of 700 planned property developments, this option is estimated to overfly and impact total population of 120,800. 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.
Air Quality		Option 1B R overflies two AQMAs; however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Greenhouse Gas impact		Option 1B R 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 Option 1B R is 39.95km (21.57nm). When compared to the 'do nothing' scenario, Option 1B R is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.
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.
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.
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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
Access		No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.
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.
Fuel burn		Option 1B R 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 39.95km (21.57nm) long. When compared to the 'do nothing' scenario, Option 1B R is shorter and at this stage it is assumed that that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.
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.
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 for MAN to assess the 'other costs' to commercial airlines of flying PBN procedures.
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.
Operational costs		ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
deployment costs		ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment		Possible hazards have been identified, some of which are extant. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with the L975 Lower ATS route, MAN arrivals/transitions, aircraft inbound to Liverpool and some GA aircraft operating at low level. Furthermore, there is the potential for 'drop out' of CAS. These hazards can be mitigated through the design process. Further assessment will be conducted at Stage 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 at 4,000ft **Better in the following areas:** - Noise impact at 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. 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.

OPTION 2B

This is an RNP1option with RF coding that is similar to option 1B but the use of RF coding results in a track slightly further west initially before heading north-east initially following the course of the M62 to provide a more direct and fuel-efficient route.
The option has been created to use the more modern technology and maximise fuel efficiency by making a second right turn earlier to head on a north-east trajectory where it terminates south of the existing POL SID.
The design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.
23L: This route commences the RF turn to the north of Knutsford. This turn continues via Over Tabley and routes north to the east of Lymm until west of Partington at which point the route heads north-east. It initially follows the route of the M62 and terminates at 7,000ft north of Prestwich.
23R: This route commences the RF turn to the north of Knutsford. This turn continues via Over Tabley and routes north to the east of Lymm until west of Partington at which point the route heads north-east. It initially follows the route of the M62 and terminates at 7,000ft north of Prestwich.
A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.

Impact	Runway 23L	Runway 23R
Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 4,750 households with an approximate population of 11,200. Taking account of 400 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 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 92,000. Taking account of 600 planned property developments, this option is estimated to overfly and impact total population of 93,400. 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 4,100 households with an approximate population of 9,700. Taking account of 200 planned property developments, this option is estimated to overfly and impact a total population of 10,200. 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 39,600 households with an approximate population of 91,700. Taking account of 350 planned property developments, this option is estimated to overfly and impact total population of 92,500. 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.
Air Quality	Option 2B L overflies three AQMAs; however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Option 2B R overflies two AQMAs; however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Greenhouse Gas impact	Option 2B L 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 Option 2B L is 41.06km (22.17nm). When compared to the 'do nothing' scenario, Option 2B L is longer and is therefore expected to emit more greenhouse gases and this option is deemed to be of dis-benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 2B R 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 Option 2B R is 41.36km (22.33nm). When compared to the 'do nothing' scenario, Option 2B R is longer and is therefore expected to emit more greenhouse gases and this option is deemed to be of dis-benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.
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.
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.
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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
Access	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.
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.
Fuel burn	Option 2B L 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 41.06km (22.17nm) long. When compared to the 'do nothing' scenario, Option 2B L is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 2B R 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 41.36km (22.33nm) long. When compared to the 'do nothing' scenario, Option 2B R is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.
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.
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 for MAN 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 for MAN to assess the 'other costs' to commercial airlines of flying PBN procedures.
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.
Operational costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
deployment costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Possible hazards have been identified, some of which are extant. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with the L975 Lower ATS route, MAN arrivals/transitions, aircraft inbound to Liverpool and some GA aircraft operating at low level. Furthermore, there is the potential for 'drop out' of CAS. These hazards can be mitigated through the design process. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with the L975 Lower ATS route, MAN arrivals/transitions, aircraft inbound to Liverpool and some GA aircraft operating at low level. Furthermore, there is the potential for 'drop out' of CAS. These hazards can be mitigated through the design process. Further assessment will be conducted at Stage 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 at 4,000ft - Greenhouse gas emissions - Fuel burn **Better in the following areas:** - Noise impact at 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 at 4,000ft - Greenhouse gas emissions - Fuel burn **Better in the following areas:** - Noise impact at 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.

OPTION 3

This provides an RNP1 option with RF coding using fly-by waypoints.
It has been created using fly-by waypoints with a tighter radius first turn than option 2B to reduce noise impact for Knutsford. It also aims to improve fuel efficiency by making a second right turn earlier than the current POL SID.
The design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.
23L: This route commences the RF turn to the north of Knutsford. The radius of this turn takes it further north of Knutsford than option 2B to route between High Legh and Bucklow Hill. The route heads north and combine near Broomedge and continue until just west of Partington. At this point the route turns right to follow the course of the M62 in a north-easterly direction and terminates at 7,000ft west of Prestwich.
23R: This route commences the RF turn earlier than 23L, to route further to the north of Knutsford. This routes it between High Legh and Bucklow Hill and it converges with the option for 23L in the vicinity of Broomedge. The route heads north until just west of Partington. At this point the route turns right to follow the course of the M62 in a north-easterly direction and terminates at 7,000ft west of Prestwich.
A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.

Impact	Runway 23L	Runway 23R
Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 4,600 households with an approximate population of 10,900. Taking account of 550 planned property developments, this option is estimated to overfly and impact a total population of 12,200. 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 43,150 households with an approximate population of 99,000. Taking account of 700 planned property developments, this option is estimated to overfly and impact total population of 100,600. 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 4,650 households with an approximate population of 11,100. Taking account of 250 planned property developments, this option is estimated to overfly and impact a total population of 11,700. 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 43,100 households with an approximate population of 98,800. Taking account of 400 planned property developments, this option is estimated to overfly and impact total population of 99,700. 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.
Air Quality	Option 3 L overflies two AQMAs; however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Option 3 R overflies two AQMAs; however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Greenhouse Gas impact	Option 3 L 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 Option 3 L is 39.99km (21.59nm). When compared to the 'do nothing' scenario, Option 3 L is longer and is therefore expected to emit more greenhouse gases and this option is deemed to be of dis-benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 3 R 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 Option 3 R is 39.77km (21.48nm). When compared to the 'do nothing' scenario, Option 3 R is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.
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.
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.
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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
Access	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.
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.
Fuel burn	Option 3 L 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 39.99km (21.59nm) long. When compared to the 'do nothing' scenario, Option 3 L is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 3 R 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 39.77km (21.48nm) long. When compared to the 'do nothing' scenario, Option 3 R is shorter and at this stage it is assumed that that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.
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.
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 for MAN 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 for MAN to assess the 'other costs' to commercial airlines of flying PBN procedures.
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.
Operational costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
deployment costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Possible hazards have been identified, some of which are extant. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with the L975 Lower ATS route, MAN arrivals/transitions, aircraft inbound to Liverpool and some GA aircraft operating at low level. Furthermore, there is the potential for 'drop out' of CAS. These hazards can be mitigated through the design process. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with the L975 Lower ATS route, MAN arrivals/transitions, aircraft inbound to Liverpool and some GA aircraft operating at low level. Furthermore, there is the potential for 'drop out' of CAS. These hazards can be mitigated through the design process. Further assessment will be conducted at Stage 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 at 4,000ft - Greenhouse gas emissions - Fuel burn **Better in the following areas:** - Noise impact at 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 at 4,000ft **Better in the following areas:** - Noise impact at 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. 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.

OPTION 4A

This is an RNP1 option with RF coding included to replicate the existing conventional POL SID but using an RF turn. This results in a slightly wider initial turn than the conventional route and the RNAV1 replication options.
It has been created with the slightly tighter radius first turn similar to option 3 to reduce noise impact for Knutsford but does not have the second turn at the earlier point of that option because it replicates the current SID.
The design aims to have aircraft make the first right turn no closer than 1nm from DER after which both routes head in a northerly direction and converge just north of Cadishead.
23L: This route commences the RF turn to the north of Knutsford. The radius of this turn takes it further north of Knutsford than option 2B to route between High Legh and Bucklow Hill. The route heads north until turning right via a fly-by turn at XUMAT (north of Cadishead) to head in a north-east direction and terminates just east of Farnworth.
23R: This route commences the RF turn earlier than 23L, to route further to the north of Knutsford. This routes it between High Legh and Bucklow Hill and it converges with the option for 23L in the vicinity of Cadishead. At this point the route turns right to head in a north-east direction and terminates just east of Farnworth.
A speed restriction of 190 KIAS is used for the first turn which allows the smallest radius. Although PANS-OPS compliant it may need to be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.

Impact	Runway 23L	Runway 23R
Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 3,500 households with an approximate population of 8,300. Taking account of 450 planned property developments, this option is estimated to overfly and impact a total population of 9,400. 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 37,750 households with an approximate population of 86,500. Taking account of 950 planned property developments, this option is estimated to overfly and impact total population of 88,700. 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 4,200 households with an approximate population of 10,100. Taking account of 300 planned property developments, this option is estimated to overfly and impact a total population of 10,800. 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 38,550 households with an approximate population of 88,400. Taking account of 800 planned property developments, this option is estimated to overfly and impact total population of 90,200. 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.
Air Quality	Option 4A L overflies five AQMAs; however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of dis-benefit as it overflies more AQMAs.	Option 4A R overflies five AQMAs; however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of dis-benefit as it overflies more AQMAs.
Greenhouse Gas impact	Option 4A L 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 Option 4A L is 42.07km (22.72nm). When compared to the 'do nothing' scenario, Option 4A L is longer and is therefore expected to emit more greenhouse gases and this option is deemed to be of dis-benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 4A R 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 Option 4A R is 42.45km (22.92nm). When compared to the 'do nothing' scenario, Option 4A R is longer and is therefore expected to emit more greenhouse gases and this option is deemed to be of dis-benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.
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.
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.
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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
Access	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.
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.
Fuel burn	Option 4A L 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 42.07km (22.72nm) long. When compared to the 'do nothing' scenario, Option 4A L is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 4A R 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 42.45km (22.92nm) long. When compared to the 'do nothing' scenario, Option 4A R is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.
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.
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 for MAN 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 for MAN to assess the 'other costs' to commercial airlines of flying PBN procedures.
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.
Operational costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
deployment costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Possible hazards have been identified, some of which are extant. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with the L975 Lower ATS route, MAN arrivals/transitions, aircraft inbound to Liverpool and some GA aircraft operating at low level. Furthermore, there is the potential for 'drop out' of CAS. These hazards can be mitigated through the design process. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with the L975 Lower ATS route, MAN arrivals/transitions, aircraft inbound to Liverpool and some GA aircraft operating at low level. Furthermore, there is the potential for 'drop out' of CAS. These hazards can be mitigated through the design process. Further assessment will be conducted at Stage 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 at 4,000ft - Greenhouse gas emissions - Fuel burn - Air Quality **Better in the following areas:** - Noise impact at 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 at 4,000ft - Greenhouse gas emissions - Fuel burn - Air Quality **Better in the following areas:** - Noise impact at 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.

OPTION 4B

This is an RNP1 option with RF coding included to replicate the existing conventional POL SID but using an RF turn. It has the same slightly tighter turn radius as option 4A to reduce noise impact for Knutsford but makes a second right turn earlier to head north-east to provide a more direct and fuel-efficient route.
The design aims to have aircraft make the first right turn no closer than 1nm from DER.
23L: This route commences the RF turn to the north of Knutsford. The radius of this turn takes it further north of Knutsford than option 2B to route between High Legh and Bucklow Hill. The route heads north until just west of Partington where it combines with the option for 23R. At this point the route turns right to follow the course of the M62 in a north-easterly direction and terminates at 7,000ft west of Prestwich.
23R: This route commences the RF turn earlier than 23L, prior to Parkgate Industrial Area to route further to the north of Knutsford. This routes between High Legh and Bucklow Hill and it converges with the option for 23L in the vicinity of Partington. At this point the route turns right to follow the course of the M62 in a north-easterly direction and terminates at 7,000ft west of Prestwich.
A speed restriction of 190 KIAS is used for the first turn which allows the smallest radius. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.

Impact	Runway 23L	Runway 23R
Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 4,800 households with an approximate population of 11,400. Taking account of 650 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 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 42,450 households with an approximate population of 97,900. Taking account of 800 planned property developments, this option is estimated to overfly and impact total population of 99,700. 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 4,850 households with an approximate population of 11,500. Taking account of 500 planned property developments, this option is estimated to overfly and impact a total population of 12,700. 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 42,900 households with an approximate population of 99,000. Taking account of 650 planned property developments, this option is estimated to overfly and impact total population of 100,500. 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.
Air Quality	Option 4B L overflies two AQMAs; however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Option 4B R overflies two AQMAs; however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Greenhouse Gas impact	Option 4B L 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 Option 4B L is 40.05km (21.63nm). When compared to the 'do nothing' scenario, Option 4B L is longer and is therefore expected to emit more greenhouse gases and this option is deemed to be of dis-benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 4B R 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 Option 4B R is 40.39km (21.81nm). When compared to the 'do nothing' scenario, Option 4B R is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.
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.
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.
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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
Access	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.
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.
Fuel burn	Option 4B L 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 40.05km (21.63nm) long. When compared to the 'do nothing' scenario, Option 4B L is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 4B R 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 40.39km (21.81nm) long. When compared to the 'do nothing' scenario, Option 4B R is shorter and at this stage it is assumed that that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.
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.
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 for MAN 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 for MAN to assess the 'other costs' to commercial airlines of flying PBN procedures.
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.
Operational costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
deployment costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Possible hazards have been identified, some of which are extant. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with the L975 Lower ATS route, MAN arrivals/transitions, aircraft inbound to Liverpool and some GA aircraft operating at low level. Furthermore, there is the potential for 'drop out' of CAS. These hazards can be mitigated through the design process. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with the L975 Lower ATS route, MAN arrivals/transitions, aircraft inbound to Liverpool and some GA aircraft operating at low level. Furthermore, there is the potential for 'drop out' of CAS. These hazards can be mitigated through the design process. Further assessment will be conducted at Stage 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 at 4,000ft - Greenhouse gas emissions - Fuel burn **Better in the following areas:** - Noise impact at 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 at 4,000ft **Better in the following areas:** - Noise impact at 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. 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.

OPTION 6A

This is an RNP1 option with RF coding that maximises fuel efficiency by removing the northbound leg between the first and second turns and replacing it with a single turn to the north-east. This provides the most direct route to POL.
The design aims to have aircraft make the first right turn no closer than 1nm from DER, and the speed applied to this option results in this option forming the westerly edge of the envelope in the initial turn along with option 6B. This speed will also permit a larger number of aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.
23L: This route commences the single RF turn to the north of Knutsford. The turn continues north via Over Tabley before heading in a north easterly direction in the vicinity of Broomedge. The route then continues to the west of the Sale and Urmston before terminating at 7,000ft in the vicinity of Eccles.
23R: This route commences the single RF turn earlier than 23L, prior to route further to the north of Knutsford. The turn continues to route east of Over Tabley before converging with the option for 23L in the vicinity of Broomedge. The route then continues to the west of the Sale and Urmston before terminating at 7,000ft in the vicinity of Eccles.
A speed restriction of 220 KIAS is used for the first turn.

Impact	Runway 23L	Runway 23R
Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 2,200 households with an approximate population of 5,000. Taking account of 550 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 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 56,750 households with an approximate population of 129,800. Taking account of 4,900 planned property developments, this option is estimated to overfly and impact total population of 141,000. 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.	Up to 4,000ft, this option is estimated to overfly approximately 1,900 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 5,200. 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 56,650 households with an approximate population of 129,500. Taking account of 4800 planned property developments, this option is estimated to overfly and impact total population of 140,500. 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.
Air Quality	Option 6A L overflies three AQMAs; however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Option 6A R overflies three AQMAs; however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Greenhouse Gas impact	Option 6A L 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 Option 6A L is 40.50km (21.87nm). When compared to the 'do nothing' scenario, Option 6A L is longer and is therefore expected to emit more greenhouse gases and this option is deemed to be of dis-benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 6A R 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 Option 6A R is 40.70km (21.98nm). When compared to the 'do nothing' scenario, Option 6A R is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.
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.
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.
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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
Access	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.
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.
Fuel burn	Option 6A L 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 40.50km (21.87nm) long. When compared to the 'do nothing' scenario, Option 6A L is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 6A R 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 40.70km (21.98nm) long. When compared to the 'do nothing' scenario, Option 6A R is shorter and at this stage it is assumed that that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.
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.
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 for MAN 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 for MAN to assess the 'other costs' to commercial airlines of flying PBN procedures.
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.
Operational costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
deployment costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Possible hazards have been identified, some of which are extant. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with the L975 Lower ATS route, MAN arrivals/transitions, aircraft inbound to Liverpool and some GA aircraft operating at low level. Furthermore, there is the potential for 'drop out' of CAS. These hazards can be mitigated through the design process. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with the L975 Lower ATS route, MAN arrivals/transitions, aircraft inbound to Liverpool and some GA aircraft operating at low level. Furthermore, there is the potential for 'drop out' of CAS. These hazards can be mitigated through the design process. Further assessment will be conducted at Stage 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 at 7,000ft - Greenhouse gas emissions - Fuel burn **Better in the following areas:** - Noise impact at 4,000ft - 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 at 4,000ft **Better in the following areas:** - Noise impact at 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. 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.

OPTION 6B

This is an RNP1option with RF coding that is similar to option 2B but the use of a higher speed results in a track slightly further west before making the second turn to the north.
The design aims to have aircraft make the first right turn no closer than 1nm from DER, and the speed applied to this option results in this option forming the westerly edge of the envelope in the initial turn along with option 6A. This speed will also permit a larger number of aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.
23L: This route commences the RF turn to the north of Knutsford. The radius of this turn takes it on the same track as option 6a via Over Tabley and east of Lymm, until west of Partington. At this point it combines with the option for 23R and heads north-east. They initially follow the route of the M62 and terminate at 7,000ft north of Prestwich.
23R: This route commences the RF turn earlier than 23L, to route further to the north of Knutsford. The radius of this turn takes it on the same track as option 6a via Over Tabley and east of Lymm, until west of Partington. At this point it combines with the option for 23L and heads north-east. They initially follow the route of the M62 and terminate at 7,000ft north of Prestwich.
A speed restriction of 220 KIAS is used for the first turn which allows most aircraft to fly in a clean configuration; however, this results in a wider turn radius than the replicated route.

Impact	Runway 23L	Runway 23R
Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 4,200 households with an approximate population of 9,700. Taking account of 300 planned property developments, this option is estimated to overfly and impact a total population of 10,400. 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 41,050 households with an approximate population of 93,900. Taking account of 500 planned property developments, this option is estimated to overfly and impact total population of 95,100. 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 3,500 households with an approximate population of 8,300. Taking account of 150 planned property developments, this option is estimated to overfly and impact a total population of 8,600. 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 40,800 households with an approximate population of 93,500. Taking account of 350 planned property developments, this option is estimated to overfly and impact total population of 94,300. 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.
Air Quality	Option 6B L overflies three AQMAs; however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Option 6B R overflies three AQMAs; however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Greenhouse Gas impact	Option 6B L 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 Option 6B L is 41.80km (22.57nm). When compared to the 'do nothing' scenario, Option 6B L is longer and is therefore expected to emit more greenhouse gases and this option is deemed to be of dis-benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 6B R 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 Option 6B R is 42.07km (22.72nm). When compared to the 'do nothing' scenario, Option 6B R is longer and is therefore expected to emit more greenhouse gases and this option is deemed to be of dis-benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.
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.
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.
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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
Access	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.
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.
Fuel burn	Option 6B L 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 41.80km (22.57nm) long. When compared to the 'do nothing' scenario, Option 6B L is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 6B R 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 42.07km (22.72nm) long. When compared to the 'do nothing' scenario, Option 6B R is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.
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.
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 for MAN 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 for MAN to assess the 'other costs' to commercial airlines of flying PBN procedures.
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.
Operational costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
deployment costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Possible hazards have been identified, some of which are extant. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with the L975 Lower ATS route, MAN arrivals/transitions, aircraft inbound to Liverpool and some GA aircraft operating at low level. Furthermore, there is the potential for 'drop out' of CAS. These hazards can be mitigated through the design process. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with the L975 Lower ATS route, MAN arrivals/transitions, aircraft inbound to Liverpool and some GA aircraft operating at low level. Furthermore, there is the potential for 'drop out' of CAS. These hazards can be mitigated through the design process. Further assessment will be conducted at Stage 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 at 4,000ft - Greenhouse gas emissions - Fuel burn **Better in the following areas:** - Noise impact at 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 at 4,000ft - Greenhouse gas emissions - Fuel burn **Better in the following areas:** - Noise impact at 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.

OPTION 7

This is an RNP1 option that uses RF coding and an initial 15° track adjustment to the right from the DER for Runway 23L and a 5° adjustment for Runway 23R. This track adjustment is aimed to reduce noise impact on Knutsford. Thereafter this option has a similar route to that of option 4B.
An RNP+RF turn follows the initial track adjustment, and this commences at 1nm from DER for Runway 23L.
The design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.
23L: After passing DER this route has a 15° track adjustment to the north which continues until 1nm from DER. An RNP+RF turn is then commenced to the north of Knutsford. This is continued until heading north in the vicinity of High Legh at which point the route heads north until just west of Partington. It then turns right to follow the course of the M62 in a north-easterly direction and terminates at 7,000ft north of Prestwich.
23R: After passing DER this route has a 5° track adjustment to the north. An RNP+RF turn is then commenced to the north of Knutsford. This is continued until the vicinity of High Legh where the route converges with the option for 23L. After this point the route heads north until just west of Cadishead where it turns right to follow the course of the M62 in a north-easterly direction and terminates at 7,000ft north of Prestwich.
A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.

Impact	Runway 23L	Runway 23R
Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 4,550 households with an approximate population of 10,800. Taking account of 150 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 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 48,200 households with an approximate population of 110,100. Taking account of 300 planned property developments, this option is estimated to overfly and impact total population of 110,800. 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 4,800 households with an approximate population of 11,400. Taking account of 150 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 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 49,000 households with an approximate population of 112,000. Taking account of 300 planned property developments, this option is estimated to overfly and impact total population of 112,700. 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.
Air Quality	Option 7 L overflies two AQMAs; however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.	Option 7 R overflies two AQMAs; however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be beneficial as it overflies fewer AQMAs.
Greenhouse Gas impact	Option 7 L 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 Option 7 L is 38.95km (21.03nm). When compared to the 'do nothing' scenario, Option 7 Lis shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 7 R 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 Option 7 R is 40.60km (21.92nm). When compared to the 'do nothing' scenario, Option 7 R is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.
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.
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.
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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
Access	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.
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.
Fuel burn	Option 7 L 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 38.95km (21.03nm) long. When compared to the 'do nothing' scenario, Option 7 L is shorter and at this stage it is assumed that that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 7 R 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 40.60km (21.92nm) long. When compared to the 'do nothing' scenario, Option 7 R is shorter and at this stage it is assumed that that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.
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.
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 for MAN 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 for MAN to assess the 'other costs' to commercial airlines of flying PBN procedures.
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.
Operational costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
deployment costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Possible hazards have been identified, some of which are extant. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with the L975 Lower ATS route, MAN arrivals/transitions, aircraft inbound to Liverpool and some GA aircraft operating at low level. Furthermore, there is the potential for 'drop out' of CAS. These hazards can be mitigated through the design process. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, options within this envelope may conflict with the L975 Lower ATS route, MAN arrivals/transitions, aircraft inbound to Liverpool and some GA aircraft operating at low level. Furthermore, there is the potential for 'drop out' of CAS. These hazards can be mitigated through the design process. Further assessment will be conducted at Stage 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 at 4,000ft **Better in the following areas:** - Noise impact at 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. 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 at 4,000ft **Better in the following areas:** - Noise impact at 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. 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.

MAG MAN ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TABLE

Departure Envelope: SID Runway 23 East

'DO NOTHING' BASELINE

For the east design envelope, the 'do nothing' scenario for departures in terms of today's operation is based around the existing conventional SONEX 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.

RIGHT TURN OPTIONS

OPTION 1A

Option 1A is an RNAV 1 replication of the current SONEX 1R/1Y SID and uses a fly-over waypoint with CF path terminator coding.
The fly-over waypoints are positioned at the existing markers.
23R this first turn is at MCT D3.
23L this is at MCT D3.2 which less than 1nm from DER but as this replicates the turn of the current procedure it therefore aligns to the Design Principle Safety.
As a replicated route it follows a similar track over the ground as the current published route. The first turn commences to the north and east of Knutsford which takes both routes north of Knutsford at which point the tracks of the SIDs converge close to Mere. The routes head north until turning right to the north of Irlam, and then heads in an easterly direction south of Eccles and terminates at 7,000ft just east of Salford.
An element of dispersion would be apparent in the turns due to the fly-over waypoint and CF coding. A speed restriction of 200 KIAS is used for the first turn to create replication of the current route.

OPTION 1C

This option provides a similar initial RNAV1 route to options 1A and 1B which are based on the existing conventional SID. However, aircraft will make the second right turn at an earlier point to route via an area of low population density to reduce noise impact.
This is aimed at recreating current ATC operational practice whereby aircraft are vectored to the east after passing 4,000ft.
An element of dispersion would be apparent in the turn due to the fly-over waypoint. These fly-over waypoints are positioned at the existing markers:
•For Runway 23R this first turn is at MCT D3.
•For Runway 23L, this is at D3.2 which is less than 1nm from DER, but this replicates the turn of the current procedure and therefore aligns to the Design Principle Safety.
23L: This follows an initial track over the ground that seeks to replicate the current route in the first right turn. This turn commences to the north of Knutsford and takes the route north where it converges with the option for 23R close to Mere. The routes continue north until turning right to the south of Partington through an area of low population density until Stretford and Urmston, where they turn right to head in an easterly direction routing south of Manchester city centre and terminating at 7,000ft overhead Gorton.
23R: This follows an initial track over the ground that seeks to replicate the current route in the first right turn. This turn commences to the north of Knutsford which takes the route north where it converges with the option for 23L close to Mere. The routes continue north until turning right to the south of Partington through an area of low population density until Stretford and Urmston, where they turn right to head in an easterly direction routing south of Manchester city centre and terminating at 7,000ft overhead Gorton.
A speed restriction of 200 KIAS is used for the first turn to create track replication of the current route.

OPTION 4A

This is an RNP1 option using RF coding that provides a more direct route to the east using a single right turn.
It is similar to option 2A but at the CAP778 recommended speed of 210kts in the turn which results in a slightly wider track to the west and north. This speed may also permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise. The design aims to have aircraft make the first right turn no closer than 1nm from DER.
23L: The first RF right turn starts to the north of Knutsford. This routes aircraft further west of Mere than option 2 but via Over Tabley before heading in a north-easterly direction to avoid Bowdon and Altrincham. The route continues in this direction before making a second right turn to the east to route to the south of Sale before terminating at 7,000ft near Heaton Chapel.
23R: This route commences the single RF turn earlier than 23L, prior to route further to the north of Knutsford. This results in a turn just west of Mere before heading in a north-easterly direction to avoid Bowdon and Altrincham. It converges with the option for 23L south of Sale where it heads east before terminating at 7,000ft near Heaton Chapel.
A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.

Option 4A for Runway 23L was rejected at the DPE stage and has therefore not been assessed.

OPTION 4B

Option 4B is and RNP1 option using RF coding included to increase the distance of routes from Knutsford through the use of a track adjustment to the north commencing at the DER. A 5° adjustment is used for Runway 23R and 15° for Runway 23L.
An RNP+RF turn follows the initial track adjustment (1nm from DER for 23L), and it then follows a similar track to option 4A.
The design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.
23L: After passing DER this route has a 15° track adjustment to the north which continues until 1nm from DER. An RNP+RF turn is then commenced which results in the route passing north of Knutsford. This RF turn takes aircraft over Mere where it combines with the option for 23R before heading in a north-easterly direction to avoid Bowdon and Altrincham. The route continues in this direction before making a second right turn to the east to route to the south of Sale before terminating at 7,000ft near Heaton Chapel.
23R: After passing DER this route has a 5° track adjustment to the north. An RNP+RF turn is then commenced which results in the route passing north of Knutsford. This is continued until the vicinity of Mere where the route converges with the option for 23L. The combined routes head in a north-easterly direction to avoid Bowdon and Altrincham and continue in this direction before making a second right turn to the east to route to the south of Sale before terminating at 7,000ft near Heaton Chapel.
A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.

OPTION 5

This is an RNP1 option using RF coding that provides a direct route to the east using a single right turn.
It is similar to option 4A but with an increased speed in the turn which results in this option forming the westerly edge of the envelope in the initial turn
The greater speed will also permit a larger number of aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise. The design aims to have aircraft make the first right turn no closer than 1nm from DER.
23L: This route commences the single RF turn to the north of Knutsford. The turn continues north via Over Tabley before heading in an easterly direction north of Altrincham. The route continues easterly heading and terminates at 7,000ft at Burnage.
23R: This route commences the single RF turn earlier than 23L, prior to Parkgate Industrial Area to route further to the north of Knutsford. The turn continues to route between Over Tabley and Mere before heading in an easterly direction north of Altrincham. It then continues easterly heading and terminates at 7,000ft at Burnage.
A speed restriction of 220 KIAS is used for the first turn which is 10kts higher than option 4A.

Option 5 for Runway 23L was rejected at the DPE stage and has therefore not been assessed.

LEFT TURN OPTIONS

OPTION 6A

This is an RNP1 left turn option using RF coding. It is included to provide a direct route to the east following an initial left turn and is intended to provide an alternative to the existing right turn departures.
This route is already used tactically by ATC in adverse weather conditions and therefore formalises these routes. The speed of the initial left turn has been applied to create the smallest radius and reduce the noise impact on Knutsford.
These routes do not converge until reaching 7,000ft.
23L: This route commences the single RF left turn close to Mobberley and routes aircraft to the south of Knutsford. The turn continues before heading in an easterly direction to the south of Alderley Edge and continues south of Poynton on an easterly heading to terminate at 7,000ft to the west of New Mills.
23R: This route commences the single RF turn slightly earlier than 23L, which results in a track slightly further south of Knutsford. The turn continues before heading in an easterly direction to the south of Alderley Edge and continues south of Poynton on an easterly heading to terminate and converge with the option for 23L at 7,000ft to the west of New Mills.
A speed restriction of 190 KIAS is used for the first turn which allows the smallest radius. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.

OPTION 6B

This is an RNP1 left turn option using RF coding that is identical to option 6A in the initial turn but terminates at 7,000ft further to the north. As with option 6A it is included to provide a direct route to the east following the initial left turn and to provide an alternative to the existing right turn departures. The speed of the initial left turn has been applied to create the smallest radius and reduce the noise impact on Knutsford.
23L: This route commences the single RF left turn close to Mobberley and routes aircraft to the south of Knutsford. The turn continues before heading in an easterly direction over Chelford to the south of Alderley Edge and continues via Woodford and Poynton to terminate at 7,000ft south of Marple.
23R: This route commences the single RF turn slightly earlier than 23L, which results in a track slightly further south of Knutsford. The turn continues before heading in an easterly direction over Chelford to the south of Alderley Edge and continues via Woodford and Poynton to terminate at 7,000ft south of Marple.
A speed restriction of 190 KIAS is used for the first turn which allows the smallest radius. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.

OPTION 6C

This is an RNP1 left turn option using RF coding that has been created with an earlier turn point when compared to option 6A and 6B to increase the distance of routes from Knutsford. This turn point used is less than 1nm from the DER but is identical to that used by existing Runway 23 departures.
After the initial turn it routes in a similar direction to option 6B and is included to provide a direct route to the east following the initial turn and provide an alternative to the existing right turn departures. The speed of the initial left turn has been applied to create the smallest radius and reduce the noise impact on Knutsford.
The waypoints for the first turn are positioned at the existing markers:
•For Runway 23R this first turn is at MCT D3.
•For Runway 23L, this is at D3.2 which is less than 1nm from DER, but this replicates the turn of the current procedure and therefore aligns to the Design Principle Safety.
23L: This route commences the single RF left turn close to Mobberley and routes aircraft further to the south of Knutsford when compared to option 6B. The turn continues before heading in an easterly direction over Chelford to the south of Alderley Edge and continues via Woodford and Poynton to terminate at 7,000ft at Marple.
23R: This route commences the single RF turn slightly earlier than 23L, which results in a track slightly further south of Knutsford when compared to option 6B. The turn continues before heading in an easterly direction over Chelford to the south of Alderley Edge and continues via Woodford and Poynton to terminate at 7,000ft at Marple.
A speed restriction of 190 KIAS is used for the first turn which allows the smallest radius. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.

OPTION 8A

This is an RNP1 left turn option using RF coding that uses a higher speed in the initial turn but terminates in a similar area to option 6A. As with option 6A it is included to provide a direct route to the east following the initial left turn and to provide an alternative to the existing right turn departures.
The speed of the initial left turn is the CAP778 recommended but this results in a track closer to Knutsford. The design speed may also permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.
23L: This route commences the single RF left turn close to Mobberley and routes aircraft close to the centre of Knutsford. The turn continues before heading in an easterly direction over Chelford to the south of Alderley Edge and continues to the north of Prestbury to terminate at 7,000ft close to Disley.
23R: This route commences the single RF turn slightly earlier than 23L, which results in a track to the southern edge of Knutsford. The turn continues before heading in an easterly direction over Chelford to the south of Alderley Edge and continues to the north of Prestbury to terminate and converge with the route for 23L at 7,000ft close to Disley.
A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.

OPTION 8B

This is an RNP1 left turn option using RF coding that uses the same higher speed and identical initial turn as option 8A but terminates further north.
As with option 8A it is included to provide a direct route to the east following the initial left turn and to provide an alternative to the existing right turn departures.
The speed of the initial left turn is the CAP778 recommended but this results in a track closer to Knutsford. The design speed may also permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.
23L: This route commences the single RF left turn close to Mobberley and routes aircraft to the south of Knutsford. The turn continues before heading in an easterly direction to the south of Chelford and Alderley Edge and continues via Woodford and Poynton to terminate at 7,000ft south of Marple.
23R: This route commences the single RF turn slightly earlier than 23L, which results in a track slightly further south of Knutsford. The turn continues before heading in an easterly direction to the south of Chelford and Alderley Edge and continues via Woodford and Poynton to terminate at 7,000ft south of Marple.
A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.

OPTION 8C

This is an RNP1 left turn option using RF coding that has the higher CAP778 turn speed as options 8A and 8B but with an earlier turn point that aims to reduce the impact of noise on Knutsford. This turn point used is less than 1nm from the DER but is identical to that used by existing Runway 23 departures.
After the initial turn it routes in a similar direction to option 8B and is included to provide a direct route to the east following the initial turn and provide an alternative to the existing right turn departures.
The design speed may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.
The waypoints for the first turn are positioned at the existing markers:
•For Runway 23R this first turn is at MCT D3.
•For Runway 23L, this is at D3.2 which is less than 1nm from DER, but this replicates the turn of the current procedure and therefore aligns with the Design Principle Safety.
23L: This route commences the single RF left turn close to Mobberley and routes aircraft just to the south of Knutsford. The turn continues before heading in an easterly direction to the south of Chelford and Alderley Edge and continues via Woodford and Poynton to terminate south of Marple.
23R: This route commences the single RF turn slightly earlier than 23L, which results in a track slightly further south of Knutsford. The turn continues before heading in an easterly direction to the south of Chelford and Alderley Edge and continues via Woodford and Poynton to terminate south of Marple.
A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.

Group	Impact	Level of Analysis	'Do nothing' Runway 23L	'Do nothing' Runway 23R	Option 1A Runway 23L	Option 1A Runway 23R	Option 1C Runway 23L	Option 1C Runway 23R
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 SONEX 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 50 planned property developments, this option is estimated to overfly and impact a total population of 1,900. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 48,500 households with an approximate population of 115,700. Taking account of 2,200 planned property developments, this option is estimated to overfly and impact a total population of 121,000.	For comparison purposes within the IOA, the 'do nothing' scenario was based upon the existing SONEX 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 2,850 households with an approximate population of 7,000. Taking account of 350 planned property developments, this option is estimated to overfly and impact a total population of 7,800. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 85,300 households with an approximate population of 202,600. Taking account of 2,100 planned property developments, this option is estimated to overfly and impact a total population of 207,600.	Up to 4,000ft, this option is estimated to overfly approximately 4,650 households with an approximate population of 11,200. Taking account of 650 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 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 74,800 households with an approximate population of 154,600. Taking account of 6,750 planned property developments, this option is estimated to overfly and impact total population of 168,500. 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 4,850 households with an approximate population of 11,700. Taking account of 500 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 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 75,300 households with an approximate population of 155,700. Taking account of 6,650 planned property developments, this option is estimated to overfly and impact total population of 169,500. 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 1,250 households with an approximate population of 2,700. Taking account of 900 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 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 105,650 households with an approximate population of 276,800. Taking account of 3,900 planned property developments, this option is estimated to overfly and impact total population of 287,000. 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.	Up to 4,000ft, this option is estimated to overfly approximately 500 households with an approximate population of 1,200. 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 106,550 households with an approximate population of 279,700. Taking account of 3,800 planned property developments, this option is estimated to overfly and impact total population of 289,700. 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.

Option 4A: Runway 23L (Not Assessed). Option 5: Runway 23L (Not Assessed).

IOA Shortlist Assessment

Option	Runway	IOA Shortlist Assessment	OPTION SHORTLIST CLASSIFICATION FOR STAGE 3
1A	23L	Based on IOA Shortlist Assessment methodology, Option 1A L has been deemed the Favourable option within this design envelope.	FAVOURABLE
1A	23R	Based on IOA Shortlist Assessment methodology, Option 1A R has been Rejected.	REJECTED
1C	23L	Based on IOA Shortlist Assessment methodology, Option 1C L has been deemed the Preferred option within this design envelope.	PREFERRED
1C	23R	Based on IOA Shortlist Assessment methodology, Option 1C R has been Rejected.	REJECTED
4A	23L (Not Assessed)		
4A	23R	Based on IOA Shortlist Assessment methodology, Option 4A R has been deemed the Preferred option within this design envelope.	PREFERRED
4B	23L	Based on IOA Shortlist Assessment methodology, Option 4B L has been deemed the Acceptable option within this design envelope.	ACCEPTABLE
4B	23R	Based on IOA Shortlist Assessment methodology, Option 4B R has been deemed the Acceptable option within this design envelope.	ACCEPTABLE
5	23L (Not Assessed)		
5	23R	Based on IOA Shortlist Assessment methodology, Option 5 R has been deemed the Favourable option within this design envelope.	FAVOURABLE
6A	23L	Based on IOA Shortlist Assessment methodology, Option 6A L has been Rejected.	REJECTED
6A	23R	Based on IOA Shortlist Assessment methodology, Option 6A R has been deemed the Preferred option within this design envelope.	PREFERRED
6B	23L	Based on IOA Shortlist Assessment methodology, Option 6B L has been Rejected.	REJECTED
6B	23R	Based on IOA Shortlist Assessment methodology, Option 6B R has been Rejected.	REJECTED
6C	23L	Based on IOA Shortlist Assessment methodology, Option 6C L has been Rejected.	REJECTED
6C	23R	Based on IOA Shortlist Assessment methodology, Option 6C R has been Rejected.	REJECTED
8A	23L	Based on IOA Shortlist Assessment methodology, Option 8A L has been deemed the Favourable option within this design envelope.	FAVOURABLE
8A	23R	Based on IOA Shortlist Assessment methodology, Option 8A R has been deemed the Acceptable option within this design envelope.	ACCEPTABLE
8B	23L	Based on IOA Shortlist Assessment methodology, Option 8B L R has been deemed the Acceptable option within this design envelope.	ACCEPTABLE
8B	23R	Based on IOA Shortlist Assessment methodology, Option 8B R has been Rejected.	REJECTED
8C	23L	Based on IOA Shortlist Assessment methodology, Option 8C L has been deemed the Preferred option within this design envelope.	PREFERRED
8C	23R	Based on IOA Shortlist Assessment methodology, Option 8C R has been deemed the Favourable option within this design envelope.	FAVOURABLE

MAG MAN ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TABLE

Departure Envelope: SID Runway 23 South

'DO NOTHING' BASELINE

For the south design envelope, the 'do nothing' scenario for departures in terms of today's operation is based around the existing conventional SANBA and LISTO SIDs. 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.

Group	Impact	Level of Analysis	Runway 23L	Runway 23R
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 SANBA SID. In terms of potential noise impact, initial quantitative analysis has identified that for the SANBA SID: - Up to 4,000 ft, this 'do nothing' scenario is estimated to overfly approximately 1,250 households with an approximate population of 3,200. Taking account of 300 planned property developments, this option is estimated to overfly and impact a total population of 3,900. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 3,000 households with an approximate population of 7,200. Taking account of 450 planned property developments, this option is estimated to overfly and impact a total population of 8,300.	For comparison purposes within the IOA, the 'do nothing' scenario was based upon the existing SANBA SID. In terms of potential noise impact, initial quantitative analysis has identified that for the SANBA SID: - Up to 4,000 ft, this 'do nothing' scenario is estimated to overfly approximately 1,350 households with an approximate population of 3,400. Taking account of zero 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 6,300 households with an approximate population of 14,300. Taking account of 850 planned property developments, this option is estimated to overfly and impact a total population of 16,200.
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 23L SANBA SID does not overfly any AQMAs. Overflight of thes AQMA occurs when the aircraft is above 1,000ft.	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 23R SANBA SID overflies one AQMA. Overflight of the AQMA occurs 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 based on the SANBA SID, the track length to the common point is 47.81km (25.82nm).	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 based on the SANBA SID, the track length to the common point is 49.48km (26.72nm).
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 DVOR in December 2022.	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 DVOR in December 2022.
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' scenarios for SANBA SID does not overfly any AONBs or National Parks.	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' scenarios for the SANBA SID does not overfly any 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 MAN 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 MAN 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 MAN will maintain their current level of access under extant operational arrangements.	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of MAN 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.	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 MAN 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 based on the SANBA SID, the track length to the common point is 47.81km (25.82nm).	The existing MAN 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 based on the SANBA SID, the track length to the common point is 49.48km (26.72nm).
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.	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 for MAN 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.	It is not proportionate for MAN 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 MAN 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.	No additional infrastructure is required at MAN 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.	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.	No deployment costs applicable to extant procedures.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft departing MAN 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.	The 'do nothing' scenario assumes that current operations at MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft departing MAN 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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing SIDs do 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.	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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing SIDs do 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.
		IOA Shortlist Assessment		
		OPTION SHORTLIST CLASSIFICATION FOR STAGE 3		

SANBA – OPTION 1

Option 1 is an RNAV 1 replication of the current SANBA 1R/1Y SID and uses a fly-by to fly-over waypoint sequence with CF path terminator coding to create an approximate replication.
As a replication of the SANBA, this option routes to the west side of the envelope.
The fly-by waypoints are positioned to replicate the turn at the existing markers:
•23R this first turn is at MCT D3.
•23L this is at MCT D3.2 which less than 1nm from DER but as this replicates the turn of the current procedure it therefore aligns to the Design Principle Safety. This earlier turn is to avoid Knutsford.
As a replicated route it follows a similar track over the ground as the current published route. The first turn commences in the vicinity of Parkgate Industrial Area and the route kinks to the north of Knutsford before turning left to head south. The routes converge in the vicinity of Lostock Gralam and it then routes in a south easterly direction to pass west of Holmes Chapel and east of Sandbach and terminates at 7,000ft just west of Kidsgrove.
An element of dispersion would be apparent in the turns due to the fly-over waypoint and CF coding. A speed restriction of 200 KIAS, then 210 KIAS is used for the first and second turn to create replication of the current route.

Impact	Runway 23L	Runway 23R
Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 500 households with an approximate population of 1,200. Taking account of 350 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 11,800 households with an approximate population of 25,900. Taking account of 1,800 planned property developments, this option is estimated to overfly and impact total population of 29,800. 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 1,150 households with an approximate population of 2,700. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 2,700. 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 12,650 households with an approximate population of 27,900. Taking account of 1,450 planned property developments, this option is estimated to overfly and impact total population of 31,100. 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.
Air Quality – Safety Assessment; Summary of Analysis	[illegible]	[illegible]
IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option 1 L has been Rejected.	Based on IOA Shortlist Assessment methodology, Option 1 R has been Rejected.
Option shortlist classification for Stage 3	REJECTED	REJECTED

SANBA – OPTION 4A

This RNAV1 option provides an initial turn over the southern edge of Knutsford and heads in a south-west direction. It serves a similar purpose as the SANBA 1R/1Y SID and terminates on the west side of the envelope.
The procedure uses a fly-over waypoint and can be coded as either course-to-fix, track-to-fix, or direct-to-fix. The climb gradient has been set at 6%.
An element of dispersion would be apparent in the turn due to the path terminator coding.
23L: After departure this route continues straight ahead before making a left turn to the south-west over Knutsford. It continues in this direction to the west of Holmes Chapel and Sandbach. It passes over the eastern edge of Crewe and converges with the option for 23R at the 7,000ft termination point just south of Crewe.
23R: After departure this route makes a left turn to the south-west to route between Knutsford and Mobberley and continues in this direction just to the west of Holmes Chapel and Sandbach. It passes over the eastern edge of Crewe and both routes converge at the 7,000ft termination point just south of Crewe.
A speed restriction of 190 KIAS is applied to the first turn.

Impact	Runway 23L	Runway 23R
Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 2,300 households with an approximate population of 5,400. Taking account of 450 planned property developments, this option is estimated to overfly and impact a total population of 6,400. 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 18,100 households with an approximate population of 42,100. Taking account of 3,350 planned property developments, this option is estimated to overfly and impact total population of 49,800. 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 1,400 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 4,000. 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 16,950 households with an approximate population of 39,800. Taking account of 3,800 planned property developments, this option is estimated to overfly and impact total population of 48,700. 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.
Air Quality – Safety Assessment; Summary of Analysis	[illegible]	[illegible]
IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option 4A L has been Rejected.	Based on IOA Shortlist Assessment methodology, Option 4A R has been Rejected.
Option shortlist classification for Stage 3	REJECTED	REJECTED

SANBA – OPTION 4C

This RNAV1 option provides a route that heads to the south-south-west of the envelope similar to the SANBA 1R/1Y SID but with the same earlier initial turn intended to avoid Knutsford as option 4B, and a left turn further down route to avoid Sandbach and Crewe.
In common with option 4B the turn point for Runway 23L is at MCT D3.2, which is 0.7nm from DER. The turn point for Runway 23R is at 1nm from DER. This combination creates separation from Knutsford.
The procedure uses a fly-over waypoint and can be coded as either course-to-fix, track-to-fix, or direct-to-fix. The climb gradient has been set at 6%. An element of dispersion would be apparent in the turn due to the path terminator coding.
23L: After departure this route makes a left turn south-west at MCT D3.2 which less than 1nm from DER. As this replicates the turn of the current procedure it aligns to the Design Principle Safety. This first turn routes to the south of Knutsford and the route continues on a south-westerly heading and combines with the 23R option midway between Lower Peover and Over Peover. The combined routes pass to the west of Holmes Chapel and Sandbach and then make a slight right turn to avoid Crewe and terminate at 7,000ft in the vicinity of Betley.
23R: After departure this route makes a left turn to the south-west to route south of Knutsford and combines with the 23L option midway between Lower Peover and Over Peover. The combined routes pass to the west of Holmes Chapel and Sandbach and then make a slight right turn to avoid Crewe and terminate at 7,000ft in the vicinity of Betley.
A speed restriction of 190 KIAS is applied to the first turn.

Impact	Runway 23L	Runway 23R
Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 700 households with an approximate population of 1,700. Taking account of 650 planned property developments, this option is estimated to overfly and impact a total population of 3,300. 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 7,900 households with an approximate population of 19,500. Taking account of 2,750 planned property developments, this option is estimated to overfly and impact total population of 26,300. 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 850 households with an approximate population of 2,000. Taking account of 50 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 8,550 households with an approximate population of 20,800. Taking account of 2,650 planned property developments, this option is estimated to overfly and impact total population of 27,200. 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.
Air Quality – Safety Assessment; Summary of Analysis	[illegible]	[illegible]
IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option 4C L has been deemed the Acceptable option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 4C R has been deemed the Acceptable option within this design envelope.
Option shortlist classification for Stage 3	ACCEPTABLE	ACCEPTABLE

SANBA – OPTION 5C

This is an RNP1 option with RF coding that follows a similar initial track to the existing LISTO 2R/2Y SID. However, the turn is stopped earlier to provide a route to the south which passes west of Congleton to terminate in the vicinity of that for the current SANBA SID.
23L: After departure this route makes a left turn at MCT D3.2 which less than 1nm from DER. As this replicates the turn of the current procedure it aligns to the Design Principle Safety. This first turn routes to the south of Knutsford and the route continues on a south-easterly heading to the south of Chelford where it combines with the 23R option. The combined routes then turn south-west to avoid Congleton and Sandbach and terminate at 7,000ft west of Stoke-on-Trent.
23R: After departure this route makes a left turn to route south of Knutsford and continues on a south-easterly heading to the south of Chelford where it combines with the 23L option. The combined routes then turn south-west to avoid Congleton and Sandbach and terminate at 7,000ft west of Stoke-on-Trent.
A speed restriction of 190 KIAS is used for the first turn to avoid Knutsford. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.

Impact	Runway 23L	Runway 23R (New)
Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 450 households with an approximate population of 1,200. Taking account of 200 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 10,050 households with an approximate population of 22,200. Taking account of 800 planned property developments, this option is estimated to overfly and impact 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.	Up to 4,000ft, this option is estimated to overfly approximately 650 households with an approximate population of 1,400. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 1,400. 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 10,300 households with an approximate population of 22,600. Taking account of 550 planned property developments, this option is estimated to overfly and impact total population of 23,800. 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.
Air Quality – Safety Assessment; Summary of Analysis	[illegible]	[illegible]
IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option 5C L has been deemed the Preferred option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 5C R has been deemed the Preferred option within this design envelope.
Option shortlist classification for Stage 3	PREFERRED	PREFERRED

SANBA – OPTION 6

This option is included to provide a RNAV1 replication of the existing conventional SANBA 1R/1Y SID to 7,000ft. However, unlike the 'do minimum' option 1 which uses fly-over waypoints, this option has been designed as an RNAV1 route using fly-by waypoints.
The benefit of fly over waypoints is more accurate track keeping. However, option 1 is more likely to be a better representation of existing operations with dispersion being apparent in the turn to the south.
The route has been designed as an RNAV1 route and uses fly-by waypoints. The climb gradient has been set at 6%.
23L: After departure, this route makes a right turn at MCT D3.2 which less than 1nm from DER. As this replicates the turn of the current procedure it aligns to the Design Principle Safety. This first turn routes to the north of Knutsford and following a short straight segment, then turns left to route south between Knutsford and Northwich where it combines with the 23R option. The combined routes pass just to the west of Holmes Chapel and to the eastern edge of Sandbach and terminate at 7,000ft south-east of Sandbach.
23R: After departure, this route makes a right turn to route north of Knutsford and following a short straight segment, then turns left to route south between Knutsford and Northwich where it combines with the 23L option. The combined routes pass just to the west of Holmes Chapel and to the eastern edge of Sandbach and terminate at 7,000ft south-east of Sandbach.
A speed restriction of 200 KIAS then 210 KIAS is used for the first turn and second turn.

Impact	Runway 23L	Runway 23R
Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 1,500 households with an approximate population of 3,600. Taking account of 300 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 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 26,100. Taking account of 1,600 planned property developments, this option is estimated to overfly and impact total population of 29,700. 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 1,850 households with an approximate population of 4,600. Taking account of zero 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 12,300 households with an approximate population of 27,600. Taking account of 1,300 planned property developments, this option is estimated to overfly and impact total population of 30,500. 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.
Air Quality – Safety Assessment; Summary of Analysis	[illegible]	[illegible]
IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option 6 L has been Rejected.	Based on IOA Shortlist Assessment methodology, Option 6 R has been Rejected.
Option shortlist classification for Stage 3	REJECTED	REJECTED

SANBA – OPTION 7B

This is an RNP1 option with RF coding that provides an alternative version of the existing LISTO 2R/2Y SID. It is similar to option 7A but makes a turn to the west of Congleton to avoid Stoke-on-Trent.
In common with option 7A, the RF turn is at 1nm DER in accordance with PANS-OPS/CAP778 which routes this option closer to the centre of Knutsford, however the final track is in a south-westerly direction.
23L: After departure, this route makes a left turn south at 1nm from DER and routes to the south of Knutsford. It then routes to the west of Chelford before turning south-west to avoid Congleton. This has the effect of avoiding Stoke-on-Trent and the route terminates at 7,000ft to the west of the town.
23R: After departure, this route makes a left turn south at 1nm from DER which routes it over the south-east edge of Knutsford. It then routes to the west of Chelford before turning south-west to avoid Congleton. This has the effect of avoiding Stoke-on-Trent and the route terminates at 7,000ft to the west of the town.
A speed restriction of 190 KIAS is used for the first turn which allows the smallest radius. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.

Impact	Runway 23L	Runway 23R
Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 900 households with an approximate population of 2,100. Taking account of 100 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 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 10,450 households with an approximate population of 23,100. Taking account of 650 planned property developments, this option is estimated to overfly and impact total population of 24,500. 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 1900. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 1,900. 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 10,350 households with an approximate population of 22,900. Taking account of 500 planned property developments, this option is estimated to overfly and impact 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.
Air Quality – Safety Assessment; Summary of Analysis	[illegible]	[illegible]
IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option 7B L has been deemed the Favourable option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 7B R has been deemed the Favourable option within this design envelope.
Option shortlist classification for Stage 3	FAVOURABLE	FAVOURABLE

'DO NOTHING' BASELINE - LISTO

For the south design envelope, the 'do nothing' scenario for departures in terms of today's operation is based around the existing conventional SANBA and LISTO SIDs. 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.

Impact	Runway 23L	Runway 23R
Noise impact on health and quality of life	In terms of potential noise impact, initial quantitative analysis has identified that for the LISTO SID as the baseline: - Up to 4,000 ft, this 'do nothing' scenario is estimated to overfly approximately 700 households with an approximate population of 1,600. Taking account of 400 planned property developments, this option is estimated to overfly and impact a total population of 2,500. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 12,400 households with an approximate population of 27,700. Taking account of 2,500 planned property developments, this option is estimated to overfly and impact a total population of 33,300.	In terms of potential noise impact, initial quantitative analysis has identified that for the LISTO SID as the baseline: - Up to 4,000 ft, this 'do nothing' scenario is estimated to overfly approximately 1,050 households with an approximate population of 2,300. Taking account of 450 planned property developments, this option is estimated to overfly and impact a total population of 3,300. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 12,600 households with an approximate population of 27,900. Taking account of 2,600 planned property developments, this option is estimated to overfly and impact a total population of 33,700.
Air Quality – Safety Assessment	[illegible]	[illegible]
Summary of Analysis	[illegible] … 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.	[illegible] … 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.
IOA Shortlist Assessment		
Option shortlist classification for Stage 3		

LISTO – OPTION 2A

This is an RNAV1 replication of the current LISTO 2R/2Y SID which turns south before Knutsford. It uses a fly-over waypoint with CF path terminator coding to create an approximate replication.
As a replication of the LISTO, this option routes to the east side of the envelope.
The fly-by waypoints are positioned to replicate the turn at the existing markers:
•23R this first turn is at MCT D3.
•23L this is at MCT D3.2 which less than 1nm from DER but as this replicates the turn of the current procedure it therefore aligns to the Design Principle Safety. This earlier turn is to avoid Knutsford.
The first turn results in both routes avoiding Knutsford to the south-east and they converge in the vicinity of Chelford. It routes in a south-easterly direction to pass over Congleton and terminate just east of Stoke-on-Trent.
An element of dispersion would be apparent in the turn due to the fly-over waypoint and CF coding. A speed restriction of 185kts is required for the initial turn for aircraft to avoid Knutsford.

Impact	Runway 23L	Runway 23R
Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 500 households with an approximate population of 1,100. Taking account of 900 planned property developments, this option is estimated to overfly and impact a total population of 3,100. 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 26,450 households with an approximate population of 59,700. Taking account of 2,950 planned property developments, this option is estimated to overfly and impact total population of 66,400. 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 650 households with an approximate population of 1,400. Taking account of 750 planned property developments, this option is estimated to overfly and impact a total population of 3,100. 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 26,750 households with an approximate population of 60,300. Taking account of 2,900 planned property developments, this option is estimated to overfly and impact total population of 66,800. 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.
Air Quality – Safety Assessment; Summary of Analysis	[illegible]	[illegible]
IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option 2A L has been Rejected.	Based on IOA Shortlist Assessment methodology, Option 2A R has been Rejected.
Option shortlist classification for Stage 3	REJECTED	REJECTED

LISTO – OPTION 2B

This is an RNAV1 option is included that provides the same initial turn inside of Knutsford as the current LISTO 2R/2Y SID but then has a track to create the maximum divergence from other southbound routes and to avoid the overflight of Congleton.
The aim is to provide a 45° track divergence from other southbound SIDs when created as a network which would enable a one-minute departure separation to align with the Design Principle Capacity.
In line with CAP493 (Manual of Air Traffic Services Pt1), the minimum departure separation can be reduced to one minute provided that the aircraft fly on tracks diverging by 45° or more immediately after take-off.
The option uses a fly-over waypoint with CF path terminator coding to create an approximate replication of the initial turn and a similar track over the ground as the current route. The waypoints are positioned to replicate the turn at the existing markers.
23L: After departure this route makes a left turn south at MCT D3.2 which less than 1nm from DER. As this replicates the turn of the current procedure it aligns to the Design Principle Safety. This first turn routes to the south-east of Knutsford and the route continues on a south-easterly heading to pass west of Chelford. A right turn to the south is made to the north-east of Congleton where the routes converge and terminate at 7,000ft to the east of Leek.
23R: After departure this route makes a left turn south at MCT D3 which creates a route that passes just east of Mobberley. The route continues on a south-easterly heading to pass east of Chelford. A right turn to the south is made to the north-east of Congleton where the routes converge and terminate at 7,000ft to the east of Leek. The combined routes avoid Congleton to the east.
A speed restriction of 185kts is required for the initial turn for aircraft to avoid Knutsford.

Impact	Runway 23L	Runway 23R
Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 400 households with an approximate population of 900. Taking account of 100 planned property developments, this option is estimated to overfly and impact a total population of 1,100. 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 1,850 households with an approximate population of 4,300. Taking account of 250 planned property developments, this option is estimated to overfly and impact total population of 4,900. 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 300 households with an approximate population of 900. Taking account of zero 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 1,750 households with an approximate population of 4,300. Taking account of 150 planned property developments, this option is estimated to overfly and impact 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.
Air Quality – Safety Assessment; Summary of Analysis	[illegible]	[illegible]
IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option 2B L has been deemed the Preferred option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 2B R has been deemed the Preferred option within this design envelope.
Option shortlist classification for Stage 3	PREFERRED	PREFERRED

LISTO – OPTION 5A

This is an RNP1 option that uses RF coding and follows a similar initial track to the existing LISTO SID which turns south before Knutsford. However, the track following the initial turn routes further south-east than the existing LISTO SID once south of Chelford.
The aim is to provide a 45° track divergence from other southbound SIDs when created as a network which would enable a one-minute departure separation to align with the Design Principle Capacity.
23L: After departure, this route makes a left turn at MCT D3.2 which less than 1nm from DER. As this replicates the turn of the current procedure it aligns to the Design Principle Safety. This first turn routes to the south of Knutsford and the route continues on a south-easterly heading to route west of Chelford where it and combines with the 23R option. The combined routes avoid Congleton and Stoke-on-Trent and terminate at 7,000ft west of Leek.
23R: After departure this route makes a left turn to route south of Knutsford and combines with the 23L option to the west of Chelford. The combined routes avoid Congleton and Stoke-on-Trent and terminate at 7,000ft west of Leek.
A speed restriction of 190 KIAS is used for the first turn which allows the smallest radius to avoid Knutsford. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.

Impact	Runway 23L	Runway 23R
Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 450 households with an approximate population of 1,000. Taking account of 300 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 9,550 households with an approximate population of 22,000. Taking account of 1,950 planned property developments, this option is estimated to overfly and impact total population of 26,400. 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 650 households with an approximate population of 1,400. Taking account of 50 planned property developments, this option is estimated to overfly and impact a total population of 1,500. 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 9,800 households with an approximate population of 22,400. Taking account of 1,750 planned property developments, this option is estimated to overfly and impact total population of 26,400. 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.
Air Quality – Safety Assessment; Summary of Analysis	[illegible]	[illegible]
IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option 5A L R has been deemed the Acceptable option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 5A R has been deemed the Favourable option within this design envelope.
Option shortlist classification for Stage 3	ACCEPTABLE	FAVOURABLE

LISTO – OPTION 5B

This is an RNP1 option with RF coding that follows a similar initial track to option 5A and turns south before Knutsford. However, this left turn is continued to provide a route more to the east to avoid Congleton and Leek to aid capacity and departure separation.
In a similar way to options 2B and 5A, the aim is to provide a 45° track divergence from other southbound SIDs when created as a network which would enable a one-minute departure separation to align with the Design Principle Capacity.
23L: After departure this route makes a left turn at MCT D3.2 which less than 1nm from DER. As this replicates the turn of the current procedure it aligns to the Design Principle Safety. This first turn routes to the south of Knutsford and the route continues on a south-easterly heading south-west of Chelford and then mid-way between Macclesfield and Congleton to avoid both towns. It combines with the 23R option south of Macclesfield and the combined routes turn south and terminate at 7,000ft between Stoke-on-Trent and Leek.
23R: After departure this route makes a left turn to route south of Knutsford and continues on a south-easterly heading over Chelford and then mid-way between Macclesfield and Congleton to avoid both towns. It combines with the 23L option south of Macclesfield and the combined routes turn south and terminate at 7,000ft between Stoke-on-Trent and Leek.
A speed restriction of 190 KIAS is used for the first turn which allows the smallest radius to avoid Knutsford. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.

Impact	Runway 23L	Runway 23R
Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 400 households with an approximate population of 900. Taking account of 200 planned property developments, this option is estimated to overfly and impact a total population of 1,400. 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 1,800 households with an approximate population of 4,300. Taking account of 350 planned property developments, this option is estimated to overfly and impact total population of 5,100. 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 1,100 households with an approximate population of 2,300. Taking account of 100 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 3,550 households with an approximate population of 5,600. Taking account of 250 planned property developments, this option is estimated to overfly and impact total population of 6,200. 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.
Air Quality – Safety Assessment; Summary of Analysis	[illegible]	[illegible]
IOA Shortlist Assessment	Based on IOA Shortlist Assessment methodology, Option 5B L has been deemed the Favourable option within this design envelope.	Based on IOA Shortlist Assessment methodology, Option 5B R has been deemed the Acceptable option within this design envelope.
Option shortlist classification for Stage 3	FAVOURABLE	ACCEPTABLE

MAG MAN ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TABLE

Departure Envelope: SID Runway 23 West

Option	Description
'DO NOTHING' BASELINE	For the west design envelope, the 'do nothing' scenario for departures in terms of today's operation is based around current operations where aircraft routing to the west via an EKLAD SID are vectored off the SID once they are above 3,000ft. 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 7	This is an RNAV1 option that modifies option 2 to minimise the interactions with LPL airspace following stakeholder feedback. It provides an initial climb out to a fly-over waypoint and then a right turn to route north of Knutsford and direct towards Wallasey to align with current operational practice. It follows the same lateral track as option 2 but following stakeholder feedback to eliminate interactions with LPL inbound traffic to Runway 27, it has an increased climb gradient up to the point the LPL delegated airspace is overflown. Thereafter the gradient is reduced to one that will result in the route terminating in the same location as option 2, which has been designed to a constant 6% gradient. The initial climb gradient in this option is greater than the 6% to 7,000ft that has been adopted for other routes and which was identified as flyable by all aircraft within the fleet equipage survey at section 5.6. This survey identified that some aircraft could exceed this 6% gradient, and because this initial climb gradient is only required to 3,500ft it will be assessed with the airlines to confirm viability should it be taken forward. The initial climb gradient has been set at 11.64% for 23L / 9.81% for 23R for the portion of the SID prior to where the route meets the 3nm buffer of the LPL delegated airspace. Thereafter a maximum climb gradient of 4.2% is applied to terminate at 7,000ft at the same end position as option 2. Waypoints will be placed at the location of the 3nm boundary to specify that an altitude of 'at or above 3,500ft' is required to ensure safe separation. The design speed may allow aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise. 23L: After departure, the route makes a turn to the right 1nm from DER which takes it just to the north of Knutsford through Mere. It then heads in a north-westerly direction routing to the south of Warrington and terminates at 7,000ft to the south-east of Liverpool. 23R: Similar to option for 23L, this route makes a right turn following take-off to the north of Knutsford through Mere. It then heads in a north-westerly direction routing to the south of Warrington and terminates at 7,000ft to the south-east of Liverpool. An element of dispersion would be apparent in the turn due to the fly-over waypoint and either CF or DF coding. A speed restriction of 210 KIAS is applied to the first turn.
OPTION 8	This is an RNAV1 option that modifies option 3B to minimise the interactions with LPL airspace following stakeholder feedback. It follows the same lateral track as option 3B but following stakeholder feedback to eliminate interactions with LPL inbound traffic to Runway 27, it has an increased climb gradient up to the point the LPL delegated airspace is overflown. Thereafter the gradient is reduced to one that will result in the route terminating in the same location as option 3B. The initial climb gradient in this option is greater than the 6% to 7,000ft that has been adopted for other routes and which was identified as flyable by all aircraft within the fleet equipage survey at section 5.6. This survey identified that some aircraft could exceed this 6% gradient, and because this initial climb gradient is only required to 3,500ft it will be assessed with the airlines to confirm viability should it be taken forward. The initial climb gradient has been set at 12.1% for 23L / 10.3% for 23R for the portion of the SID prior to where the route meets the 3nm buffer of the LPL delegated airspace. Thereafter a maximum climb gradient of 3.7% is applied to terminate at 7,000ft at the same end position as option 3B. As the option is within a turn segment at the location of the airspace boundary, a waypoint cannot be placed on the intersection of the nominal track and the boundary. A restriction greater than 3,500 ft would need to be placed upon the second waypoint to follow the profile of the required climb to ensure that the correct altitude is met at the boundary. 23L: After departure, the route makes a turn to the right at 0.7nm from DER which replicates the turn of the current EKLAD procedure and therefore aligns to the Design Principle Safety. It continues to replicate the EKLAD SID to the north of Knutsford through Mere and passes north of Northwich at which point it turns right onto a westerly heading which takes it overhead Widnes where it terminates at 7,000ft. 23R: After departure, the route makes a turn to the right and replicates the track of the current EKLAD SID to the north of Knutsford through Mere where it combines with the route for 23L. It then routes north of Northwich at which point it turns right onto a westerly heading which takes it overhead Widnes where it terminates at 7,000ft An element of dispersion would be apparent in the turn due to the fly-over waypoint and either CF or DF coding. A speed restriction of 200 KIAS then 250 KIAS is used for the first turn and second turn.
OPTION 9	This is an RNP1 option that modifies option 4 to minimise the interactions with LPL airspace following stakeholder feedback. It follows the same lateral track as option 4 but following stakeholder feedback to eliminate interactions with LPL inbound traffic to Runway 27, it has an increased climb gradient up to the point the LPL delegated airspace is overflown. Thereafter the gradient is reduced to one that will result in the route terminating in the same location as option 4. It has an almost identical track across the ground as option 2 but to a higher navigation standard to provide more accurate track keeping. The initial climb gradient in this option is greater than the 6% to 7,000ft that has been adopted for other routes and which was identified as flyable by all aircraft within the fleet equipage survey at section 5.6. This survey identified that some aircraft could exceed this 6% gradient, and because this initial climb gradient is only required to 3,500ft it will be assessed with the airlines to confirm viability should it be taken forward. The initial climb gradient has been set at 11.7% for 23L / 9.9% for 23R for the portion of the SID prior to where the route meets the 3nm buffer of the LPL delegated airspace. Thereafter a maximum climb gradient of 4.2% is applied to terminate at 7,000ft at the same end position as option 4. Waypoints will be placed at the location of the 3nm boundary to specify that an altitude of 'at or above 3,500ft' is required to ensure safe separation. 23L: After departure, the route makes a turn to the right 1nm from DER which takes it just to the north of Knutsford through Mere. It then heads in a north-westerly direction routing to the south of Warrington and terminates at 7,000ft to the south-east of Liverpool. 23R: Similar to option for 23L, this route makes a turn to the right which takes it just to the north of Knutsford through Mere. It then heads in a north-westerly direction routing to the south of Warrington and terminates at 7,000ft to the south-east of Liverpool. A speed restriction of 190 KIAS is used for the first turn, thereafter 250 KIAS would apply. Although PANS-OPS compliant it should be assessed for flyability as part of the procedure validation process within Stage 4 of CAP1616.
OPTION 10	This is an RNP1 option that modifies option 5A to minimise the interactions with LPL airspace following stakeholder feedback. It follows the same lateral track as option 5A with an RF right turn that routes north of Knutsford and then direct towards Wallasey to align with current operational practice. However, to eliminate interactions with LPL inbound traffic to Runway 27, it has an increased climb gradient up to the point the LPL delegated airspace is overflown. Thereafter the gradient is reduced to one that will result in the route terminating in the same position as option 5A, which has been designed to a constant 6% gradient. The initial climb gradient in this option is greater than the 6% to 7,000ft that has been adopted for other routes and which was identified as flyable by all aircraft within the fleet equipage survey at section 5.6. This survey identified that some aircraft could exceed this 6% gradient, and because this initial climb gradient is only required to 3,500ft it will be assessed with the airlines to confirm viability should it be taken forward. The initial climb gradient has been set at 11.3% for 23L / 9.7% for 23R for the portion of the SID prior to where the route meets the 3nm buffer of the LPL delegated airspace. Thereafter a maximum climb gradient of 4.2% is applied to terminate at 7,000ft at the same end position as option 5A. Waypoints will be placed at the location of the 3nm boundary to specify that an altitude of 'at or above 3,500ft' is required to ensure safe separation. For 23L, placing a waypoint on this boundary may result in a segment length that is too short between the RF turn and the 3nm boundary (in accordance with PANS-OPS requirements). This could either be assessed in flight validation for FMS anomalies, or the waypoint can be located at the necessary distance from the RF turn and specified with a higher altitude than 3,500ft to follow the profile of the required climb to ensure that the correct altitude is met at the boundary. The route followed by the options is as follows: 23L: After departure, the route makes a turn to the right at 1nm from DER which takes it just to the north of Knutsford through Mere. It then heads in a north-westerly direction routing to the south of Warrington and terminates at 7,000ft just west of Widnes. 23R: After departure, the route makes a turn to the right which takes it over the northern edge of Knutsford through Mere. It then heads in a north-westerly direction routing to the south of Warrington and terminates at 7,000ft just west of Widnes. A speed restriction of 220 KIAS is used for the first turn, thereafter 250 KIAS would apply.
OPTION 11	This is an RNP1 option that modifies option 5B to minimise the interactions with LPL airspace following stakeholder feedback. It follows the same lateral track as option 5B with an RF right turn that routes north of Knutsford and then direct towards Wallasey to align with current operational practice. However, to eliminate interactions with LPL inbound traffic to Runway 27, it has an increased climb gradient up to the point the LPL delegated airspace is overflown. Thereafter the gradient is reduced to one that will result in the route terminating in the same position as option 5B. The initial climb gradient in this option is greater than the 6% to 7,000ft that has been adopted for other routes and which was identified as flyable by all aircraft within the fleet equipage survey at section 5.6. This survey identified that some aircraft could exceed this 6% gradient, and because this initial climb gradient is only required to 3,500ft it will be assessed with the airlines to confirm viability should it be taken forward. The initial climb gradient has been set at 11.5% for 23L / 9.7% for 23R for the portion of the SID prior to where the route meets the 3nm buffer of the LPL delegated airspace; thereafter a maximum climb gradient of 4.2% would be required to terminate at 7,000ft at the same end position as option 5B. Waypoints will be placed at the location of the 3nm boundary to specify that an altitude of 'at or above 3,500ft' is required to ensure safe separation. The design speed will permit a larger number of aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise. 23L: After departure, the route makes a turn to the right at 1nm from DER which takes it to the north of Knutsford through Mere. It then heads in a north-westerly direction routing to the south of Warrington and terminates at 7,000ft just west of Widnes. 23R: After departure, the route makes a turn to the right which takes it just to the north of Knutsford through Mere. It then heads in a north-westerly direction routing to the south of Warrington and terminates at 7,000ft just west of Widnes. A speed restriction of 220 KIAS is used for the first turn, thereafter 250 KIAS would apply.
OPTION 12	This is an RNP1 option that modifies option 6 to minimise the interactions with LPL airspace following stakeholder feedback. It follows the same lateral track as option 6 with an RF right turn that routes north before turning towards Wallasey. However, to eliminate interactions with LPL inbound traffic to Runway 27, it has an increased climb gradient up to the point the LPL delegated airspace is overflown. Thereafter the gradient is reduced to one that will result in the route terminating in the same position as option 6. The initial climb gradient in this option is greater than the 6% to 7,000ft that has been adopted for other routes and which was identified as flyable by all aircraft within the fleet equipage survey at section 5.6. This survey identified that some aircraft could exceed this 6% gradient, and because this initial climb gradient is only required to 3,500ft it will be assessed with the airlines to confirm viability should it be taken forward. The initial climb gradient has been set at 11.0% for 23L/8.9% for 23R for the portion of the SID prior to where the route meets the 3nm buffer of the LPL delegated airspace. Thereafter a maximum climb gradient of 4.4% is applied to terminate at 7,000ft at the same end position as option 6. As the option is within a turn segment at the location of the airspace boundary, a waypoint cannot be placed on the intersection of the nominal track and the boundary. A restriction greater than 3500ft would need to be placed upon the waypoints at the end of the RF turns to follow the profile of the required climb to ensure that the correct altitude is met at the boundary. The design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise. 23L: After departure, the route makes a turn to the right at 1nm from DER which takes it to the north of Knutsford through Mere. It then heads north on a short straight segment before making a left turn to the west, just to the north of Lymm where it combines with the option from 23R. The combined routes continue in a westerly direction routing overhead Warrington and terminate at 7,000ft just north of Widnes. 23R: After departure, the route makes a turn to the right which takes it to the north of Knutsford through Mere. It then heads north on a short straight segment before making a left turn to the west, just to the north of Lymm where it combines with the option from 23L. The combined routes continue in a westerly direction routing overhead Warrington and terminate at 7,000ft just north of Widnes. A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.

Group	Impact	Level of Analysis	'DO NOTHING' BASELINE Runway 23L	'DO NOTHING' BASELINE Runway 23R
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 EKLAD 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 350 households with an approximate population of 800. Taking account of 300 planned property developments, this option is estimated to overfly and impact a total population of 1,500. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 2,600 households with an approximate population of 6,300. Taking account of 350 planned property developments, this option is estimated to overfly and impact a total population of 7,100.	For comparison purposes within the IOA, the 'do nothing' scenario was based upon the existing EKLAD 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 350 households with an approximate population of 800. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 800. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 4,000 households with an approximate population of 10,100. Taking account of 1,250 planned property developments, this option is estimated to overfly and impact a total population of 13,200.
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 23L EKLAD SID overflies one AQMA. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	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 23R EKLAD SID overflies one AQMA. Overflight of these AQMAs occurs 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 based on the EKLAD SID, the track length to the common point is 40.62km (21.93nm).	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 based on the EKLAD SID, the track length to the common point is 42.04km (22.70nm).
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 DVOR in December 2022.	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 DVOR in December 2022.
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.	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.
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 MAN 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 MAN 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 MAN will maintain their current level of access under extant operational arrangements.	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of MAN 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.	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 MAN 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 based on the EKLAD SID, the track length to the common point is 40.62km (21.93nm).	The existing MAN 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 based on the EKLAD SID, the track length to the common point is 42.04km (22.70nm).
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.	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 for MAN 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.	It is not proportionate for MAN 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 MAN 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.	No additional infrastructure is required at MAN 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.	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.	No deployment costs applicable to extant procedures.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft departing MAN 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.	The 'do nothing' scenario assumes that current operations at MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft departing MAN 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.

Group	Impact	OPTION 7 Runway 23L	OPTION 7 Runway 23R	OPTION 8 Runway 23L	OPTION 8 Runway 23R
Communities	Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 750 households with an approximate population of 1,700. Taking account of 550 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 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 27,450 households with an approximate population of 63,500. Taking account of 4,500 planned property developments, this option is estimated to overfly and impact total population of 73,900. 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 250 households with an approximate population of 600. Taking account of 50 planned property developments, this option is estimated to overfly and impact a total population of 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 26,300 households with an approximate population of 61,300. Taking account of 3,700 planned property developments, this option is estimated to overfly and impact total population of 69,900. 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 100 households with an approximate population of 200. Taking account of 400 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 27,850 households with an approximate population of 65,100. Taking account of 3,600 planned property developments, this option is estimated to overfly and impact total population of 73,500. 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 150 households with an approximate population of 400. Taking account of 50 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 27,950 households with an approximate population of 65,300. Taking account of 3,250 planned property developments, this option is estimated to overfly and impact total population of 72,900. 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	Option 7 L overflies three AQMAs; however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of a dis-benefit as it overflies more AQMAs.	Option 7 R overflies three AQMAs; however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of a dis-benefit as it overflies more AQMAs.	Option 8 L overflies three AQMAs; however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of a dis-benefit as it overflies more AQMAs.	Option 8 R overflies three AQMAs; however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of a dis-benefit as it overflies more AQMAs.
Wider Society	Greenhouse Gas impact	Option 7 L 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 Option 7 L is 38.73km (20.91nm). When compared to the 'do nothing' scenario, Option 7 L is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 7 R 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 Option 7 R is 40.17km (21.69nm). When compared to the 'do nothing' scenario, Option 7 R is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 8 L 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 Option 8 L is 40.19km (21.70nm). When compared to the 'do nothing' scenario, Option 8 L is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 8 R 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 Option 8 R is 41.85km (22.59nm). When compared to the 'do nothing' scenario, Option 8 R is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of 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 air or on the ground). The reduction of the reliance on outdated ground based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground based navigational aid 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.
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 MAN 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 MAN 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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 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.
General Aviation / commercial airlines	Fuel burn	Option 7 L 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 38.73km (20.91nm) long. When compared to the 'do nothing' scenario, Option 7 L is shorter and at this stage it is assumed that that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 7 R 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 40.17km (21.69nm) long. When compared to the 'do nothing' scenario, Option 7 R is shorter and at this stage it is assumed that that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 8 L 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 40.19km (21.70nm) long. When compared to the 'do nothing' scenario, Option 8 L is shorter and at this stage it is assumed that that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 8 R 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 41.85km (22.59nm) long. When compared to the 'do nothing' scenario, Option 8 R is shorter and at this stage it is assumed that that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. 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.
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 for MAN 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 for MAN 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 for MAN 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 for MAN 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.
Airport / Air navigation service provider	Operational costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	deployment costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation. Furthermore, options within this envelope may conflict with Liverpool traffic, MAN arrivals/transitions and some GA aircraft operating at low level. These hazards can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation. Furthermore, options within this envelope may conflict with Liverpool traffic, MAN arrivals/transitions and some GA aircraft operating at low level. These hazards can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation. Furthermore, options within this envelope may conflict with Liverpool traffic, MAN arrivals/transitions and some GA aircraft operating at low level. These hazards can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation. Furthermore, options within this envelope may conflict with Liverpool traffic, MAN arrivals/transitions and some GA aircraft operating at low level. These hazards can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.

Group	Impact	OPTION 9 Runway 23L	OPTION 9 Runway 23R	OPTION 10 Runway 23L	OPTION 10 Runway 23R
Communities	Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 450 households with an approximate population of 1,000. Taking account of 550 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 more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 26,650 households with an approximate population of 61,800. Taking account of 4,400 planned property developments, this option is estimated to overfly and impact total population of 72,100. 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 250 households with an approximate population of 600. Taking account of 50 planned property developments, this option is estimated to overfly and impact a total population of 800. The potential noise impact on health and quality of life up to 4,000ft is assessed as likely to affect an equal amount of people as the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 30,700 households with an approximate population of 72,100. Taking account of 1,250 planned property developments, this option is estimated to overfly and impact total population of 75,000. 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.	Up to 4,000ft, this option is estimated to overfly approximately 2,550 households with an approximate population of 5,200. Taking account of 400 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 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 31,350 households with an approximate population of 72,400. Taking account of 1,650 planned property developments, this option is estimated to overfly and impact total population of 76,200. 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.	Up to 4,000ft, this option is estimated to overfly approximately 250 households with an approximate population of 600. Taking account of 250 planned property developments, this option is estimated to overfly and impact a total population of 1,200. 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 29,900 households with an approximate population of 70,100. Taking account of 1,450 planned property developments, this option is estimated to overfly and impact total population of 73,500. 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	Option 9 L overflies three AQMAs; however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of a dis-benefit as it overflies more AQMAs.	Option 9 R overflies four AQMAs; however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of a dis-benefit as it overflies more AQMAs.	Option 10 L overflies four AQMAs; however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of a dis-benefit as it overflies more AQMAs.	Option 10 R overflies four AQMAs; however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of a dis-benefit as it overflies more AQMAs.
Wider Society	Greenhouse Gas impact	Option 9 L 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 Option 9 L is 38.70km (20.90nm). When compared to the 'do nothing' scenario, Option 9 L is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 9 R 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 Option 9 R is 40.12km (21.66nm). When compared to the 'do nothing' scenario, Option 9 R is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 10 L 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 Option 10 L is 39.37km (21.26nm). When compared to the 'do nothing' scenario, Option 10 L is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 10 R 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 Option 10 R is 40.37km (21.8nm). When compared to the 'do nothing' scenario, Option 10 R is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of 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 air or on the ground). The reduction of the reliance on outdated ground based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground based navigational aid 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.
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 MAN 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 MAN 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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 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.
General Aviation / commercial airlines	Fuel burn	Option 9 L 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 38.70km (20.90nm) long. When compared to the 'do nothing' scenario, Option 9 L is shorter and at this stage it is assumed that that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 9 R 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 40.12km (21.66nm) long. When compared to the 'do nothing' scenario, Option 9 R is shorter and at this stage it is assumed that that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 10 L 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 39.37km (21.26nm) long. When compared to the 'do nothing' scenario, Option 10 L is shorter and at this stage it is assumed that that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 10 R 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 40.37km (21.8nm) long. When compared to the 'do nothing' scenario, Option 10 R is shorter and at this stage it is assumed that that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. 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.
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 for MAN 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 for MAN 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 for MAN 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 for MAN 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.
Airport / Air navigation service provider	Operational costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	deployment costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation. Furthermore, options within this envelope may conflict with Liverpool traffic, MAN arrivals/transitions and some GA aircraft operating at low level. These hazards can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation. Furthermore, options within this envelope may conflict with Liverpool traffic, MAN arrivals/transitions and some GA aircraft operating at low level. These hazards can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation. Furthermore, options within this envelope may conflict with Liverpool traffic, MAN arrivals/transitions and some GA aircraft operating at low level. These hazards can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation. Furthermore, options within this envelope may conflict with Liverpool traffic, MAN arrivals/transitions and some GA aircraft operating at low level. These hazards can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.

Group	Impact	OPTION 11 Runway 23L	OPTION 11 Runway 23R	OPTION 12 Runway 23L	OPTION 12 Runway 23R
Communities	Noise impact on health and quality of life	Up to 4,000ft, this option is estimated to overfly approximately 1,000 households with an approximate population of 2,200. Taking account of 550 planned property developments, this option is estimated to overfly and impact a total population of 3,400. 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 31,050 households with an approximate population of 72,500. Taking account of 1,850 planned property developments, this option is estimated to overfly and impact total population of 76,900. 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 250 households with an approximate population of 600. Taking account of 250 planned property developments, this option is estimated to overfly and impact a total population of 1,200. 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 26,200 households with an approximate population of 61,300. Taking account of 3,800 planned property developments, this option is estimated to overfly and impact total population of 70,200. 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.	Up to 4,000ft, this option is estimated to overfly approximately 1,200 households with an approximate population of 2,500. Taking account of 550 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 more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 66,500 households with an approximate population of 149,000. Taking account of 2,850 planned property developments, this option is estimated to overfly and impact total population of 155,400. 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 1,100 households with an approximate population of 2,500. Taking account of 150 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 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 63,800 households with an approximate population of 143,000. Taking account of 2,350 planned property developments, this option is estimated to overfly and impact total population of 148,300. 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.
Communities	Air Quality	Option 11 L overflies four AQMAs; however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of a dis-benefit as it overflies more AQMAs.	Option 11 R overflies three AQMAs; however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of a dis-benefit as it overflies more AQMAs.	Option 12 L overflies three AQMAs; however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of a dis-benefit as it overflies more AQMAs.	Option 12 R overflies three AQMAs; however, as per CAP1616 , para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate vicinity of the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of a dis-benefit as it overflies more AQMAs.
Wider Society	Greenhouse Gas impact	Option 11 L 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 Option 11 L is 39.01km (21.06nm). When compared to the 'do nothing' scenario, Option 11 L is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 11 R 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 Option 11 R is 40.38km (21.8nm). When compared to the 'do nothing' scenario, Option 11 R is shorter and is therefore expected to emit less greenhouse gases this option is deemed to be of benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 12 L 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 Option 12 L is 42.8km (23.11nm). When compared to the 'do nothing' scenario, Option 12 L is longer and is therefore expected to emit more greenhouse gases this option is deemed to be of dis-benefit. More in-depth analysis will take place at Stage 3, to confirm the exact volumes of greenhouse gases released.	Option 12 R 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 Option 12 R is 43.51km (23.49nm). When compared to the 'do nothing' scenario, Option 12 R is longer and is therefore expected to emit more greenhouse gases this option is deemed to be of 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 air or on the ground). The reduction of the reliance on outdated ground based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground based navigational aid 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.
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 MAN 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 MAN 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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 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.
General Aviation / commercial airlines	Fuel burn	Option 11 L 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 39.01km (21.06nm) long. When compared to the 'do nothing' scenario, Option 11 L is shorter and at this stage it is assumed that that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 11 R 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 40.38km (21.8nm) long. When compared to the 'do nothing' scenario, Option 11 R is shorter and at this stage it is assumed that that less fuel will be burnt. This option is deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 12 L 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 42.8km (23.11nm) long. When compared to the 'do nothing' scenario, Option 12 L is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 12 R 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 43.51km (23.49nm) long. When compared to the 'do nothing' scenario, Option 12 R is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. 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.
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 for MAN 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 for MAN 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 for MAN 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 for MAN 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.
Airport / Air navigation service provider	Operational costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
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Safety Assessment	Safety Assessment	Possible hazards have been identified, some of which are extant. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation. Furthermore, options within this envelope may conflict with Liverpool traffic, MAN arrivals/transitions and some GA aircraft operating at low level. These hazards can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation. Furthermore, options within this envelope may conflict with Liverpool traffic, MAN arrivals/transitions and some GA aircraft operating at low level. These hazards can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation. Furthermore, options within this envelope may conflict with Liverpool traffic, MAN arrivals/transitions and some GA aircraft operating at low level. These hazards can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 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. Firstly, aircraft executing a MAP may conflict with aircraft on the SID. This is an extant hazard. In addition, there is the potential for faster aircraft to catch up with slower aircraft due to dispersion in the turn, which may lead to a loss of separation. Furthermore, options within this envelope may conflict with Liverpool traffic, MAN arrivals/transitions and some GA aircraft operating at low level. These hazards can be mitigated through the design process or procedurally if required. Further assessment will be conducted at Stage 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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing SIDs do 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.	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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing SIDs do 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may 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 at 4,000ft - Noise impact at 7,000ft - Air Quality **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 at 7,000ft - Air Quality **Better in the following areas:** - Noise impact at 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.	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MAG MAN ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TAB

Departure Envelope: SID Runway 23 Southwest

EKLAD

'DO NOTHING' BASELINE

For the south-west design envelope, the 'do nothing' scenario for departures in terms of today's operation is based around current operations where aircraft routing to the west via the EKLAD, KUXEM and MONTY SIDs. 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 of the EKLAD SID 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.

Note: There has been no overflight analysis conducted with regards to define a baseline for the MONTY SID due to its current lack of regular use and the route usually being utilised for traffic leaving CAS. A replication of this SID has been provided at Option 1A and for assessment purposes, this option has been compared against data relating to the EKLAD 'do nothing' scenario.

OPTION 1D

This option is included to provide a RNAV1 replication of the EKLAD 1R/1Y SIDs.
The procedure uses fly-by waypoints, positioned to replicate the turn at the existing markers:
•23R this first turn is at MCT D3.
•23L this is at MCT D3.2 which less than 1nm from DER but as this replicates the turn of the current procedure it therefore aligns to the Design Principle Safety. This earlier turn is to avoid Knutsford.
As a replicated route it follows a similar track over the ground as the current route. This routes aircraft to the north of Knutsford, before making a left turn to the west to route north of Northwich. The route continues in this direction until reaching 7,000ft to the north-east of Chester.
A speed restriction of 200 KIAS is used for the first turn, thereafter 250 KIAS would apply.

OPTION 1A

This option is included to provide a RNAV1 replication of the MONTY 1R/1Y SIDs.
The procedure uses fly-by waypoints, positioned to replicate the turn at the existing markers:
•23R this first turn is at MCT D3.
•23L this is at MCT D3.2 which less than 1nm from DER but as this replicates the turn of the current procedure it therefore aligns to the Design Principle Safety. This earlier turn is to avoid Knutsford.
As a replicated route it follows a similar track over the ground as the current SID. This routes aircraft to the north of Knutsford, before making a left turn to the west to route north of Northwich and then making a left to the south of Frodsham to route south-west.
A speed restriction of 200 KIAS is used for the first turn, thereafter 250 KIAS would apply.

KUXEM

'DO NOTHING' BASELINE

For the south-west design envelope, the 'do nothing' scenario for departures in terms of today's operation is based around current operations where aircraft routing to the west via the EKLAD, KUXEM and MONTY SIDs. 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 of the KUXEM SID 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 1B

Option 1b is an RNAV1 option that avoids Knutsford in a similar way to the current KUXEM departure but the second turn to the south-west to join the network is earlier.
The procedure uses fly-by waypoints.
23L: After departure the route makes turn to the right to route to the north of Knutsford. This turn is at D3.2 which less than Design Principle Safety. Following a short straight segment, it then makes a left turn close to Over Tabley where it combines with the option for 23R. The combined routes continue in a south-westerly direction to avoid Northwich and then make a left turn to the south-west to terminate at 7,000ft south of Kelsall.
23R: After departure the route makes turn to the right to route to the north of Knutsford. Following a short straight segment it then makes a left turn close to Over Tabley where it combines with the option for 23L. The combined routes continue in a south-westerly direction to avoid Northwich and then make a left turn to the south-west to terminate at 7,000ft south of Kelsall.
A speed restriction of 200 KIAS is used for the first turn, thereafter 250 KIAS would apply.

Option 1B for Runway 23L was rejected at the DPE stage and has therefore not been assessed.

OPTION 1C

This is option is included to provide a RNAV 1 replication of the KUXEM 1R/1Y SIDs.
The procedure uses fly-by waypoints, positioned to replicate the turn at the existing markers:
•23R this first turn is at MCT D3.
•23L this is at MCT D3.2 which less than 1nm from DER but as this replicates the turn of the current procedure it therefore aligns to the Design Principle Safety. This earlier turn is to avoid Knutsford.
As a replicated route it follows a similar track over the ground as the current route. This routes aircraft to the north of Knutsford, before making a left turn to the west to route north of Northwich. It then then makes a second left turn to the north-west of Northwich to route south-west and terminates at 7,000ft to the east of Chester.
A speed restriction of 200 KIAS is used for the first turn, thereafter 250 KIAS would apply.

OPTION 3B

This option uses an RNP1 with RF coding right turn initially (1nm DER for Runway 23L) to avoid Knutsford. It is similar to option 3A initially, but the track after the first turn is further north to provide greater avoidance from Northwich.
This route increases fuel efficiency when compared to the replicated route by removing the legs using the MCT and POL VOR and routes towards the centre of the design envelope.
The design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.
23L: After departure, the route makes an RF turn to the right to route to the north of Knutsford at 1nm from DER. Following a short straight segment, it combines with the option for 23R and turns left on a track that takes it well to the north of Northwich. It continues in this direction until north of Delamere and then turns left onto a more south-westerly track and terminates at 7,000ft close to Kelsall.
23R: After departure the route makes an RF turn to the right to route to the north of Knutsford at 1nm from DER. Following a short straight segment it combines with the option for 23L and turns left on a track that takes it well to the north of Northwich. It continues in this direction until north of Delamere and then turns left onto a more south-westerly track and terminates at 7,000ft close to Kelsall.
A speed restriction of 210 KIAS is applied to the first turn which is the PANS-OPS/CAP778 recommended speed.

Option 3B for Runway 23L was rejected at the DPE stage and has therefore not been assessed.

OPTION 3C

This option uses an RNP1 with RF coding right turn in the same way as option 3B, except that the turn point for Runway 23L is earlier and replicates the current turn position of MCT D3.2 position (0.7nm DER). This provides greater avoidance of Knutsford.
This route is intended as an alternative to the EKLAD SID and routes towards the centre of the design envelope.
The design speed aligns to the CAP778 recommendation and may permit some aircraft to fly this route in a clean configuration (without the use of flaps) which has potential benefits in terms of noise.
23L: After departure the route makes an RF turn to the right at 0.7nm from DER which replicates the turn of the current procedure and therefore aligns to the Design Principle Safety. It routes to the north of Knutsford and following a short straight segment it combines with the option for 23R and turns left on a track that takes it well to the north of Northwich and Kelsall and terminates at 7,000ft east of Chester.
23R: After departure the route makes an RF turn to the right to route to the north of Knutsford. Following a short straight segment it combines with the option for 23L and turns left on a track that takes it well to the north of Northwich. It continues in this direction until north of Delamere and then turns left onto a more south-westerly track and terminates at 7,000ft close to Kelsall.
A speed restriction of 210 KIAS is applied to the first turn which is the CAP778 recommended speed.

Option 3C for Runway 23L was rejected at the DPE stage and has therefore not been assessed.

OPTION 6

This is an RNP1 with RF coding initially (1nm DER for Runway 23L) to make a kink around Knutsford before tracking back on the extended runway centreline. It is similar to option 4B except that the radius of the turn is shorter resulting in a track that is more to the south of Northwich.
This route is intended as an alternative to the KUXEM SID and routes towards the south of the design envelope.
23L: After departure, the route makes an RF turn to the right 1nm from DER which takes it just to the north of Knutsford. It then turns left and then right to return the route onto the extended runway centreline where it combines with the option for 23R. It continues to the south of Northwich and just north of Winsford and terminates at 7,000ft just east of Tattenhall.
23R: After departure, the route makes an RF turn to the right which takes it just to the north of Knutsford. It then turns left and then right to return the route onto the extended runway centreline where it combines with the option for 23L. It continues to the south of Northwich and just north of Winsford and terminates at 7,000ft just east of Tattenhall.
A speed restriction of 190 KIAS is applied to the first turn, 210 KIAS to the second turn and 250 KIAS thereafter.

OPTION 7A

This is an RNAV1 option included to provide a similar route to that of option 1A (the MONTY 1R/1Y SID) however, it uses an initial 15° track adjustment to the right (north) from the DER to reduce the impact of noise on Knutsford. It then follows the same route as the replicated route once beyond Mere.
The procedure uses fly-by waypoints.
23L: Aircraft make a 15° track adjustment at DER to the right to route to the north of Knutsford and to the south of Mere. It then follows the same track as 1A and routes west to combine with the option for 23R just west of Over Tabley. The routes continue in a south-westerly direction to avoid Northwich and then makes a left turn to the south of Frodsham to terminate at 7,000ft north of Tarvin.
23R: Aircraft make a 15° track adjustment at DER to the right to route to the north of Knutsford. It then follows the same track as 1A just north of Knutsford and routes west to combine with the option for 23L around Bate Heath. The combined routes continue in a south-westerly direction to avoid Northwich and then makes a left turn to the south of Frodsham to terminate at 7,000ft north-west of Kelsall.
A speed restriction of 200/210 KIAS is used for the first and second turn, thereafter 250 KIAS would apply.

OPTION 7B

This is an RNAV1 option included to provide a similar route to that of option 1B but using an initial 15° track adjustment to the right (north) from the DER to reduce the impact of noise on Knutsford. It then follows the same route as option 1B for the remainder of the route.
The procedure uses fly-by waypoints.
23L: Aircraft make a 15° track adjustment at DER to the right to route to the north of Knutsford and to the south of Mere. It then follows the same track as 1B to combine with the option for 23R around Over Tabley. The combined routes continue in a south-westerly direction to avoid Northwich and then make a left turn north of Weaverham to terminate at 7,000ft south of Kelsall.
23R: Aircraft make a 15° track adjustment at DER to the right to route to the north of Knutsford and to the south of Mere. It then follows the same track as 1B to combine with the option for 23L around Over Tabley. The combined routes continue in a south-westerly direction to avoid Northwich and then make a left turn north of Weaverham to terminate at 7,000ft south of Kelsall.
A speed restriction of 200/210 KIAS is used for the first and second turn, thereafter 250 KIAS would apply.

OPTION 8

This is as an alternative RNP1 with RF coding option to the current KUXEM SID. This option has been designed following bilateral engagement with LPL that identified interactions with the proposed LPL Runway 27 VEGUN arrival route from the south, with the intention of resolving those interactions.
This option has been assessed against a 4.2nm buffer from this arrival route in line with minimum radar separation criteria of 3nm plus a buffer of 1.2nm (in line with CAP1385) and seeks to eliminate the interaction using vertical separation.
This option uses an RNP1 RF turn initially (1nm DER for Runway 23L) to make a kink around Knutsford. This is like other options, but the radius of the turn is shorter to create a track that is more to the south of Northwich. A third turn to the right routes aircraft north of the extended centreline by approximately 12° which creates a route to the expected network joining point and ensures containment within controlled airspace.
The assessment of the route identifies that a PDG of less than 6% is required for both 23L/23R to achieve 3,500ft (the required vertical separation) at the 4.2nm buffer zone therefore aligning this option with the design principles Safety and Policy.
Initially, a route south of the buffer line was considered to achieve the satisfactory lateral separation; however, this would not offer great flexibility to design options within this envelope, and so a route that achieved the required 1,000ft vertical separation was investigated.
23L: After departure, the route makes an RF turn to the right 1nm from DER which takes it just to the north of Knutsford. It then turns left and then right to return the route north of the extended runway centreline where it combines with the option for 23R. It continues just to the south of Northwich and north of Winsford and terminates at 7,000ft south of Kelsall.
23R: After departure, the route makes an RF turn to the right which takes it just to the north of Knutsford. It then turns left and then right to return the route north of the extended runway centreline where it combines with the option for 23L. It continues to the south of Northwich and north of Winsford and terminates at 7,000ft just south of Kelsall.
A speed restriction of 190 KIAS is applied to the first turn, 210 KIAS to the second turn and 250 KIAS thereafter.

OPTION 10

This is an RNP1 option with RF coding as an alternative to the current KUXEM SID. It aims to minimise the interactions with the proposed LPL Runway 27 VEGUN arrival route from the south following stakeholder feedback It is similar to option 8 but routes further south after Knutsford to reduce noise impact on Northwich.
This option has been assessed against a 4.2nm buffer from this arrival route in line with minimum radar separation criteria of 3nm plus a buffer of 1.2nm (in line with CAP1385) and seeks to resolve the interaction using vertical separation.
This option uses an RNP1 RF turn initially (1nm DER for Runway 23L) to make a kink around Knutsford before tracking back north of the extended runway centreline. This is like other options, but the radius of the turn is shorter and the subsequent track to the south is longer to create an option that fully avoids Northwich.
The assessment of the route identifies that a PDG of less than 6% is required for both 23L/23R to achieve 3,500ft at the 4.2nm buffer zone.
The procedure uses radius-to-fix coding, and the climb gradient has been set at 6%.
23L: After departure, the route makes an RF turn to the right 1nm from DER which takes it just to the north of Knutsford. It then turns left and routes south of Northwich where it combines with the option for 23R. It then turns left and routes to the south-west and terminates at 7,000ft south of Kelsall.
23R: After departure, the route makes an RF turn to the right which takes it just to the north of Knutsford. It then turns left and routes south of Northwich where it combines with the option for 23L. It then turns left and routes to the south-west and terminates at 7,000ft south of Kelsall.
A speed restriction of 190 KIAS is applied to the first turn, 210 KIAS to the second turn and 250 KIAS thereafter.

Option 10 for Runway 23L was rejected at the DPE stage and has therefore not been assessed.

EKLAD 'Do nothing' baseline

Group	Impact	Level of Analysis	Runway 23L	Runway 23R
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 EKLAD 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 350 households with an approximate population of 800. Taking account of 300 planned property developments, this option is estimated to overfly and impact a total population of 1,500. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 2,600 households with an approximate population of 6,300. Taking account of 350 planned property developments, this option is estimated to overfly and impact a total population of 7,100.	For comparison purposes within the IOA, the 'do nothing' scenario was based upon the existing EKLAD 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 350 households with an approximate population of 800. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 800. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 4,000 households with an approximate population of 10,100. Taking account of 1,250 planned property developments, this option is estimated to overfly and impact a total population of 13,200.
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 23L EKLAD SID overflies one AQMA. Overflight of the AQMA occurs when the aircraft is above 1,000ft.	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 23R EKLAD SID overflies one AQMA. Overflight of the AQMA occurs 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 based on the EKLAD SID, the track length to the common point is 40.62km (21.93nm).	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 based on the EKLAD SID, the track length to the common point is 42.04km (22.70nm).
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 DVOR in December 2022.	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 DVOR in December 2022.
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 for the EKLAD SID does not overfly any AONBs or National Parks.	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 for the EKLAD SID does not overfly any 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 MAN 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 MAN 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 MAN will maintain their current level of access under extant operational arrangements.	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of MAN 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.	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 MAN 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 based on the EKLAD SID, the track length to the common point is 40.62km (21.93nm).	The existing MAN 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 based on the EKLAD SID, the track length to the common point is 42.04km (22.70nm).
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.	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 for MAN 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.	It is not proportionate for MAN 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 MAN 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.	No additional infrastructure is required at MAN 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.	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.	No deployment costs applicable to extant procedures.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft departing MAN 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.	The 'do nothing' scenario assumes that current operations at MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft departing MAN 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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing SIDs do 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.	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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing SIDs do 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.

Communities — Noise impact on health and quality of life (Initial Options Appraisal: Qualitative)

Option	Runway 23L	Runway 23R
Option 1D	Up to 4,000ft, this option is estimated to overfly approximately 350 households with an approximate population of 800. Taking account of 250 planned property developments, this option is estimated to overfly and impact a total population of 1,400. 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 5,100 households with an approximate population of 11,800. Taking account of 250 planned property developments, this option is estimated to overfly and impact total population of 12,400. 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 400 households with an approximate population of 900. Taking account of zero 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 more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 5,200 households with an approximate population of 12,100. Taking account of zero planned property developments, this option is estimated to overfly and impact 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.
Option 1A	Up to 4,000ft, this option is estimated to overfly approximately 350 households with an approximate population of 900. Taking account of 250 planned property developments, this option is estimated to overfly and impact a total population of 1,500. The potential noise impact on health and quality of life up to 4,000ft is assessed as being likely to affect the same amount of people as the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 2,200 households with an approximate population of 5,400. Taking account of 250 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 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 400 households with an approximate population of 1,000. Taking account of zero 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 more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 2,300 households with an approximate population of 5,600. Taking account of zero planned property developments, this option is estimated to overfly and impact total population of 5,600. 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.
KUXEM 'Do nothing' baseline	For comparison purposes within the IOA, the 'do nothing' scenario based upon the existing KUXEM 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 300 households with an approximate population of 700. Taking account of 200 planned property developments, this option is estimated to overfly and impact a total population of 1,200. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 6,850 households with an approximate population of 15,800. Taking account of 650 planned property developments, this option is estimated to overfly and impact a total population of 17,300.	For comparison purposes within the IOA, the 'do nothing' scenario based upon the existing KUXEM 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 200 households with an approximate population of 500. Taking account of zero planned property developments, this option is estimated to overfly and impact a total population of 500. - Up to 7,000 ft, this 'do nothing' scenario is estimated to overfly approximately 6,700 households with an approximate population of 15,500. Taking account of 400 planned property developments, this option is estimated to overfly and impact a total population of 16,400.
Option 1B	(Not Assessed)	Up to 4,000ft, this option is estimated to overfly approximately 400 households with an approximate population of 1,000. Taking account of zero 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 3,200 households with an approximate population of 7,700. Taking account of 150 planned property developments, this option is estimated to overfly and impact total population of 8,100. 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.
Option 1C	Up to 4,000ft, this option is estimated to overfly approximately 350 households with an approximate population of 800. Taking account of 250 planned property developments, this option is estimated to overfly and impact a total population of 1,400. 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 3,450 households with an approximate population of 8,200. Taking account of 350 planned property developments, this option is estimated to overfly and impact total population of 9,000. 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 400 households with an approximate population of 900. Taking account of zero 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 more people than the 'do nothing' scenario. Up to 7,000ft, this option is estimated to overfly approximately 3,550 households with an approximate population of 8,400. Taking account of 100 planned property developments, this option is estimated to overfly and impact total population of 8,600. 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.
Option 3B	(Not Assessed)	Up to 4,000ft, this option is estimated to overfly approximately 800 households with an approximate population of 1,900. Taking account of 50 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 5,050 households with an approximate population of 11,900. Taking account of 150 planned property developments, this option is estimated to overfly and impact total population of 12,300. 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.
Option 3C	(Not Assessed)	Up to 4,000ft, this option is estimated to overfly approximately 800 households with an approximate population of 1,900. Taking account of 50 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 3,200 households with an approximate population of 7,600. Taking account of 50 planned property developments, this option is estimated to overfly and impact total population of 7,700. 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.
Option 6	Up to 4,000ft, this option is estimated to overfly approximately 6,100 households with an approximate population of 14,400. Taking account of 600 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 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 9,000 households with an approximate population of 21,000. Taking account of 2,600 planned property developments, this option is estimated to overfly and impact total population of 27,100. 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 6,250 households with an approximate population of 14,700. Taking account of 250 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 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 9,400 households with an approximate population of 22,000. Taking account of 2,350 planned property developments, this option is estimated to overfly and impact total population of 27,500. 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.
Option 7A	Up to 4,000ft, this option is estimated to overfly approximately 450 households with an approximate population of 1,100. Taking account of 50 planned property developments, this option is estimated to overfly and impact a total population of 1,200. 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 2,350 households with an approximate population of 5,600. Taking account of 50 planned property developments, this option is estimated to overfly and impact total population of 5,800. 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 400 households with an approximate population of 1,000. Taking account of zero 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 2,400 households with an approximate population of 5,800. Taking account of zero planned property developments, this option is estimated to overfly and impact total population of 5,800. 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.
Option 7B	Up to 4,000ft, this option is estimated to overfly approximately 450 households with an approximate population of 1,100. Taking account of 50 planned property developments, this option is estimated to overfly and impact a total population of 1,200. 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 3,150 households with an approximate population of 7,600. Taking account of 200 planned property developments, this option is estimated to overfly and impact total population of 8,100. 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 400 households with an approximate population of 1,000. Taking account of zero 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 3,200 households with an approximate population of 7,700. Taking account of 150 planned property developments, this option is estimated to overfly and impact total population of 8,100. 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.
Option 8	Up to 4,000ft, this option is estimated to overfly approximately 7,800 households with an approximate population of 18,800. Taking account of 850 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 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 9,150 households with an approximate population of 22,300. Taking account of 1,000 planned property developments, this option is estimated to overfly and impact total population of 24,700. 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 7,700 households with an approximate population of 18,600. Taking account of 450 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 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 9,300 households with an approximate population of 22,700. Taking account of 650 planned property developments, this option is estimated to overfly and impact total population of 24,300. 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.
Option 10	(Not Assessed)	Up to 4,000ft, this option is estimated to overfly approximately 2,700 households with an approximate population of 6,600. Taking account of 400 planned property developments, this option is estimated to overfly and impact a total population of 7,600. 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 5,050 households with an approximate population of 12,200. Taking account of 1,900 planned property developments, this option is estimated to overfly and impact total population of 16,700. 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.

IOA Shortlist Assessment

OPTION SHORTLIST CLASSIFICATION FOR STAGE 3

Option	Runway	IOA Shortlist Assessment	Classification
1D	23L	Based on IOA Shortlist Assessment methodology, Option 1D L has been deemed the Preferred option within this design envelope.	PREFERRED
1D	23R	Based on IOA Shortlist Assessment methodology, Option 1D R has been deemed the Preferred option within this design envelope.	PREFERRED
1A	23L	Based on IOA Shortlist Assessment methodology, Option 1A L has been deemed the Preferred option within this design envelope.	PREFERRED
1A	23R	Based on IOA Shortlist Assessment methodology, Option 1A R has been deemed the Preferred option within this design envelope.	PREFERRED
1B	23R	Based on IOA Shortlist Assessment methodology, Option 1 B R has been deemed the Acceptable option within this design envelope.	ACCEPTABLE
1C	23L	Based on IOA Shortlist Assessment methodology, Option 1C L has been deemed the Acceptable option within this design envelope.	ACCEPTABLE
1C	23R	Based on IOA Shortlist Assessment methodology, Option 1C R has been Rejected.	REJECTED
3B	23R	Based on IOA Shortlist Assessment methodology, Option 3B R has been Rejected.	REJECTED
3C	23R	Based on IOA Shortlist Assessment methodology, Option 3C R has been Rejected.	REJECTED
6	23L	Based on IOA Shortlist Assessment methodology, Option 6 L has been Rejected.	REJECTED
6	23R	Based on IOA Shortlist Assessment methodology, Option 6 R has been Rejected.	REJECTED
7A	23L	Based on IOA Shortlist Assessment methodology, Option 7A L has been deemed the Preferred option within this design envelope.	PREFERRED
7A	23R	Based on IOA Shortlist Assessment methodology, Option 7A R has been deemed the Preferred option within this design envelope.	PREFERRED
7B	23L	Based on IOA Shortlist Assessment methodology, Option 7B L has been deemed the Favourable option within this design envelope.	FAVOURABLE
7B	23R	Based on IOA Shortlist Assessment methodology, Option 7B R has been deemed the Favourable option within this design envelope.	FAVOURABLE
8	23L	Based on IOA Shortlist Assessment methodology, Option 8 L has been Rejected.	REJECTED
8	23R	Based on IOA Shortlist Assessment methodology, Option 8 R has been Rejected.	REJECTED
10	23R	Based on IOA Shortlist Assessment methodology, Option 10 R has been Rejected.	REJECTED

Arrivals

MAG Manchester Airport

MAG MAN ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TABLE

Arrival Envelope: Runway 05 North 2,000ft

			'DO NOTHING' BASELINE		IAF 12 - OPTION 13 (ROSUN)	
			For arrivals from the north, the 'do nothing' scenario in terms of today's operation is based around the existing ROSUN and MIRSI Holds. 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 generated based upon current operations where most arrivals are radar vectored from the Hold. In addition to the modal tracks, a polygon has also been created that represents an area where current operations and approaches to MAN 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. All data is based on current aircraft performance data and is calculated based on the distance between the Arrival End of Runway and the start of the modal track. For the purpose of the IOA, the change sponsor has elected to use the data aligned to the ROSUN 'do nothing' scenario for Option 13 as it most closely aligns to current operations and the positions of the IAFs that are being assessed.		Option 13 has an IAF at 7,000ft to the north-north-west of the airport in the vicinity of Worsley, co-located with the IAF for option 23L/23R North 11A and has been designed to reduce potential interactions and increase the lateral separation from LPL Runway 27 arrivals. From the Worsley area, west of Prestwich, the route splits, and heads south-west just to the west of Irlam and overflying Cadishead and Lymm. Both routes then turn left to establish aircraft on final approach at 2,000ft for either Runway 05L or 05R. The descent gradient to the FAF is 4.37%/2.50° for Runway 05L and 4.09%/2.34° for Runway 05R. These gradients are optimum for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.	
Group	**Impact**	**Level of Analysis**	**Runway 05L**	**Runway 05R**	**Runway 05L**	**Runway 05R**
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes within the IOA, for Runway 05L, Northerly arrivals are compared to the ROSUN 'do nothing' scenario. For comparison purposes in the IOA, in terms of potential noise impact, the ROSUN 'do nothing' scenario for Runway 05L is estimated to overfly: From 7,000ft, this option is estimated to overfly approximately 409,400 households with an approximate population of 943,000. Taking account of 24,550 planned property developments, this option is estimated to overfly and impact a total population of 999,600. From 4,000ft, this option is estimated to overfly approximately 28,000 households with an approximate population of 64,300. Taking account of 2,300 planned property developments, this option is estimated to overfly and impact total population of 69,600.	For comparison purposes within the IOA, for Runway 05R, Northerly arrivals are compared to the ROSUN 'do nothing' scenario. For comparison purposes in the IOA, in terms of potential noise impact, the ROSUN 'do nothing' scenario for Runway 05R is estimated to overfly: From 7,000ft, this option is estimated to overfly approximately 414,600 households with an approximate population of 952,300. Taking account of 22,300 planned property developments, this option is estimated to overfly and impact a total population of 1,003,500. From 4,000ft, this option is estimated to overfly approximately 21,900 households with an approximate population of 50,800. Taking account of 750 planned property developments, this option is estimated to overfly and impact total population of 52,500.	From 7,000ft, this option is estimated to overfly approximately 51,300 households with an approximate population of 118,700. Taking account of 1,600 planned property developments, this option is estimated to overfly and impact a total population of 122,400. 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 4,000 households with an approximate population of 8,800. Taking account of 500 planned property developments, this option is estimated to overfly and impact total population of 9,900. 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.	From 7,000ft, this option is estimated to overfly approximately 56,600 households with an approximate population of 131,200. Taking account of 2,100 planned property developments, this option is estimated to overfly and impact a total population of 136,100. 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 11,350 households with an approximate population of 26,200. Taking account of 1,200 planned property developments, this option is estimated to overfly and impact total population of 29,000. 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	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions, the majority of the extant procedures involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to MAN. For safety reasons, aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. In terms of AQMAs, the ROSUN 'do nothing' scenario overflies 13 AQMAs and overflight of these AQMAs occurs when the aircraft is above 1,000ft.	No change to air quality is predicted in maintaining baseline conditions, the majority of the extant procedures involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to MAN. For safety reasons, aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. In terms of AQMAs, the ROSUN 'do nothing' scenario overflies 12 AQMAs and overflight of these AQMAs occurs when the aircraft is above 1,000ft.	Option 13 L overflies three AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.	Option 13 R overflies two AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival operations do not enable continuous descent approaches to all runways at MAN 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 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 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 ROSUN 05L 'do nothing' scenario track is 75.97km (41.02nm) long.	Current arrival operations do not enable continuous descent approaches to all runways at MAN 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 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 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 ROSUN 05R 'do nothing' scenario track is 79.37km (42.86nm) long.	Option 13 L has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 13 L is 52.21km (28.19nm). When compared to the 'do nothing' scenario, Option 13 L is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of a benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 13 R has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 13 R is 54.73km (29.55nm). When compared to the 'do nothing' scenario, Option 13 R is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of a benefit. More in-depth analysis at Stage 3 is required 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 DVOR in December 2022.	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 DVOR in December 2022.	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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 ROSUN 'do nothing' scenario does not overfly any AONBs or National Parks.	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 ROSUN '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.
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 MAN 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 MAN 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 MAN 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 MAN 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 MAN will maintain their current level of access under extant operational arrangements.	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of MAN will maintain their current level of access under extant operational arrangements.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 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 General Aviation/airlines.	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for General Aviation/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 MAN procedures for arrivals do not support continuous descent approaches. Fuel burn is expected to be greater due to tactical ATC intervention and periods of level flight in the approach phase.With regards to the 'do nothing' scenario track lengths, the ROSUN 05L 'do nothing' scenario track is 75.97km (41.02nm) long.	The existing MAN procedures for arrivals do not support continuous descent approaches. Fuel burn is expected to be greater due to tactical ATC intervention and periods of level flight in the approach phase. With regards to the 'do nothing' scenario track lengths, the ROSUN 05R 'do nothing' scenario track is 79.37km (42.86nm) long.	Option 13 L supports continuous descent approaches, 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 52.21km (28.19nm) long. When compared to the 'do nothing' scenario, Option 13 L is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 13 R supports continuous descent approaches, 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 54.73km (29.55nm) long. When compared to the 'do nothing' scenario, Option 13 R is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. 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.	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 for MAN 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.	It is not proportionate for MAN 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 for MAN 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 for MAN 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 MAN 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.	No additional infrastructure is required at MAN 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 anticipated to be 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 anticipated to be 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 existing procedures.	No change to operational costs is attributable to maintaining the existing procedures.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; 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	No Deployment costs applicable to extant procedures	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of 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 MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft arriving at MAN would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a potential increase in ATCO workload.	The 'do nothing' scenario assumes that current operations at MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft arriving at MAN would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a potential increase in ATCO workload.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Work has already commenced to understand and resolve the interactions with Liverpool. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Work has already commenced to understand and resolve the interactions with Liverpool. Further assessment will be conducted at Stage 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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing arrival arrangements do not enable continuous descent approaches 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.	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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing arrival arrangements do not enable continuous descent approaches 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may 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 at 7,000ft - Noise impact at 4,000ft - 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. 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: **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 4,000ft - 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. 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 13 L has been deemed the Preferred option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 13 R has been deemed the Preferred option within this design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3		**PREFERRED**	**PREFERRED**

MAG MAN ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TABLE

Arrival Envelope: Runway 05 North 2,500ft (Baseline ROSUN)

'DO NOTHING' BASELINE (ROSUN): For arrivals from the north, the 'do nothing' scenario in terms of today's operation is based around the existing ROSUN and MIRSI Holds. 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 generated based upon current operations where most arrivals are radar vectored from the Hold. In addition to the modal tracks, a polygon has also been created that represents an area where current operations and approaches to MAN 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. All data is based on current aircraft performance data and is calculated based on the distance between the Arrival End of Runway and the start of the modal track.

For the purpose of the IOA, the change sponsor has elected to use the data aligned to the ROSUN 'do nothing' scenario for Options 1B, 2B, 8B and 9B as they most closely align to current operations and the positions of the IAFs that are being assessed.

IAF Steak - OPTION 1B (ROSUN): Option 1B has an IAF at 7,000ft to the north-west of the airport in the vicinity of Atherton and is equidistant to easterly or westerly operations. It is designed to facilitate a CDA profile to all runways.
From this location the route turns south-west and splits, heading west of Urmston, Irlam and east of Warrington towards base-leg positions. Both routes then turn left to establish aircraft on final approach at 2,500ft for either Runway 05L or 05R.
The descent gradient to the FAF is 4.24%/2.43° for Runway 05L and 3.96%/2.27° Runway 05R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.

IAF Steak - OPTION 2B (ROSUN): Option 2B has an IAF at 7,000ft to the north-west of the airport in the vicinity of Atherton and is equidistant to easterly or westerly operation. It is designed to facilitate a CDA profile to all runways.
From this location the route follows an initial straight segment towards the airport where it splits before turning right on to the downwind leg overflying Partington. Both routes then turn left to establish aircraft on final approach at 2,500ft for either Runway 05L or 05R.
The descent gradient to the FAF is 3.79%/2.17° for Runway 05L and 3.53%/2.02° for Runway 05R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.

IAF 3 - OPTION 8B (ROSUN): Option 8B has an IAF at 7,000ft to the north-west of the airport in the vicinity of the Middlebrook Retail Park (marked on VFR charts as Middlebrook Stadium). It has been designed to reduce potential interactions with departures and to facilitate a CDA profile to all runways.
From this location the route splits, heads south-west and routes to the east of Warrington. Both routes then turn left to establish aircraft on final approach at 2,500ft for either Runway 05L or 05R.
The descent gradient to the FAF is 3.65%/2.09° for Runway 05L and 3.45%/1.98° for Runway 05R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.

IAF 4 - OPTION 9B (ROSUN): Option 9B has an IAF at 7,000ft to the north of the airport in the vicinity of Bolton and is designed to facilitate a CDA profile to all runways.
From this location the route splits, heads south-west and tracks to the east of Warrington. Both routes then turn left to establish aircraft on final approach at 2,500ft for either Runway 05L or 05R.
The descent gradient to the FAF is 3.24%/1.86° for Runway 05L and 3.07%/1.76° for Runway 05R. These gradients at the lower end of the optimum range for low noise approaches but within the acceptable range for CDAs defined within ICAO guidance.

'DO NOTHING' BASELINE (MIRSI): For arrivals from the north, the 'do nothing' scenario in terms of today's operation is based around the existing ROSUN and MIRSI Holds. 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 generated based upon current operations where most arrivals are radar vectored from the Hold. In addition to the modal tracks, a polygon has also been created that represents an area where current operations and approaches to MAN 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. All data is based on current aircraft performance data and is calculated based on the distance between the Arrival End of Runway and the start of the modal track.

For the purpose of the IOA, the change sponsor has elected to use the data aligned to the MIRSI 'do nothing' scenario for Options 6B, 7B and 10B as they most closely align to current operations and the positions of the IAFs that are being assessed.

IAF 5 - OPTION 10B (MIRSI): Option 10B has an IAF at 7,000ft to the north of the airport in the vicinity of Hawkshaw. The IAF is located approximately 2nm south of the ROSUN hold and is co-located with the IAF for the 23L/23R option 3B.
From this location the route splits, heads south-west and tracks to the east of Warrington. Both routes then turn left to establish aircraft on final approach at 2,500ft for either Runway 05L or 05R.
The descent gradient to the FAF is 2.79%/1.60° for Runway 05L and 2.66%/1.53° for Runway 05R. These gradients are at the lower end of the optimum range for low noise approaches but within the acceptable range for CDAs defined within ICAO guidance.

'Do Nothing' Baseline (ROSUN)

Group	Impact	Level of Analysis	Runway 05L	Runway 05R
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes within the IOA, for Runway 05L, Northerly arrivals are compared to the ROSUN 'do nothing' scenario. For comparison purposes in the IOA, in terms of potential noise impact, the ROSUN 'do nothing' scenario for Runway 05L is estimated to overfly: From 7,000ft, this option is estimated to overfly approximately 409,400 households with an approximate population of 943,000. Taking account of 24,550 planned property developments, this option is estimated to overfly and impact a total population of 999,600. From 4,000ft, this option is estimated to overfly approximately 28,000 households with an approximate population of 64,300. Taking account of 2,300 planned property developments, this option is estimated to overfly and impact total [illegible]	For comparison purposes within the IOA, for Runway 05R, Northerly arrivals are compared to the ROSUN 'do nothing' scenario. For comparison purposes in the IOA, in terms of potential noise impact, the ROSUN 'do nothing' scenario for Runway 05R is estimated to overfly: From 7,000ft, this option is estimated to overfly approximately 414,600 households with an approximate population of 952,300. Taking account of 22,300 planned property developments, this option is estimated to overfly and impact a total population of 1,003,500. From 4,000ft, this option is estimated to overfly approximately 21,900 households with an approximate population of 50,800. Taking account of 750 planned property developments, this option is estimated to overfly and impact total population [illegible]
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions, the majority of the extant procedures involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to MAN. For safety reasons, aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. In terms of AQMAs, the ROSUN 'do nothing' scenario overflies 13 AQMAs and overflight of these AQMAs occurs when the aircraft is above 1,000ft.	No change to air quality is predicted in maintaining baseline conditions, the majority of the extant procedures involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to MAN. For safety reasons, aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. In terms of AQMAs, the ROSUN 'do nothing' scenario overflies 12 AQMAs and overflight of these AQMAs occurs when the aircraft is above 1,000ft.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival operations do not enable continuous descent approaches to all runways at MAN from 7,000ft. [illegible] With regards to the 'do nothing' scenario track lengths, the ROSUN 05L 'do nothing' scenario track is 75.97km (41.02nm) long.	[illegible]
Wider Society	Capacity and resilience	Initial Options Appraisal: Qualitative	Maintaining extant procedures would maintain current capacity; [illegible] the DVOR in December 2022.	[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. [illegible] The ROSUN 'do nothing' scenario does not overfly any AONBs or National Parks.	[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 [illegible] process by Subject Matter Experts.	[illegible]
General Aviation	Access	Initial Options Appraisal: Qualitative	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of MAN will maintain their current level of access under extant operational arrangements.	[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 General Aviation/airlines.	[illegible]
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing MAN procedures for arrivals do not support continuous descent approaches. [illegible] scenario track is 75.97km (41.02nm) long.	[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.	[illegible]
Commercial airlines	Other costs	Initial Options Appraisal: Qualitative	It is not proportionate for MAN to assess potential other costs for commercial airlines [illegible] effectively.	[illegible]
Airport / Air navigation service provider	Infrastructure costs	Initial Options Appraisal: Qualitative	No additional infrastructure is required at MAN to maintain extant conventional procedures [illegible] proposed removal date.	[illegible]
Airport / Air navigation service provider	Operational costs	Initial Options Appraisal: Qualitative	No change to operational costs is attributable to maintaining the existing procedures.	[illegible]
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No Deployment costs applicable to extant procedures	[illegible]
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at MAN [illegible] ATCO workload.	[illegible]
		Summary of Analysis	The 'do nothing' scenario in relation to this ACP is not a viable option [illegible] 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.	[illegible] 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.
		IOA Shortlist Assessment		
		OPTION SHORTLIST CLASSIFICATION FOR STAGE 3		

IAF Steak - Option 1B (ROSUN)

Group	Impact	Runway 05L	Runway 05R
Communities	Noise impact on health and quality of life	From 7,000ft, this option is estimated to overfly approximately 37,050 households with an approximate population of 83,700. Taking account of 2,750 planned property developments, this option is estimated to overfly and impact a total population of 89,900. 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 10,650 households with an approximate population of 24,800. Taking account of 800 planned property developments, this option is estimated to overfly and impact total population of 26,600. 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.	From 7,000ft, this option is estimated to overfly approximately 38,000 households with an approximate population of 85,600. Taking account of 2,550 planned property developments, this option is estimated to overfly and impact a total population of 91,300. 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 5,450 households with an approximate population of 12,300. Taking account of 100 planned property developments, this option is estimated to overfly and impact 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 fewer people than the 'do nothing' scenario.
Communities	Air Quality	Option 1B L overflies three AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.	Option 1B R overflies two AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	[illegible]	[illegible]
Wider Society	Capacity and resilience	[illegible]	[illegible]
Wider Society	Tranquillity	[illegible]	[illegible]
Wider Society	Biodiversity	[illegible]	[illegible]
General Aviation	Access	[illegible]	[illegible]
General Aviation / commercial airlines	Economic impact from increased effective capacity	[illegible]	[illegible]
General Aviation / commercial airlines	Fuel burn	[illegible]	[illegible]
Commercial airlines	Training costs	[illegible]	[illegible]
Commercial airlines	Other costs	[illegible]	[illegible]
Airport / Air navigation service provider	Infrastructure costs	[illegible]	[illegible]
Airport / Air navigation service provider	Operational costs	[illegible]	[illegible]
Airport / Air navigation service provider	Deployment costs	[illegible]	[illegible]
Safety Assessment	Safety Assessment	[illegible]	[illegible]
Summary of Analysis		[illegible] 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.	[illegible] 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 1B L has been Rejected.	Based on the IOA Shortlist Assessment methodology, Option 1 B R has been deemed the Preferred option within this design envelope.
Option Shortlist Classification for Stage 3		REJECTED	PREFERRED

IAF Steak - Option 2B (ROSUN)

Group	Impact	Runway 05L	Runway 05R
Communities	Noise impact on health and quality of life	From 7,000ft, this option is estimated to overfly approximately 21,500 households with an approximate population of 67,700. Taking account of 1,850 planned property developments, this option is estimated to overfly and impact a total population of 72,100. 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 10,700 households with an approximate population of 24,900. Taking account of 750 planned property developments, this option is estimated to overfly and impact total population of 26,600. [illegible]	From 7,000ft, this option is estimated to overfly approximately 26,450 households with an approximate population of 58,200. Taking account of 1,050 planned property developments, this option is estimated to overfly and impact a total population of 60,700. 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 6,000 households with an approximate population of 13,400. [illegible]
Communities	Air Quality	[illegible]	[illegible]
Wider Society	Greenhouse Gas impact	[illegible]	[illegible]
Wider Society	Capacity and resilience	[illegible]	[illegible]
Wider Society	Tranquillity	[illegible]	[illegible]
Wider Society	Biodiversity	[illegible]	[illegible]
General Aviation	Access	[illegible]	[illegible]
General Aviation / commercial airlines	Economic impact from increased effective capacity	[illegible]	[illegible]
General Aviation / commercial airlines	Fuel burn	[illegible]	[illegible]
Commercial airlines	Training costs	[illegible]	[illegible]
Commercial airlines	Other costs	[illegible]	[illegible]
Airport / Air navigation service provider	Infrastructure costs	[illegible]	[illegible]
Airport / Air navigation service provider	Operational costs	[illegible]	[illegible]
Airport / Air navigation service provider	Deployment costs	[illegible]	[illegible]
Safety Assessment	Safety Assessment	[illegible]	[illegible]
Summary of Analysis		[illegible] 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.	[illegible] 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 2 B L has been deemed the Acceptable option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 2B R has been deemed the Acceptable option within this design envelope.
Option Shortlist Classification for Stage 3		ACCEPTABLE	ACCEPTABLE

IAF 3 - Option 8B (ROSUN)

Group	Impact	Runway 05L	Runway 05R
Communities	Noise impact on health and quality of life	From 7,000ft, this option is estimated to overfly approximately 69,750 households with an approximate population of 159,400. Taking account of 4,850 planned property developments, this option is estimated to overfly and impact a total population of 170,500. 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 11,100 households with an approximate population of 26,700. [illegible]	From 7,000ft, this option is estimated to overfly approximately 71,200 households with an approximate population of 161,900. Taking account of 4,500 planned property developments, this option is estimated to overfly and impact a total population of 172,100. 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 7,300 households with an approximate [illegible]
Communities	Air Quality	[illegible]	[illegible]
Wider Society	Greenhouse Gas impact	[illegible]	[illegible]
Wider Society	Capacity and resilience	[illegible]	[illegible]
Wider Society	Tranquillity	[illegible]	[illegible]
Wider Society	Biodiversity	[illegible]	[illegible]
General Aviation	Access	[illegible]	[illegible]
General Aviation / commercial airlines	Economic impact from increased effective capacity	[illegible]	[illegible]
General Aviation / commercial airlines	Fuel burn	[illegible]	[illegible]
Commercial airlines	Training costs	[illegible]	[illegible]
Commercial airlines	Other costs	[illegible]	[illegible]
Airport / Air navigation service provider	Infrastructure costs	[illegible]	[illegible]
Airport / Air navigation service provider	Operational costs	[illegible]	[illegible]
Airport / Air navigation service provider	Deployment costs	[illegible]	[illegible]
Safety Assessment	Safety Assessment	[illegible]	[illegible]
Summary of Analysis		[illegible] 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.	[illegible] 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 8B L has been Rejected.	Based on the IOA Shortlist Assessment methodology, Option 8B R has been Rejected.
Option Shortlist Classification for Stage 3		REJECTED	REJECTED

IAF 4 - Option 9B (ROSUN)

Group	Impact	Runway 05L	Runway 05R
Communities	Noise impact on health and quality of life	From 7,000ft, this option is estimated to overfly approximately 65,500 households with an approximate population of 150,000. Taking account of 1,250 planned property developments, this option is estimated to overfly and impact a total population of 152,900. 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 9,350 households with an approximate population of 21,800. Taking account of 500 planned property developments, this option is estimated to overfly and impact total population of 22,900. 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.	From 7,000ft, this option is estimated to overfly approximately 61,750 households with an approximate population of 141,300. Taking account of 850 planned property developments, this option is estimated to overfly and impact a total population of 143,200. 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 5,300 households with an approximate population of 12,400. Taking account of 150 planned property developments, this option is estimated to overfly and impact total population of 12,800. 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.
Communities	Air Quality	Option 9B L overflies three AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.	Option 9B R overflies two AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	[illegible]	[illegible]
Wider Society	Capacity and resilience	[illegible]	[illegible]
Wider Society	Tranquillity	[illegible]	[illegible]
Wider Society	Biodiversity	[illegible]	[illegible]
General Aviation	Access	[illegible]	[illegible]
General Aviation / commercial airlines	Economic impact from increased effective capacity	[illegible]	[illegible]
General Aviation / commercial airlines	Fuel burn	[illegible]	[illegible]
Commercial airlines	Training costs	[illegible]	[illegible]
Commercial airlines	Other costs	[illegible]	[illegible]
Airport / Air navigation service provider	Infrastructure costs	[illegible]	[illegible]
Airport / Air navigation service provider	Operational costs	[illegible]	[illegible]
Airport / Air navigation service provider	Deployment costs	[illegible]	[illegible]
Safety Assessment	Safety Assessment	[illegible]	[illegible]
Summary of Analysis		[illegible] 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.	[illegible] 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 9B has been deemed the Preferred option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 9B R has been deemed the Favourable option within this design envelope.
Option Shortlist Classification for Stage 3		PREFERRED	FAVOURABLE

'Do Nothing' Baseline (MIRSI)

Group	Impact	Runway 05L	Runway 05R
Communities	Noise impact on health and quality of life	For comparison purposes within the IOA, for Runway 05L, Northerly arrivals are compared to the MIRSI 'do nothing' scenario. For comparison purposes in the IOA, in terms of potential noise impact, the MIRSI 'do nothing' scenario for Runway 05L is estimated to overfly: From 7,000ft, this option is estimated to overfly approximately 188,600 households with an approximate population of 437,000. Taking account of 13,300 planned property developments, this option is estimated to overfly and impact a total population of 467,800. From 4,000ft, this option is estimated to overfly approximately 29,000 households with an approximate population of 66,800. Taking account of 2,700 planned property developments, this option is estimated to overfly and impact total population of 73,000.	For comparison purposes within the IOA, for Runway 05R, Northerly arrivals are compared to the MIRSI 'do nothing' scenario. For comparison purposes in the IOA, in terms of potential noise impact, the MIRSI 'do nothing' scenario for Runway 05R is estimated to overfly: From 7,000ft, this option is estimated to overfly approximately 162,100 households with an approximate population of 373,700. Taking account of 7,050 planned property developments, this option is estimated to overfly and impact a total population of 389,500. From 4,000ft, this option is estimated to overfly approximately 18,900 households with an approximate population of 44,000. Taking account of 750 planned property developments, this option is estimated to overfly and impact total population of 45,700.
Communities	Air Quality	No change to air quality is predicted in maintaining baseline conditions, the majority of the extant procedures involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to MAN. For safety reasons, aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. In terms of AQMAs, the MIRSI 'do nothing' scenario overflies 8 AQMAs and overflight of these AQMAs occurs when the aircraft is above 1,000ft.	No change to air quality is predicted in maintaining baseline conditions, the majority of the extant procedures involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to MAN. For safety reasons, aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. In terms of AQMAs, the MIRSI 'do nothing' scenario overflies 7 AQMAs and overflight of these AQMAs occurs when the aircraft is above 1,000ft.
Wider Society	Greenhouse Gas impact	[illegible]	[illegible]
Wider Society	Capacity and resilience	[illegible]	[illegible]
Wider Society	Tranquillity	[illegible]	[illegible]
Wider Society	Biodiversity	[illegible]	[illegible]
General Aviation	Access	[illegible]	[illegible]
General Aviation / commercial airlines	Economic impact from increased effective capacity	[illegible]	[illegible]
General Aviation / commercial airlines	Fuel burn	[illegible]	[illegible]
Commercial airlines	Training costs	[illegible]	[illegible]
Commercial airlines	Other costs	[illegible]	[illegible]
Airport / Air navigation service provider	Infrastructure costs	[illegible]	[illegible]
Airport / Air navigation service provider	Operational costs	[illegible]	[illegible]
Airport / Air navigation service provider	Deployment costs	[illegible]	[illegible]
Safety Assessment	Safety Assessment	[illegible]	[illegible]
Summary of Analysis		[illegible] of this scenario. From a safety perspective, it is assumed that current MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.	[illegible] of this scenario. From a safety perspective, it is assumed that current MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.
IOA Shortlist Assessment			
Option Shortlist Classification for Stage 3			

IAF 5 - Option 10B (MIRSI)

Group	Impact	Runway 05L	Runway 05R
Communities	Noise impact on health and quality of life	From 7,000ft, this option is estimated to overfly approximately 66,000 households with an approximate population of 155,300. Taking account of 1,600 planned property developments, this option is estimated to overfly and impact a total population of 159,000. 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 10,100 households with an approximate population of 23,700. Taking account of 400 planned property developments, this option is estimated to overfly and impact total population of 24,700. 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.	From 7,000ft, this option is estimated to overfly approximately 68,100 households with an approximate population of 160,100. Taking account of 18,800 planned property developments, this option is estimated to overfly and impact a total population of 164,300. 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 9,900 households with an approximate population of 23,500. Taking account of 750 planned property developments, this option is estimated to overfly and impact total population of 25,200. 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.
Communities	Air Quality	Option 10B L overflies five AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.	Option 10B R overflies four AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	[illegible]	[illegible]
Wider Society	Capacity and resilience	[illegible]	[illegible]
Wider Society	Tranquillity	[illegible]	[illegible]
Wider Society	Biodiversity	[illegible]	[illegible]
General Aviation	Access	[illegible]	[illegible]
General Aviation / commercial airlines	Economic impact from increased effective capacity	[illegible]	[illegible]
General Aviation / commercial airlines	Fuel burn	[illegible]	[illegible]
Commercial airlines	Training costs	[illegible]	[illegible]
Commercial airlines	Other costs	[illegible]	[illegible]
Airport / Air navigation service provider	Infrastructure costs	[illegible]	[illegible]
Airport / Air navigation service provider	Operational costs	[illegible]	[illegible]
Airport / Air navigation service provider	Deployment costs	[illegible]	[illegible]
Safety Assessment	Safety Assessment	[illegible]	[illegible]
Summary of Analysis		[illegible] 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.	[illegible] 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 10B L has been deemed the Favourable option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 10B R has been Rejected.
Option Shortlist Classification for Stage 3		FAVOURABLE	REJECTED

MAG MAN ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TABLE

Arrival Envelope: Runway 05 North 3,000ft

			'DO NOTHING' BASELINE		IAF Steak - OPTION 1A (ROSUN)		IAF Steak - OPTION 2A (ROSUN)		IAF 3 - OPTION 8A (ROSUN)		IAF 4 - OPTION 9A (ROSUN)	
			For arrivals from the north, the 'do nothing' scenario in terms of today's operation is based around the existing ROSUN and MIRSI Holds. Modal tracks have been derived to provide an accurate representation of what occurs today. The 'do nothing' scenario for arrivals consists of modal tracks that have been generated based upon current operations where most arrivals are radar vectored from the Hold. In addition to the modal tracks, a polygon has also been created that represents an area where current operations and approaches to MAN 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. All data is based on current aircraft performance data and is calculated based on the distance between the Arrival End of Runway and the start of the modal track. For the purpose of the IOA, the change sponsor has elected to use the data aligned to the ROSUN 'do nothing' scenario for Options 1A, 2A, 8A and 9A as they most closely align to current operations and the positions of the IAFs that are being assessed.		Option 1A has an IAF at 7,000ft to the north-west of the airport in the vicinity of Atherton and is equidistant to easterly or westerly operations. It is designed to facilitate an equal CDA profile to all runways. From this location the route splits and turns south-west, west of Urmston, Irlam, Partington, Cadishead and then east of Warrington before turning on to the final approach to the west of Northwich at 3,000ft for either Runway 05L or Runway 05R. The descent gradient to the FAF is 3.5%/2.01° for Runway 05L and 3.28%/1.88° for Runway 05R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.		Option 2A has an IAF at 7,000ft to the north-west of the airport in the vicinity of Atherton and is equidistant to easterly or westerly operation. It is designed to facilitate an equal CDA profile to all runways. From this location the route follows an initial straight segment towards the airport where it splits before turning right on to the downwind leg overflying Partington. Both routes then turn left to establish aircraft on final approach at 3,000ft for either Runway 05L or 05R. The descent gradient to the FAF is 3.13%/1.79° for Runway 05L and 2.92%/1.68° for Runway 05R. These gradients are at the lower end of the optimum for low noise approach but still within the acceptable range for CDAs defined within ICAO guidance.		Option 8A has an IAF at 7,000ft to the north-west of the airport in the vicinity of the Middlebrook Retail Park (marked on VFR charts as Middlebrook Stadium). It has been designed to reduce potential interactions with departures and to facilitate a CDA profile to all runways. It also provides a broadly equal CDA for both runway directions. From this location the route splits, and heads south-west in the vicinity of Atherton and routes just to the east of central Warrington. Both routes then turn left to establish aircraft on final approach to the west of Northwich at 3,000ft for either Runway 05L or 05R. The descent gradient to the FAF is 3.06%/1.75° for Runway 05L and 2.9%/1.66° for Runway 05R. These gradients are at the lower end of the optimum for low noise approach but still within the acceptable range for CDAs defined within ICAO guidance.		Option 9A has an IAF at 7,000ft to the north of the airport just to the east of Bolton and is designed to facilitate a CDA profile to all runways. This position results in this being the longest transition for Runway 05 and therefore the least optimal CDA profile. From this location the route splits, heads initially south to avoid Bolton and then turns south-west to and tracks to the east of Warrington. Both routes then turn left to establish aircraft on final approach at 3,000ft for either Runway 05L or 05R. The descent gradient to the FAF is 2.72%/1.56° for Runway 05L and 2.58%/1.48° for Runway 05R. These gradients are below the optimum for low noise approaches but just within the acceptable range for CDAs defined within ICAO guidance.	
Group	**Impact**	**Level of Analysis**	**Runway 05L**	**Runway 05R**	**Runway 05L**	**Runway 05R**	**Runway 05L**	**Runway 05R**	**Runway 05L**	**Runway 05R**	**Runway 05L**	**Runway 05R**
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes within the IOA, for Runway 05L, Northerly arrivals are compared to the ROSUN 'do nothing' scenario. For comparison purposes in the IOA, in terms of potential noise impact, the ROSUN 'do nothing' scenario for Runway 05L is estimated to overfly: From 7,000ft, this option is estimated to overfly approximately 409,400 households with an approximate population of 943,000. Taking account of 24,550 planned property developments, this option is estimated to overfly and impact a total population of 999,600. From 4,000ft, this option is estimated to overfly approximately 28,000 households with an approximate population of 64,300. Taking account of 2,300 planned property developments, this option is estimated to overfly and impact total population of 69,600.	For comparison purposes within the IOA, for Runway 05R, Northerly arrivals are compared to the ROSUN 'do nothing' scenario. For comparison purposes in the IOA, in terms of potential noise impact, the ROSUN 'do nothing' scenario for Runway 05R is estimated to overfly: From 7,000ft, this option is estimated to overfly approximately 414,600 households with an approximate population of 952,300. Taking account of 22,300 planned property developments, this option is estimated to overfly and impact a total population of 1,003,500. From 4,000ft, this option is estimated to overfly approximately 21,900 households with an approximate population of 50,800. Taking account of 750 planned property developments, this option is estimated to overfly and impact total population of 52,500.	From 7,000ft, this option is estimated to overfly approximately 39,950 households with an approximate population of 90,400. Taking account of 2,850 planned property developments, this option is estimated to overfly and impact a total population of 96,900. 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 7,100 households with an approximate population of 16,400. Taking account of 400 planned property developments, this option is estimated to overfly and impact 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.	From 7,000ft, this option is estimated to overfly approximately 44,500 households with an approximate population of 100,700. Taking account of 2,650 planned property developments, this option is estimated to overfly and impact a total population of 106,700. 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 5,850 households with an approximate population of 13,200. Taking account of 200 planned property developments, this option is estimated to overfly and impact total population of 13,700. 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.	From 7,000ft, this option is estimated to overfly approximately 25,250 households with an approximate population of 59,900. Taking account of 1,500 planned property developments, this option is estimated to overfly and impact a total population of 63,500. 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 7,150 households with an approximate population of 16,500. Taking account of 400 planned property developments, this option is estimated to overfly and impact total population of 17,400. 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.	From 7,000ft, this option is estimated to overfly approximately 24,900 households with an approximate population of 58,900. Taking account of 1,200 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 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 5,900 households with an approximate population of 13,400. Taking account of 200 planned property developments, this option is estimated to overfly and impact total population of 13,800. 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.	From 7,000ft, this option is estimated to overfly approximately 75,900 households with an approximate population of 172,200. Taking account of 4,550 planned property developments, this option is estimated to overfly and impact a total population of 182,500. 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 7,800 households with an approximate population of 18,200. Taking account of 500 planned property developments, this option is estimated to overfly and impact total population of 19,400. 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.	From 7,000ft, this option is estimated to overfly approximately 80,600 households with an approximate population of 180,300. Taking account of 4,250 planned property developments, this option is estimated to overfly and impact a total population of 189,800. 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 5,500 households with an approximate population of 12,400. Taking account of 200 planned property developments, this option is estimated to overfly and impact total population of 12,900. 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.	From 7,000ft, this option is estimated to overfly approximately 65,450 households with an approximate population of 149,900. Taking account of 1,500 planned property developments, this option is estimated to overfly and impact a total population of 153,300. 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 6,800 households with an approximate population of 16,000. Taking account of 750 planned property developments, this option is estimated to overfly and impact total population of 17,700. 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.	From 7,000ft, this option is estimated to overfly approximately 68,200 households with an approximate population of 156,700. Taking account of 1,650 planned property developments, this option is estimated to overfly and impact a total population of 160,500. 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 6,400 households with an approximate population of 15,100. Taking account of 900 planned property developments, this option is estimated to overfly and impact total population of 17,200. 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.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions, the majority of the extant procedures involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to MAN. For safety reasons, aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. In terms of AQMAs, the ROSUN 'do nothing' scenario overflies 13 AQMAs and overflight of these AQMAs occurs when the aircraft is above 1,000ft.	No change to air quality is predicted in maintaining baseline conditions, the majority of the extant procedures involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to MAN. For safety reasons, aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. In terms of AQMAs, the ROSUN 'do nothing' scenario overflies 12 AQMAs and overflight of these AQMAs occurs when the aircraft is above 1,000ft.	Option 1A L overflies three AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.	Option 1A R overflies two AQMAs, having said that, as per. CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.	Option 2A L overflies four AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.	Option 2A R overflies three AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.	Option 8A L overflies three AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.	Option 8A R overflies two AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.	Option 9A L overflies three AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.	Option 9A R overflies two AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival operations do not enable continuous descent approaches to all runways at MAN 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 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 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 ROSUN 05L 'do nothing' scenario track is 75.97km (41.02nm) long.	Current arrival operations do not enable continuous descent approaches to all runways at MAN 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 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 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 ROSUN 05R 'do nothing' scenario track is 79.37km (42.86nm) long.	Option 1A L has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 1A L is 58.40km (31.53nm). When compared to the 'do nothing' scenario, Option 1A L is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 1A R1A R has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 1A R is 61.98km (33.47nm). When compared to the 'do nothing' scenario, Option 1A R is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 2A L has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 2A L is 59.48km (32.12nm). When compared to the 'do nothing' scenario, Option 2A L is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 2A R has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 2A R is 62.4km (33.69nm). When compared to the 'do nothing' scenario, Option 2A R is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 8A L has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 8A L is 64.46km (34.81nm). When compared to the 'do nothing' scenario, Option 8A L is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 8A R has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 8A R is 66.85km (36.09nm). When compared to the 'do nothing' scenario, Option 8A R is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 9A L has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 9A L is 69.38km (37.46nm). When compared to the 'do nothing' scenario, Option 9A L is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 9A R has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 9A R is 71.94km (38.84nm). When compared to the 'do nothing' scenario, Option 9A R is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required 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 DVOR in December 2022.	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 DVOR in December 2022.	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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 ROSUN 'do nothing' scenario does not overfly any AONBs or National Parks.	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 ROSUN '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.	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 MAN 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 MAN 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 MAN 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 MAN 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 MAN 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 MAN 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 MAN 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 MAN 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 MAN 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 MAN 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 MAN will maintain their current level of access under extant operational arrangements.	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of MAN will maintain their current level of access under extant operational arrangements.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 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 General Aviation/airlines.	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for General Aviation/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.	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 MAN procedures for arrivals do not support continuous descent approaches. Fuel burn is expected to be greater due to tactical ATC intervention and periods of level flight in the approach phase.With regards to the 'do nothing' scenario track lengths, the ROSUN 05L 'do nothing' scenario track is 75.97km (41.02nm) long.	The existing MAN procedures for arrivals do not support continuous descent approaches. Fuel burn is expected to be greater due to tactical ATC intervention and periods of level flight in the approach phase. With regards to the 'do nothing' scenario track lengths, the ROSUN 05R 'do nothing' scenario track is 79.37km (42.86nm) long.	Option 1A L supports continuous descent approaches, 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 58.40km (31.53nm) long. When compared to the 'do nothing' scenario, Option 1A L is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 1A R supports continuous descent approaches, 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 61.98km (33.47nm) long. When compared to the 'do nothing' scenario, Option 1A R is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 2A L supports continuous descent approaches, 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 59.48 km (32.12nm) long. When compared to the 'do nothing' scenario, Option 2A L is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 2A R supports continuous descent approaches, 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 62.4km (33.69nm) long. When compared to the 'do nothing' scenario, Option 2A R is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 8A L supports continuous descent approaches, 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 64.46km (34.81nm) long. When compared to the 'do nothing' scenario, Option 8A L is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 8A R supports continuous descent approaches, 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 66.85km (36.09nm) long. When compared to the 'do nothing' scenario, Option 8A R is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 9A L supports continuous descent approaches, 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 69.38km (37.46nm) long. When compared to the 'do nothing' scenario, Option 9A L is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 9A R supports continuous descent approaches, 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 71.94km (38.84nm) long. When compared to the 'do nothing' scenario, Option 9A R is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. 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.	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.	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 for MAN 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.	It is not proportionate for MAN 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 for MAN 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 for MAN 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 for MAN 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 for MAN 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 for MAN 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 for MAN 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 for MAN 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 for MAN 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 MAN 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.	No additional infrastructure is required at MAN 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 anticipated to be 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 anticipated to be 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 anticipated to be 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 anticipated to be 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 anticipated to be 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 anticipated to be 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 anticipated to be 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 anticipated to be 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 existing procedures.	No change to operational costs is attributable to maintaining the existing procedures.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; 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	No Deployment costs applicable to extant procedures	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of 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 MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft arriving at MAN would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a potential increase in ATCO workload.	The 'do nothing' scenario assumes that current operations at MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft arriving at MAN would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a potential increase in ATCO workload.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Work has already commenced to understand and resolve the interactions with Liverpool. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Work has already commenced to understand and resolve the interactions with Liverpool. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Work has already commenced to understand and resolve the interactions with Liverpool. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Work has already commenced to understand and resolve the interactions with Liverpool. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Work has already commenced to understand and resolve the interactions with Liverpool. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Work has already commenced to understand and resolve the interactions with Liverpool. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Work has already commenced to understand and resolve the interactions with Liverpool. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Work has already commenced to understand and resolve the interactions with Liverpool. Further assessment will be conducted at Stage 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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing arrival arrangements do not enable continuous descent approaches 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.	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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing arrival arrangements do not enable continuous descent approaches 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may 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 at 7,000ft - Noise impact at 4,000ft - 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. 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: **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 4,000ft - 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. 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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When compared to the 'do nothing' scenario, this option performs: **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 4,000ft - 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. 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: **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 4,000ft - 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. 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 1A L has been deemed the Preferred option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 1A R has been deemed the Favourable option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 2 AL has been deemed the Favourable option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 2A R has been deemed the Acceptable option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 8A L has been Rejected.	Based on the IOA Shortlist Assessment methodology, Option 8A R has been deemed the Preferred option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 9A L has been deemed the Acceptable option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 9A R has been Rejected.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3		PREFERRED	FAVOURABLE	FAVOURABLE	ACCEPTABLE	REJECTED	PREFERRED	ACCEPTABLE	REJECTED

MAG MAN ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TABLE

Arrival Envelope: Runway 05 South 2,500ft (Baseline DAYNE)

'DO NOTHING' BASELINE

For arrivals from the south, the 'do nothing' scenario in terms of today's operation is based around the existing DAYNE 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 generated based upon current operations where most arrivals are radar vectored from the Hold. In addition to the modal tracks, a polygon has also been created that represents an area where current operations and approaches to MAN 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. All data is based on current aircraft performance data and is calculated based on the distance between the Arrival End of Runway and the start of the modal track.

Group	Impact	Level of Analysis	Runway 05L	Runway 05R
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes within the IOA, for Runway 05L, Southerly arrivals are compared to the DAYNE 'do nothing' scenario. In terms of potential noise impact, the DAYNE 'do nothing' scenario for Runway 05L is estimated to overfly: From 7,000ft, this option is estimated to overfly approximately 104,500 households with an approximate population of 237,400. Taking account of 16,300 planned property developments, this option is estimated to overfly and impact a total population of 274,400. From 4,000ft, this option is estimated to overfly approximately 37,600 households with an approximate population of 88,700. Taking account of 6,600 planned property developments, this option is estimated to overfly and impact total population of 104,300.	For comparison purposes within the IOA, for Runway 05R, Southerly arrivals are compared to the DAYNE 'do nothing' scenario. In terms of potential noise impact, the DAYNE 'do nothing' scenario for Runway 05L is estimated to overfly: From 7,000ft, this option is estimated to overfly approximately 66,900 households with an approximate population of 152,200. Taking account of 13,100 planned property developments, this option is estimated to overfly and impact a total population of 182,000. From 4,000ft, this option is estimated to overfly approximately 24,600 households with an approximate population of 57,700. Taking account of 4,750 planned property developments, this option is estimated to overfly and impact total population of 68,800.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions, the majority of the extant procedures involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to MAN. For safety reasons, aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. In terms of AQMAs, the DAYNE 05L 'do nothing' scenario overflies 12 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	No change to air quality is predicted in maintaining baseline conditions, the majority of the extant procedures involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to MAN. For safety reasons, aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. In terms of AQMAs, the DAYNE 05R 'do nothing' scenario overflies 8 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival operations do not enable continuous descent approaches to all runways at MAN 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 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 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 DAYNE 05L 'do nothing' scenario track is 64.02km (34.57nm) long.	Current arrival operations do not enable continuous descent approaches to all runways at MAN 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 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 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 DAYNE 05R 'do nothing' scenario track is 66.28km (35.79nm) long.
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 DVOR in December 2022.	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 DVOR in December 2022.
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 DAYNE 'do nothing' scenario overflies no AONBs and one National Park.	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 DAYNE 'do nothing' scenario overflies no AONBs and one National Park.
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 MAN 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 MAN 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 MAN will maintain their current level of access under extant operational arrangements.	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of MAN 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 General Aviation/airlines.	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for General Aviation/airlines.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing MAN procedures for arrivals do not support continuous descent approaches. Fuel burn is expected to be greater due to tactical ATC intervention and periods of level flight in the approach phase. In the case of the DAYNE 05L 'do nothing' scenario the track length is 64.02km (34.57nm) long.	The existing MAN procedures for arrivals do not support continuous descent approaches. Fuel burn is expected to be greater due to tactical ATC intervention and periods of level flight in the approach phase. In the case of the DAYNE 05R 'do nothing' scenario the track length is 66.28km (35.79nm) long.
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.	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 for MAN 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.	It is not proportionate for MAN 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 MAN 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.	No additional infrastructure is required at MAN 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 existing procedures.	No change to operational costs is attributable to maintaining the existing procedures.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures	No deployment costs applicable to extant procedures
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft arriving at MAN would continuously require radar vectoring (should CAP1781 or aD13:E22 commercial agreement to maintain the existing navigational aid not be implemented), resulting in a potential increase in ATCO workload.	The 'do nothing' scenario assumes that current operations at MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft arriving at MAN would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a potential increase in ATCO workload.

IAF TURKY - OPTION 1B

Option 1B has an IAF at 7,000ft to the south-east of the airport in the vicinity of Meerbrook and is equidistant to easterly or westerly operation. It is designed to facilitate a CDA profile to all runways.
From this location the route splits and heads west, to the south of Macclesfield, north of Congleton and over Middlewich. Both routes then turn right to establish aircraft on final approach at 2,500ft for either Runway 05L or 05R.
The descent gradient to the FAF is 4.17%/2.39° for Runway 05L and 3.95%/2.26° for Runway 05R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.

Group	Impact	Level of Analysis	Runway 05L	Runway 05R
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	From 7,000ft, this option is estimated to overfly approximately 12,050 households with an approximate population of 27,700. Taking account of 1,500 planned property developments, this option is estimated to overfly and impact a total population of 31,100. 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 11,100 households with an approximate population of 25,300. Taking account of 1,450 planned property developments, this option is estimated to overfly and impact total population of 28,600. 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.	From 7,000ft, this option is estimated to overfly approximately 12,450 households with an approximate population of 29,300. Taking account of 2,200 planned property developments, this option is estimated to overfly and impact a total population of 34,500. 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 11,300 households with an approximate population of 26,500. Taking account of 1,800 planned property developments, this option is estimated to overfly and impact 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 fewer people than the 'do nothing' scenario.
Communities	Air Quality	Initial Options Appraisal: Qualitative	Option 1B L overflies three AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.	Option 1B R overflies two AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Option 1B L has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 1B L is 54.62km (29.49nm). When compared to the 'do nothing' scenario, Option 1B L is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 1B R has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 1B R is 56.64km (30.58nm). When compared to the 'do nothing' scenario, Option 1B R is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	This option overflies no AONBs and one National Park. It is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no AONBs and one National Park. It 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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 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.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	Option 1B L supports continuous descent approaches, 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 54.62km (29.49nm) long. When compared to the 'do nothing' scenario, Option 1B L is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 1B R supports continuous descent approaches, 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 56.64km (30.58nm) long. When compared to the 'do nothing' scenario, Option 1B R is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. 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.
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 for MAN 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 for MAN 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 anticipated to be 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 anticipated to be 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	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.

IAF 7 - OPTION 6B

Option 6B has an IAF at 7,000ft to the south-east of the airport, just to the north of Leek. It is designed to facilitate a CDA profile to all runways.
From this location the route splits and heads west, south of Holmes Chapel, north of Sandbach and over Middlewich. Both routes then turn right to establish aircraft on final approach at 2,500ft for either Runway 05L or 05R.
This is the southernmost option and has been designed to maintain 3nm separation from the boundary of CAS in accordance with the CAA containment policy.
The descent gradient to the FAF is 4.26%/2.44° for Runway 05L and 4.06%/2.33° Runway 05R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.

Group	Impact	Level of Analysis	Runway 05L	Runway 05R
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	From 7,000ft, this option is estimated to overfly approximately 13,200 households with an approximate population of 30,400. Taking account of 3,050 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 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 21,300. Taking account of 900 planned property developments, this option is estimated to overfly and impact total population of 23,300. 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.	From 7,000ft, this option is estimated to overfly approximately 18.200 households with an approximate population of 41.900. Taking account of 4.000 planned property developments, this option is estimated to overfly and impact a total population of 51.100. 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 11.000 households with an approximate population of 25.700. Taking account of 1.750 planned property developments, this option is estimated to overfly and impact total population of 29.800. 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.
Communities	Air Quality	Initial Options Appraisal: Qualitative	Option 6B L overflies two AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.	Option 6B R overflies two AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Option 6B L has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 6B L is 53.97km (29.14nm). When compared to the 'do nothing' scenario, Option 6B L is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 6B R has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 6B R is 55.71km (30.08nm). When compared to the 'do nothing' scenario, Option 6B R is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	This option overflies no AONBs and one National Park. It is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no AONBs and one National Park. It 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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 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.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	Option 6B L supports continuous descent approaches, 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 53.97km (29.14nm) long. When compared to the 'do nothing' scenario, Option 6B L is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 6B R supports continuous descent approaches, 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 55.71km (30.08nm) long. When compared to the 'do nothing' scenario, Option 6B R is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. 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.
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 for MAN 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 for MAN 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 anticipated to be 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 anticipated to be 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	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.

IAF 8 - OPTION 7B

Option 7B has an IAF at 7,000ft co-located at the existing DAYNE hold. It is designed to facilitate a CDA profile to all runways.
From this location the route splits and heads west, south of Macclesfield, north of Congleton and over Middlewich. Both routes then turn right to establish aircraft on final approach at 2,500ft for either Runway 05L or 05R.
The descent gradient to the FAF is 3.82%/2.19° for Runway 05L and 3.62%/2.08° Runway 05R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.

Group	Impact	Level of Analysis	Runway 05L	Runway 05R
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	From 7,000ft, this option is estimated to overfly approximately 12.500 households with an approximate population of 28.600. Taking account of 1.950 planned property developments, this option is estimated to overfly and impact a total population of 33.000. 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 10.600 households with an approximate population of 224.300. Taking account of 1.300 planned property developments, this option is estimated to overfly and impact total population of 27.300. 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.	From 7,000ft, this option is estimated to overfly approximately 14.550 households with an approximate population of 34.000. Taking account of 2.650 planned property developments, this option is estimated to overfly and impact a total population of 40.200. 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 29.800. Taking account of 2.250 planned property developments, this option is estimated to overfly and impact total population of 35.100. 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.
Communities	Air Quality	Initial Options Appraisal: Qualitative	Option 7B L overflies three AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.	Option 7B R overflies two AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Option 7B L has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 7B L is 57.43km (31.01nm). When compared to the 'do nothing' scenario, Option 7B L is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 7B R has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 7B R is 59.52km (32.14nm). When compared to the 'do nothing' scenario, Option 7B R is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	This option overflies no AONBs and one National Park. It is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no AONBs and one National Park. It 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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 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.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	Option 7B L supports continuous descent approaches, 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 57.43km (31.01nm) long. When compared to the 'do nothing' scenario, Option 7B L is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 7B R supports continuous descent approaches, 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 59.52km (32.14nm) long. When compared to the 'do nothing' scenario, Option 7B R is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. 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.
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 for MAN 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 for MAN 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 anticipated to be 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 anticipated to be 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	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.

IAF 3 - OPTION 8B

Option 8B has an IAF at 7,000ft to the south-east of the airport in the vicinity of Buxton.
From this location the route splits and turns downwind, to the south of Macclesfield, just north of Congleton, then west just north of Sandbach and over Middlewich to establish aircraft on the final approach at 2,500ft for either Runway 05L or 05R.
The route has been designed to replicate the existing vectoring patterns used by ATC and is anticipated to reduce interactions with Runway 05 southbound departures.
The descent gradient to the FAF is 3.2%/1.83° for Runway 05L and 3.11%/1.78° Runway 05R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.

Group	Impact	Level of Analysis	Runway 05L	Runway 05R
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	From 7,000ft, this option is estimated to overfly approximately 20.550 households with an approximate population of 45,100. Taking account of 3.450 planned property developments, this option is estimated to overfly and impact a total population of 52.700. 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 8.300 households with an approximate population of 19,000. Taking account of 600 planned property developments, this option is estimated to overfly and impact total population of 20,300. 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.	From 7,000ft, this option is estimated to overfly approximately 21,350 households with an approximate population of 47,600. Taking account of 4,900 planned property developments, this option is estimated to overfly and impact a total population of 58,600. 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 9,000 households with an approximate population of 21,200. Taking account of 2,050 planned property developments, this option is estimated to overfly and impact total population of 26,100. 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.
Communities	Air Quality	Initial Options Appraisal: Qualitative	Option 8B L overflies four AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.	Option 8B R overflies three AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Option 8B L has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 8B L is 63.9km (34.51nm). When compared to the 'do nothing' scenario, Option 8B L is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 8B R has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 8B R is 65.36km (35.29nm). When compared to the 'do nothing' scenario, Option 8B R is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	This option overflies no AONBs and one National Park. It is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no AONBs and one National Park. It 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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 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.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	Option 8B L supports continuous descent approaches, 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 63.9km (34.51nm) long. When compared to the 'do nothing' scenario, Option 8B L is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 8B R supports continuous descent approaches, 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 65.36km (35.29nm) long. When compared to the 'do nothing' scenario, Option 8B R is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. 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.
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 for MAN 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 for MAN 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 anticipated to be 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 anticipated to be 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	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.

IAF 10 - OPTION 9B

Option 9B has an IAF at 7,000ft to the south-east of the airport in the vicinity of The Roaches.
From this location the route splits and turns downwind, south-west to Congleton, then west just north of Sandbach and over Middlewich before turning on to the final approach at 2,500ft for either Runway 05L or 05R.
The route has been designed to replicate the existing vectoring patterns used by ATC and is anticipated to reduce interactions with Runway 05 southbound departures.
The descent gradient to the FAF is 3.82%/2.19° for Runway 05L and 3.67%/2.1° for Runway 05R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.

Group	Impact	Level of Analysis	Runway 05L	Runway 05R
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	From 7,000ft, this option is estimated to overfly approximately 19,300 households with an approximate population of 43,300. Taking account of 3,050 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 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 8,900 households with an approximate population of 20,300. Taking account of 700 planned property developments, this option is estimated to overfly and impact total population of 21,900. 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.	From 7,000ft, this option is estimated to overfly approximately 20,550 households with an approximate population of 46,900. Taking account of 4,300 planned property developments, this option is estimated to overfly and impact a total population of 56,700. 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 9,900 households with an approximate population of 23,300. Taking account of 2,050 planned property developments, this option is estimated to overfly and impact total population of 28,100. 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.
Communities	Air Quality	Initial Options Appraisal: Qualitative	Option 9B L overflies three AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.	Option 9B R overflies two AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Option 9B L has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 9B L is 56.96km (30.76nm). When compared to the 'do nothing' scenario, Option 9B L is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 9B R has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 9B R is 58.55km (31.62nm). When compared to the 'do nothing' scenario, Option 9B R is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	Initial Options Appraisal: Qualitative	This option overflies no AONBs and one National Park. It is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no AONBs and one National Park. It 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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 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.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	Option 9B L supports continuous descent approaches, 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 56.96km (30.76nm) long. When compared to the 'do nothing' scenario, Option 9B L is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 9B R supports continuous descent approaches, 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 58.55km (31.62nm) long. When compared to the 'do nothing' scenario, Option 9B R is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. 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.
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 for MAN 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 for MAN 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 anticipated to be 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 anticipated to be 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	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing arrival arrangements do not enable continuous descent approaches 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.	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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing arrival arrangements do not enable continuous descent approaches 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may 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 at 7,000ft - Noise impact at 4,000ft - 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. 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: **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 4,000ft - 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. 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: **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 4,000ft - 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. 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: **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 4,000ft - 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. 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: **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 4,000ft - 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. 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: **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 4,000ft - 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. 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: **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 4,000ft - 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. 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: **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 4,000ft - 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. 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: **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 4,000ft - 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. 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: **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 4,000ft - 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. 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 1B L has been Rejected.	Based on the IOA Shortlist Assessment methodology, Option 1B R has been deemed the Acceptable option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 6B L has been deemed the Favourable option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 6B R has been deemed the Favourable option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 7B L has been deemed the Acceptable option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 7B R has been Rejected.	Based on the IOA Shortlist Assessment methodology, Option 8B L has been Rejected.	Based on the IOA Shortlist Assessment methodology, Option 8B R has been Rejected.	Based on the IOA Shortlist Assessment methodology, Option 9B L has been deemed the Preferred option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 9 B R has been deemed the Preferred option within this design envelope.
	OPTION SHORTLIST CLASSIFICATION FOR STAGE 3		🟥 REJECTED	ACCEPTABLE	🟩 FAVOURABLE	🟩 FAVOURABLE	ACCEPTABLE	🟥 REJECTED	🟥 REJECTED	🟥 REJECTED	🟩 PREFERRED	🟩 PREFERRED

MAG MAN ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TABLE

Arrival Envelope: Runway 05 South 3,000ft (Baseline DAYNE) NEW

'DO NOTHING' BASELINE

For arrivals from the south, the 'do nothing' scenario in terms of today's operation is based around the existing DAYNE 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 generated based upon current operations where most arrivals are radar vectored from the Hold. In addition to the modal tracks, a polygon has also been created that represents an area where current operations and approaches to MAN 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. All data is based on current aircraft performance data and is calculated based on the distance between the Arrival End of Runway and the start of the modal track.

Group	Impact	Level of Analysis	'Do nothing' Runway 05L	'Do nothing' Runway 05R
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes within the IOA, for Runway 05L, Southerly arrivals are compared to the DAYNE 'do nothing' scenario. In terms of potential noise impact, the DAYNE 'do nothing' scenario for Runway 05L is estimated to overfly: From 7,000ft, this option is estimated to overfly approximately 104,500 households with an approximate population of 237,400. Taking account of 16,300 planned property developments, this option is estimated to overfly and impact a total population of 274,400. From 4,000ft, this option is estimated to overfly approximately 37,600 households with an approximate population of 88,700. Taking account of 6,600 planned property developments, this option is estimated to overfly and impact total population of 104,300.	For comparison purposes within the IOA, for Runway 05R, Southerly arrivals are compared to the DAYNE 'do nothing' scenario. In terms of potential noise impact, the DAYNE 'do nothing' scenario for Runway 05L is estimated to overfly: From 7,000ft, this option is estimated to overfly approximately 66,900 households with an approximate population of 152,200. Taking account of 13,100 planned property developments, this option is estimated to overfly and impact a total population of 182,000. From 4,000ft, this option is estimated to overfly approximately 24,600 households with an approximate population of 57,700. Taking account of 4,750 planned property developments, this option is estimated to overfly and impact total population of 68,800.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions, the majority of the extant procedures involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to MAN. For safety reasons, aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. In terms of AQMAs, the DAYNE 05L 'do nothing' scenario overflies 12 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	No change to air quality is predicted in maintaining baseline conditions, the majority of the extant procedures involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to MAN. For safety reasons, aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. In terms of AQMAs, the DAYNE 05R 'do nothing' scenario overflies 8 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival operations do not enable continuous descent approaches to all runways at MAN 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 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 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 DAYNE 05L 'do nothing' scenario track is 64.02km (34.57nm) long.	Current arrival operations do not enable continuous descent approaches to all runways at MAN 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 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 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 DAYNE 05R 'do nothing' scenario track is 66.28km (35.79nm) long.
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 DVOR in December 2022.	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 DVOR in December 2022.
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 DAYNE 'do nothing' scenario overflies no AONBs and one National Park.	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 DAYNE 'do nothing' scenario overflies no AONBs and one National Park.
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 MAN 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 MAN 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 MAN will maintain their current level of access under extant operational arrangements.	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of MAN 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 General Aviation/airlines.	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for General Aviation/airlines.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing MAN procedures for arrivals do not support continuous descent approaches. Fuel burn is expected to be greater due to tactical ATC intervention and periods of level flight in the approach phase. In the case of the DAYNE 05L 'do nothing' scenario the track length is 64.02km (34.57nm) long.	The existing MAN procedures for arrivals do not support continuous descent approaches. Fuel burn is expected to be greater due to tactical ATC intervention and periods of level flight in the approach phase. In the case of the DAYNE 05R 'do nothing' scenario the track length is 66.28km (35.79nm) long.
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.	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 for MAN 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.	It is not proportionate for MAN 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 MAN 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.	No additional infrastructure is required at MAN 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 existing procedures.	No change to operational costs is attributable to maintaining the existing procedures.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures	No deployment costs applicable to extant procedures
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft arriving at MAN would continuously require radar vectoring (should CAP1781 or aD13:E22 commercial agreement to maintain the existing navigational aid not be implemented), resulting in a potential increase in ATCO workload.	The 'do nothing' scenario assumes that current operations at MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft arriving at MAN would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a potential increase in ATCO workload.

IAF TURKY - OPTION 1A

Option 1A has an IAF at 7,000ft to the south-east of the airport in the vicinity of Meerbrook and is equidistant to easterly or westerly operation. It is designed to facilitate a CDA profile to all runways.
From this location the route splits and heads west, to the south of Macclesfield, north of Congleton. Both routes then turn right to establish aircraft on final approach at 3,000ft for either Runway 05L or 05R.
The descent gradient to the FAF is 3.45%/1.98° for Runway 05L and 3.28%/1.88° for Runway 05R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.

Group	Impact	Option 1A Runway 05L	Option 1A Runway 05R
Communities	Noise impact on health and quality of life	From 7,000ft, this option is estimated to overfly approximately 14,550 households with an approximate population of 34,200. Taking account of 2,250 planned property developments, this option is estimated to overfly and impact a total population of 39,500. 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 13,100 households with an approximate population of 30,600. Taking account of 1,850 planned property developments, this option is estimated to overfly and impact total population of 34,900. 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.	From 7,000ft, this option is estimated to overfly approximately 10,800 households with an approximate population of 25,600. Taking account of 3,600 planned property developments, this option is estimated to overfly and impact a total population of 34,100. 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 9,700 households with an approximate population of 22,900. Taking account of 3,500 planned property developments, this option is estimated to overfly and impact total population of 31,200. 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.
Communities	Air Quality	Option 1A L overflies three AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.	Option 1A R overflies one AQMA, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Option 1A L has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 1A L is 59.94km (32.36nm). When compared to the 'do nothing' scenario, Option 1A L is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 1A R has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 1A R is 62.04km (33.50nm). When compared to the 'do nothing' scenario, Option 1A R is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	This option overflies no AONBs and one National Park. It is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no AONBs and one National Park. It 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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 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.
General Aviation / commercial airlines	Fuel burn	Option 1AL supports continuous descent approaches, 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 59.94km (32.36nm) long. When compared to the 'do nothing' scenario, Option 1A L is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 1A R supports continuous descent approaches, 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 62.04km (33.50nm) long. When compared to the 'do nothing' scenario, Option 1A R is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. 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.
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 for MAN 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 for MAN 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 anticipated to be 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 anticipated to be 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	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.

IAF 7 - OPTION 6A

Option 6A has an IAF at 7,000ft to the south-east of the airport, just to the north of Leek. It is co-located with the IAF for the 23L/23R option 9A and is designed to facilitate a CDA profile to all runways.
From this location the route splits and heads west, south of Holmes Chapel, north of Sandbach and over Middlewich. Both routes then turn right to establish aircraft on final approach at 3,000ft for either Runway 05L or 05R.
This is the southernmost option and has been designed to maintain 3nm separation from the boundary of CAS in accordance with the CAA containment policy.
The descent gradient to the FAF is 3.55% 2.03° for Runway 05L and 3.38%/1.94° Runway 05R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.

Group	Impact	Option 6A Runway 05L	Option 6A Runway 05R
Communities	Noise impact on health and quality of life	From 7,000ft, this option is estimated to overfly approximately 19,700 households with an approximate population of 45,400. Taking account of 4,050 planned property developments, this option is estimated to overfly and impact a total population of 54,700. 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 12,450 households with an approximate population of 29,000. Taking account of 1,750 planned property developments, this option is estimated to overfly and impact total population of 33,100. 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.	From 7,000ft, this option is estimated to overfly approximately 20,200 households with an approximate population of 46,200. Taking account of 5,550 planned property developments, this option is estimated to overfly and impact a total population of 58,900. 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 9,350 households with an approximate population of 22,000. Taking account of 3,150 planned property developments, this option is estimated to overfly and impact 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 fewer people than the 'do nothing' scenario.
Communities	Air Quality	Option 6A L overflies three AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.	Option 6A R overflies two AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Option 6A L has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 6A L is 59.01km (31.86nm). When compared to the 'do nothing' scenario, Option 6A L is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 6A R has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 6A R is 60.87km (32.87nm). When compared to the 'do nothing' scenario, Option 6A R is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	This option overflies no AONBs and one National Park. It is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no AONBs and one National Park. It 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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 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.
General Aviation / commercial airlines	Fuel burn	Option 6A L supports continuous descent approaches, 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 59.01km (31.86nm) long. When compared to the 'do nothing' scenario, Option 6A L is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 6A R supports continuous descent approaches, 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 60.87km (32.87nm). long. When compared to the 'do nothing' scenario, Option 6A R is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. 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.
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 for MAN 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 for MAN 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 anticipated to be 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 anticipated to be 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	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.

IAF 8 - OPTION 7A

Option 7A has an IAF at 7,000 ft co-located at the existing DAYNE Hold. It is designed to facilitate a CDA profile to all runways.
From this location the route splits and heads west, south of Macclesfield, north of Congleton and Sandbach and then over Middlewich. Both routes then turn right to establish aircraft on final approach at 3,000ft for either Runway 05L or 05R.
The descent gradient to the FAF is 3.17%/1.82° for Runway 05L and 3.01%/1.73° Runway 05R. These gradients are just below the optimum for low noise approaches but within the acceptable range for CDAs defined within ICAO guidance.

Group	Impact	Option 7A Runway 05L	Option 7A Runway 05R
Communities	Noise impact on health and quality of life	From 7,000ft, this option is estimated to overfly approximately 16,650 households with an approximate population of 38,600. Taking account of 2,650 planned property developments, this option is estimated to overfly and impact a total population of 44,800. 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 13,450 households with an approximate population of 31,500. Taking account of 1,900 planned property developments, this option is estimated to overfly and impact total population of 35,900. 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.	From 7,000ft, this option is estimated to overfly approximately 11,650 households with an approximate population of 27,400. Taking account of 4,050 planned property developments, this option is estimated to overfly and impact a total population of 37,000. 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 9,800 households with an approximate population of 23,200. Taking account of 3,300 planned property developments, this option is estimated to overfly and impact total population of 31,000. 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.
Communities	Air Quality	Option 7A L overflies three AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.	Option 7A R overflies two AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Option 7A L has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 7A L is 62.81km (33.92nm). When compared to the 'do nothing' scenario, Option 7A L is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 7A R has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 7A R is 64.97km (35.08nm). When compared to the 'do nothing' scenario, Option 7A R is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	This option overflies no AONBs and one National Park. It is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no AONBs and one National Park. It 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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 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.
General Aviation / commercial airlines	Fuel burn	Option 7A L supports continuous descent approaches, 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 62.81km (33.92nm) long. When compared to the 'do nothing' scenario, Option 7A L is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 7A R supports continuous descent approaches, 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 64.97km (35.08nm) long. When compared to the 'do nothing' scenario, Option 7A R is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. 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.
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 for MAN 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 for MAN 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 anticipated to be 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 anticipated to be 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	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.

IAF 9 - OPTION 8A

Option 8A has an IAF at 7,000ft to the south-east of the airport in the vicinity of Buxton.
From this location the route splits and turns downwind, to the south of Macclesfield, just north of Congleton, then west just north of Sandbach and over Middlewich to establish aircraft on the final approach at 3,000ft for either Runway 05L or 05R.
The route has been designed to replicate the existing vectoring patterns used by ATC and is anticipated to reduce interactions with Runway 05 southbound departures.
The descent gradient to the FAF is 2.72%/1.56° for Runway 05L and 2.63%/1.51° Runway 05R. These gradients are below the optimum for low noise approaches but just within the acceptable range for CDAs defined within ICAO guidance.

Group	Impact	Option 8A Runway 05L	Option 8A Runway 05R
Communities	Noise impact on health and quality of life	From 7,000ft, this option is estimated to overfly approximately 22,400 households with an approximate population of 49,600. Taking account of 5,000 planned property developments, this option is estimated to overfly and impact a total population of 60,700. 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 9,650 households with an approximate population of 22,400. Taking account of 2,150 planned property developments, this option is estimated to overfly and impact total population of 27,400. 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.	From 7,000ft, this option is estimated to overfly approximately 24,700 households with an approximate population of 55,000. Taking account of 6,100 planned property developments, this option is estimated to overfly and impact a total population of 68,600. 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 11,600 households with an approximate population of 27,100. Taking account of 3,200 planned property developments, this option is estimated to overfly and impact total population of 34,600. 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.
Communities	Air Quality	Option 8A L overflies four AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.	Option 8A R overflies three AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Option 8A L has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 8A L is 68.66km (38.08nm). When compared to the 'do nothing' scenario, Option 8A L is longer and is therefore expected to emit more greenhouse gases and this option is deemed to be of dis-benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 8A R has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 8A R is 70.38km (38.00nm). When compared to the 'do nothing' scenario, Option 8A R is longer and is therefore expected to emit more greenhouse gases and this option is deemed to be of dis-benefit. More in-depth analysis at Stage 3 is required 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	This option overflies no AONBs and one National Park. It is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no AONBs and one National Park. It 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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 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.
General Aviation / commercial airlines	Fuel burn	Option 8A L supports continuous descent approaches, 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 68.66km (38.08nm) long. When compared to the 'do nothing' scenario, Option 8A L is longer and at this stage it is assumed that it will require a greater amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 8A R supports continuous descent approaches, 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 70.38km (38.00nm) long. When compared to the 'do nothing' scenario, Option 8A R is longer and at this stage it is assumed that it will require a greater amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. 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.
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 for MAN 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 for MAN 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 anticipated to be 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 anticipated to be 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	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.

IAF 10 - OPTION 9A

Option 9A has an IAF at 7,000ft to the south-east of the airport in the vicinity of The Roaches. It is co-located with the IAF for the 23L/23R option 8A and is designed to facilitate a CDA profile to all runways.
From this location the route splits and turns downwind, south-west to Congleton, then west just north of Sandbach and over Middlewich before turning on to the final approach at 3,000ft for either Runway 05L or 05R.
The route has been designed to replicate the existing vectoring patterns used by ATC and is anticipated to reduce interactions with Runway 05 southbound departures.
The descent gradient to the FAF is 3.21%/1.84° for Runway 05L and 3.08%/1.77° Runway 05R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.

Group	Impact	Option 9A Runway 05L	Option 9A Runway 05R
Communities	Noise impact on health and quality of life	From 7,000ft, this option is estimated to overfly approximately **21,900** households with an approximate population of **49,900**. Taking account of 4,450 planned property developments, this option is estimated to overfly and impact a total population of **60,000**. 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 **11,150** households with an approximate population of 26,100. Taking account of 2,150 planned property developments, this option is estimated to overfly and impact total population of 31,100. 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.	From 7,000ft, this option is estimated to overfly approximately 22,000 households with an approximate population of 50,100. Taking account of 5,600 planned property developments, this option is estimated to overfly and impact a total population of **62,900**. 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 10,050 households with an approximate population of 23,600. Taking account of 3,100 planned property developments, this option is estimated to overfly and impact total population of 30,900. 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.
Communities	Air Quality	Option 9A L overflies three AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.	Option 9A R overflies two AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Option 9A L has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 9A L is 61.85km (33.4nm). When compared to the 'do nothing' scenario, Option 9A L is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 9A R has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 9A R is 63.64km (34.36nm). When compared to the 'do nothing' scenario, Option 9A R is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid will significantly increase operational resilience through the introduction of PBN.
Wider Society	Tranquillity	This option overflies no AONBs and one National Park. It is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no AONBs and one National Park. It 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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 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.
General Aviation / commercial airlines	Fuel burn	Option 9A L supports continuous descent approaches, 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 61.85km (33.4nm) long. When compared to the 'do nothing' scenario, Option 9B L is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 9A R supports continuous descent approaches, 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 63.64km (34.36nm) long. When compared to the 'do nothing' scenario, Option 9B R is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. 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.
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 for MAN 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 for MAN 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 anticipated to be 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 anticipated to be 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	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing arrival arrangements do not enable continuous descent approaches 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.	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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing arrival arrangements do not enable continuous descent approaches 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may 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 at 7,000ft - Noise impact at 4,000ft - 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. 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: **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 4,000ft - 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. 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 1A L has been deemed the Acceptable option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 1 R has been Rejected.	Based on the IOA Shortlist Assessment methodology, Option 6A L has been deemed the Favourable option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 6A R has been deemed the Preferred option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 7A L has been Rejected.	Based on the IOA Shortlist Assessment methodology, Option 7A R has been deemed the Acceptable option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 8A L has been Rejected.	Based on the IOA Shortlist Assessment methodology, Option 8 A R has been Rejected.	Based on the IOA Shortlist Assessment methodology, Option 9A L has been deemed the Preferred option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 9A R has been deemed the Favourable option within this design envelope.
	OPTION SHORTLIST CLASSIFICATION FOR STAGE 3		ACCEPTABLE	REJECTED	FAVOURABLE	PREFERRED	REJECTED	ACCEPTABLE	REJECTED	REJECTED	PREFERRED	FAVOURABLE

Arrival Envelope: Runway 23 North 3,000ft (Baseline ROSUN/MIRSI)

			'DO NOTHING' BASELINE		IAF 5 - OPTION 3B (ROSUN)		IAF 4 - OPTION 7B (ROSUN)		'DO NOTHING' BASELINE		IAF 12 - OPTION 11B (MIRSI)	
			For arrivals from the north, the 'do nothing' scenario in terms of today's operation is based around the existing ROSUN and MIRSI Holds. 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 generated based upon current operations where most arrivals are radar vectored from the Hold. In addition to the modal tracks, a polygon has also been created that represents an area where current operations and approaches to MAN 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. All data is based on current aircraft performance data and is calculated based on the distance between the Arrival End of Runway and the start of the modal track. For the purpose of the IOA, the change sponsor has elected to use the data aligned to the ROSUN 'do nothing' scenario for Options 3B and 6B as they most closely align to current operations and the positions of the IAFs that are being assessed.		Option 3B has an IAF at 7,000ft to the north of the airport in the vicinity of Hawkshaw approximately 2nm south of the ROSUN hold. From this location the route splits and heads south-east between Bury and Rochdale. Both routes then turn right to establish aircraft on final approach at 3,000ft for either Runway 23L or 23R. The descent gradient to the FAF is 3.96%/2.27° for Runway 23L and 3.93%/2.25° for Runway 23R. These gradients are within the optimum range for low noise approaches but within the acceptable range for CDAs defined within ICAO guidance.		Option 7B has an IAF at 7,000ft to the north-west of the airport in the vicinity of Harwood. It is designed to facilitate a CDA profile to all runways. From this location the route splits and heads south-east between Bolton and Bury but overhead Oldham. Both routes then turn right to establish aircraft on final approach at 3,000ft for either Runway 23L or 23R. The descent gradient to the FAF is 4.45%/2.55° for Runway 23L and 4.32%/2.48° for Runway 23R. These gradients are optimal for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.		For arrivals from the north, the 'do nothing' scenario in terms of today's operation is based around the existing ROSUN and MIRSI Holds. 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 generated based upon current operations where most arrivals are radar vectored from the Hold. In addition to the modal tracks, a polygon has also been created that represents an area where current operations and approaches to MAN 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. All data is based on current aircraft performance data and is calculated based on the distance between the Arrival End of Runway and the start of the modal track. For the purpose of the IOA, the change sponsor has elected to use the data aligned to the MIRSI 'do nothing' scenario for Option 11B, as it most closely aligns to current operations and the positions of the IAFs that are being assessed.		Option 11B has an IAF at 7,000ft to the north-west of the airport in the vicinity of Worsley, co-located with the IAF for option 05L/05R North 13. It is designed to facilitate a CDA profile to all runways. From this location the route splits and heads south-east overhead Farnworth, then heads east, just to the north of Prestwich overhead Oldham. Both routes then turn right to establish aircraft on final approach at 3,000ft for either Runway 23L or 23R. This option is included to provide a design option from an IAF created specifically for Runways 05L/05R (05L/05R 2,000ft FAF option 13), where design options were required that minimise the impact on LPL Runway 27 arrivals. The descent gradient to the FAF is 4.45%/2.55° for Runway 23L and 4.27%/2.45° for Runway 23R. These gradients are optimal for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.	
Group	**Impact**	**Level of Analysis**	**Runway 23L**	**Runway 23R**	**Runway 23L**	**Runway 23R**	**Runway 23L**	**Runway 23R**	**Runway 23L**	**Runway 23R**	**Runway 23L**	**Runway 23R**
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes within the IOA, for Runway 23L, Northerly arrivals are compared to the ROSUN 'do nothing' scenario. For comparison purposes in the IOA, in terms of potential noise impact, the ROSUN 'do nothing' scenario for Runway 23L is estimated to overfly: From 7,000ft, this option is estimated to overfly approximately 171,200 households with an approximate population of 409,800. Taking account of 7,300 planned property developments, this option is estimated to overfly and impact a total population of 427,200. From 4,000ft, this option is estimated to overfly approximately 47,100 households with an approximate population of 109,500. Taking account of 1,650 planned property developments, this option is estimated to overfly and impact total population of 113,300.	For comparison purposes within the IOA, for Runway 23R, Northerly arrivals are compared to the ROSUN 'do nothing' scenario. For comparison purposes in the IOA, in terms of potential noise impact, the ROSUN 'do nothing' scenario for Runway 23R is estimated to overfly: From 7,000ft, this option is estimated to overfly approximately 153,300 households with an approximate population of 368,800. Taking account of 5,350 planned property developments, this option is estimated to overfly and impact a total population of 381,600. From 4,000ft, this option is estimated to overfly approximately 38,200 households with an approximate population of 87,500. Taking account of 550 planned property developments, this option is estimated to overfly and impact total population of 88,800.	From 7,000ft, this option is estimated to overfly approximately 87,300 households with an approximate population of 213,400. Taking account of 3,650 planned property developments, this option is estimated to overfly and impact a total population of 222,300. 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 31,000 households with an approximate population of 73,900. Taking account of 900 planned property developments, this option is estimated to overfly and impact total population of 76,100. 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.	From 7,000ft, this option is estimated to overfly approximately 82,400 households with an approximate population of 192,000. Taking account of 3,300 planned property developments, this option is estimated to overfly and impact a total population of 199,700. 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 33,650 households with an approximate population of 78,200. Taking account of 1,400 planned property developments, this option is estimated to overfly and impact total population of 81,400. 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.	From 7,000ft, this option is estimated to overfly approximately 118,050 households with an approximate population of 283,400. Taking account of 8,150 planned property developments, this option is estimated to overfly and impact a total population of 303,000. 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 33,150 households with an approximate population of 82,300. Taking account of 850 planned property developments, this option is estimated to overfly and impact total population of 84,400. 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.	From 7,000ft, this option is estimated to overfly approximately 111,900 households with an approximate population of 260,500. Taking account of 8,400 planned property developments, this option is estimated to overfly and impact a total population of 280,000. 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 36,700 households with an approximate population of 85,500. Taking account of 1,400 planned property developments, this option is estimated to overfly and impact total population of 88,700. 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.	For comparison purposes within the IOA, for Runway 23L, Northerly arrivals are compared to the MIRSI 'do nothing' scenario. For comparison purposes in the IOA, in terms of potential noise impact, the MIRSI 'do nothing' scenario for Runway 23L is estimated to overfly: From 7,000ft, this option is estimated to overfly approximately 317,900 households with an approximate population of 753,900. Taking account of 16,650 planned property developments, this option is estimated to overfly and impact a total population of 793,400. From 4,000ft, this option is estimated to overfly approximately 54,400 households with an approximate population of 129,600. Taking account of 1,550 planned property developments, this option is estimated to overfly and impact total population of 1,333,000.	For comparison purposes within the IOA, for Runway 23R, Northerly arrivals are compared to the MIRSI 'do nothing' scenario. For comparison purposes in the IOA, in terms of potential noise impact, the MIRSI 'do nothing' scenario for Runway 23R is estimated to overfly: From 7,000ft, this option is estimated to overfly approximately 301,600 households with an approximate population of 717,300. Taking account of 16,050 planned property developments, this option is estimated to overfly and impact a total population of 755,500. From 4,000ft, this option is estimated to overfly approximately 65,800 households with an approximate population of 158,000. Taking account of 1,500 planned property developments, this option is estimated to overfly and impact total population of 161,600.	From 7,000ft, this option is estimated to overfly approximately 124,100 households with an approximate population of 304,100. Taking account of 2,300 planned property developments, this option is estimated to overfly and impact a total population of 309,800. 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 32,950 households with an approximate population of 81,600. Taking account of 850 planned property developments, this option is estimated to overfly and impact total population of 83,700. 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.	From 7,000ft, this option is estimated to overfly approximately 123,350 households with an approximate population of 291,100. Taking account of 3,700 planned property developments, this option is estimated to overfly and impact a total population of 299,800. 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 37,550 households with an approximate population of 87,600. Taking account of 1,400 planned property developments, this option is estimated to overfly and impact total population of 90,900. 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.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions, the majority of the extant procedures involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to MAN. For safety reasons, aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. In terms of AQMAs, the ROSUN 'do nothing' scenario overflies 7 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	No change to air quality is predicted in maintaining baseline conditions, the majority of the extant procedures involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to MAN. For safety reasons, aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. In terms of AQMAs, the ROSUN 'do nothing' scenario overflies 6 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	Option 3B L overflies six AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be benefical as it overflies less AQMAs.	Option 3B R overflies six AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be neutral as it overflies the same number of AQMAs.	Option 7B L overflies seven AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be neutral as it overflies the same number of AQMAs.	Option 7B R overflies seven AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of dis-benefit as it overflies more AQMAs.	No change to air quality is predicted in maintaining baseline conditions, the majority of the extant procedures involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to MAN. For safety reasons, aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. In terms of AQMAs, the MIRSI 'do nothing' scenario overflies 9 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	No change to air quality is predicted in maintaining baseline conditions, the majority of the extant procedures involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to MAN. For safety reasons, aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. In terms of AQMAs, the MIRSI 'do nothing' scenario overflies 9 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	Option 11B L overflies eight AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.	Option 11B R overflies eight AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival operations do not enable continuous descent approaches to all runways at MAN 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 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 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 ROSUN 23L 'do nothing' scenario track is 54.13km (29.23nm) long.	Current arrival operations do not enable continuous descent approaches to all runways at MAN 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 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 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 ROSUN 23R 'do nothing' scenario track is 58.51km (31.59nm) long.	Option 3B L has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 3B L is 51.22km (27.66nm). When compared to the 'do nothing' scenario, Option 3B L is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 3B R has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 3B R is 51.3km (27.70nm). When compared to the 'do nothing' scenario, Option 3B R is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 7B L has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 7B L is 52.09km (28.13nm). When compared to the 'do nothing' scenario, Option 7B L is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 7B R has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 7B R is 52.73km (28.47nm). When compared to the 'do nothing' scenario, Option 7B R is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Current arrival operations do not enable continuous descent approaches to all runways at MAN 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 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 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 MIRSI 23L 'do nothing' scenario track is 86.15km (46.52nm) long.	Current arrival operations do not enable continuous descent approaches to all runways at MAN 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 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 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 MIRSI 23R 'do nothing' scenario track is 72.00km (38.88nm) long.	Option 11B L has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 11B L is 51.97km (28.06nm). When compared to the 'do nothing' scenario, Option 11B L is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 11B R has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 11B R is 52.88km (28.55nm). When compared to the 'do nothing' scenario, Option 11B R is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required 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 DVOR in December 2022.	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 DVOR in December 2022.	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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid will significantly increase operational resilience through the introduction of	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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid will significantly increase operational resilience through the introduction of	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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid will significantly increase operational resilience through the introduction of PBN.	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 DVOR in December 2022.	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 DVOR in December 2022.	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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 ROSUN 'do nothing' scenario overflies no AONBs and one National Park.	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 ROSUN 'do nothing' scenario overflies no AONBs and one National Park.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore and is therefore deemed to be beneficial compared to the 'do nothing' scenario.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore and is therefore deemed to be beneficial compared to the 'do nothing' scenario.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore and is therefore deemed to be beneficial compared to the 'do nothing' scenario.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore and is therefore deemed to be beneficial compared to the 'do nothing' scenario.	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 ROSUN 'do nothing' scenario overflies no AONBs and one National Park.	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 ROSUN 'do nothing' scenario overflies no AONBs and one National Park.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore and is therefore deemed to be beneficial compared to the 'do nothing' scenario.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore and is therefore deemed to be beneficial compared to the 'do nothing' scenario.
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 MAN 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 MAN 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 MAN 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 MAN 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 MAN 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 MAN 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 MAN 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 MAN 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 MAN 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 MAN 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 MAN will maintain their current level of access under extant operational arrangements.	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of MAN will maintain their current level of access under extant operational arrangements.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of MAN will maintain their current level of access under extant operational arrangements.	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of MAN will maintain their current level of access under extant operational arrangements.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 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 General Aviation/airlines.	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for General Aviation/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	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	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.	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for General Aviation/airlines.	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for General Aviation/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 MAN procedures for arrivals do not support continuous descent approaches. Fuel burn is expected to be greater due to tactical ATC intervention and periods of level flight in the approach phase. In the case of the ROSUN 23L 'do nothing' scenario the track length is 54.13km (29.23nm) long.	The existing MAN procedures for arrivals do not support continuous descent approaches. Fuel burn is expected to be greater due to tactical ATC intervention and periods of level flight in the approach phase. In the case of the ROSUN 23R 'do nothing' scenario the track length is 58.51km (31.59nm) long.	Option 3B L supports continuous descent approaches, 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 51.22km (27.66nm) long. When compared to the ROSUN 'do nothing' scenario, Option 3B L is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth	Option 3B R supports continuous descent approaches, 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 51.3km (27.70nm) long. When compared to the ROSUN 'do nothing' scenario, Option 3B R is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth	Option 7B L supports continuous descent approaches, 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 52.09km (28.13nm) long. When compared to the ROSUN 'do nothing' scenario, Option 7B L is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 7B R supports continuous descent approaches, 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 52.73km (28.47nm) long. When compared to the ROSUN 'do nothing' scenario, Option 7B R is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	The existing MAN procedures for arrivals do not support continuous descent approaches. Fuel burn is expected to be greater due to tactical ATC intervention and periods of level flight in the approach phase. In the case of the MIRSI 23L 'do nothing' scenario the track length is 86.15km (46.52nm) long.	The existing MAN procedures for arrivals do not support continuous descent approaches. Fuel burn is expected to be greater due to tactical ATC intervention and periods of level flight in the approach phase. In the case of the MIRSI 23R 'do nothing' scenario the track length is 72.00km (38.88nm) long.	Option 11B L supports continuous descent approaches, 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 51.97km (28.06nm) long. When compared to the MIRSI 'do nothing' scenario, Option 11B L is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 11B R supports continuous descent approaches, 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 52.88km (28.55nm) long. When compared to the MIRSI 'do nothing' scenario, Option 11B R is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. 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.	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.	Standard training would be applicable for existing procedures which would be practised by crews through existing simulator exercises.	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 for MAN 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.	It is not proportionate for MAN 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 for MAN 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 for MAN 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 for MAN 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 for MAN to assess the 'other costs' to commercial airlines of flying PBN procedures.	It is not proportionate for MAN 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.	It is not proportionate for MAN 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 for MAN 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 for MAN 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 MAN 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.	No additional infrastructure is required at MAN 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 anticipated to be 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 anticipated to be 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 anticipated to be 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 anticipated to be required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.	No additional infrastructure is required at MAN 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.	No additional infrastructure is required at MAN 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 anticipated to be 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 anticipated to be 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 existing procedures.	No change to operational costs is attributable to maintaining the existing procedures.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	No change to operational costs is attributable to maintaining the existing procedures.	No change to operational costs is attributable to maintaining the existing procedures.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; 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	No deployment costs applicable to extant procedures	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	No deployment costs applicable to extant procedures	No deployment costs applicable to extant procedures	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of 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 MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft arriving at MAN would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a potential increase in ATCO workload.	The 'do nothing' scenario assumes that current operations at MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft arriving at MAN would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a potential increase in ATCO workload.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The 'do nothing' scenario assumes that current operations at MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft arriving at MAN would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a potential increase in ATCO workload.	The 'do nothing' scenario assumes that current operations at MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft arriving at MAN would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a potential increase in ATCO workload.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing arrival arrangements do not enable continuous descent approaches 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.	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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing arrival arrangements do not enable continuous descent approaches 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may 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 at 7,000ft - Noise impact at 4,000ft - Greenhouse gas emissions - Fuel burn - Air Quality - Tranquility **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: **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 4,000ft - Greenhouse gas emissions - Fuel burn - Tranquility **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: **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 4,000ft - Greenhouse gas emissions - Fuel burn - Tranquility **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:** - Air Quality **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 4,000ft - Greenhouse gas emissions - Fuel burn - Tranquility **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.	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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing arrival arrangements do not enable continuous descent approaches 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.	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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing arrival arrangements do not enable continuous descent approaches 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may 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 at 7,000ft - Noise impact at 4,000ft - Greenhouse gas emissions - Fuel burn - Air Quality - Tranquility **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: **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 4,000ft - Greenhouse gas emissions - Fuel burn - Air Quality - Tranquility **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, Option3B L has been deemed the Preferred option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option3B R has been deemed the Preferred option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 7B L has been deemed the Acceptable option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 7B R has been deemed the Favourable option within this design envelope.			Based on the IOA Shortlist Assessment methodology, Option 7B L has been deemed the Favourable option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 7B L has been deemed the Acceptable option within this design envelope.
			OPTION SHORTLIST CLASSIFICATION FOR STAGE 3		PREFERRED	PREFERRED	ACCEPTABLE	FAVOURABLE			FAVOURABLE	ACCEPTABLE

MAG MAN ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TABLE

Arrival Envelope: Runway 23 North 3,500ft (Baseline ROSUN/MIRSI)

Group	Impact	Level of Analysis	'DO NOTHING' BASELINE		IAF STEAK - OPTION 1A (MIRSI)	
			For arrivals from the north, the 'do nothing' scenario in terms of today's operation is based around the existing ROSUN and MIRSI Holds. 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 generated based upon current operations where most arrivals are radar vectored from the Hold. In addition to the modal tracks, a polygon has also been created that represents an area where current operations and approaches to MAN 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. All data is based on current aircraft performance data and is calculated based on the distance between the Arrival End of Runway and the start of the modal track. For the purpose of the IOA, the change sponsor has elected to use the data aligned to the MIRSI 'do nothing' scenario for Options 1A, 8A, 11A as they most closely aligns to current operations and the positions of the IAFs that are being assessed.		Option 1A has an IAF at 7,000ft to the north-west of the airport in the vicinity of Aspull. It is designed to facilitate a CDA profile to all runways. From this location the route splits and heads east, over Boothstown, Prestwich and Oldham but north of Manchester city centre. Both routes then turn right to establish aircraft on final approach at 3,500ft for either Runway 23L or 23R. The descent gradient to the FAF is 2.99%/1.71° for Runway 23L and 2.89%/1.65° for Runway 23R. These gradients are just below the optimum for low noise approaches but within the acceptable range for CDAs defined within ICAO guidance.	
			Runway 23L	Runway 23R	Runway 23L	Runway 23R
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes within the IOA, for Runway 23L, Northerly arrivals are compared to the MIRSI 'do nothing' scenario. For comparison purposes in the IOA, in terms of potential noise impact, the MIRSI 'do nothing' scenario for Runway 23L is estimated to overfly: From 7,000ft, this option is estimated to overfly approximately 317,900 households with an approximate population of 753,900. Taking account of 16,650 planned property developments, this option is estimated to overfly and impact a total population of 793,400. From 4,000ft, this option is estimated to overfly approximately 54,400 households with an approximate population of 129,600. Taking account of 1,550 planned property developments,	For comparison purposes within the IOA, for Runway 23R, Northerly arrivals are compared to the MIRSI 'do nothing' scenario. For comparison purposes in the IOA, in terms of potential noise impact, the MIRSI 'do nothing' scenario for Runway 23R is estimated to overfly: From 7,000ft, this option is estimated to overfly approximately 301,600 households with an approximate population of 717,300. Taking account of 16,050 planned property developments, this option is estimated to overfly and impact a total population of 755,500. From 4,000ft, this option is estimated to overfly approximately 65,800 households with an approximate population of 158,000. Taking account of 1,500 planned property developments,	From 7,000ft, this option is estimated to overfly approximately 132,550 households with an approximate population of 311,900. Taking account of 3,600 planned property developments, this option is estimated to overfly and impact a total population of 320,300. 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 33,000 households with an approximate population of 75,400. Taking account of 750 planned property developments, this option is estimated to overfly and impact total population of 77,100. 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.	From 7,000ft, this option is estimated to overfly approximately 123,600 households with an approximate population of 292,000. Taking account of 3,650 planned property developments, this option is estimated to overfly and impact a total population of 300,700. 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 24,950 households with an approximate population of 59,000. Taking account of zero planned property developments, this option is estimated to overfly and impact total population of 59,000. 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.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions, the majority of the extant procedures involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to MAN. For safety reasons, aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. In terms of AQMAs, the MIRSI 'do nothing' scenario overflies 9 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	No change to air quality is predicted in maintaining baseline conditions, the majority of the extant procedures involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to MAN. For safety reasons, aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. In terms of AQMAs, the MIRSI 'do nothing' scenario overflies 9 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	Option 1A L overflies eight AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.	Option 1A R overflies eight AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival operations do not enable continuous descent approaches to all runways at MAN 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 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 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 MIRSI 23L 'do nothing' scenario track is 86.15km (46.52nm) long.	Current arrival operations do not enable continuous descent approaches to all runways at MAN 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 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 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 MIRSI 23R 'do nothing' scenario track is 72.00km (38.88nm) long.	Option 1A L has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 1A L is 62.79km (33.90nm). When compared to the 'do nothing' scenario, Option 1A L is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 1A R has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 1A R is 63.92km (34.51nm). When compared to the 'do nothing' scenario, Option 1A R is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required 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 DVOR in December 2022.	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 DVOR in December 2022.	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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 ROSUN 'do nothing' scenario overflies no AONBs and one National Park.	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 ROSUN 'do nothing' scenario overflies no AONBs and one National Park.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore deemed to be beneficial compared to the 'do nothing' scenario.	This option overflies no AONBs and one National Park. It 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 MAN 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 MAN 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 MAN 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 MAN 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 MAN will maintain their current level of access under extant operational arrangements.	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of MAN will maintain their current level of access under extant operational arrangements.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 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 General Aviation/airlines.	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for General Aviation/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 MAN procedures for arrivals do not support continuous descent approaches. Fuel burn is expected to be greater due to tactical ATC intervention and periods of level flight in the approach phase. In the case of the MIRSI 23L 'do nothing' scenario the track length is 86.15km (46.52nm) long.	The existing MAN procedures for arrivals do not support continuous descent approaches. Fuel burn is expected to be greater due to tactical ATC intervention and periods of level flight in the approach phase. In the case of the MIRSI 23R 'do nothing' scenario the track length is 72.00km (38.88nm) long.	Option 1A L supports continuous descent approaches, 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 62.79km (33.90nm) long. When compared to the MIRSI 'do nothing' scenario, Option 1A L is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 1A R supports continuous descent approaches, 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 63.92km (34.51nm) long. When compared to the MIRSI 'do nothing' scenario, Option 1A R is shoter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be of benefit in terms of fuel burn. 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.	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 for MAN 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.	It is not proportionate for MAN 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 for MAN 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 for MAN 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 MAN 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.	No additional infrastructure is required at MAN 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 anticipated to be 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 anticipated to be 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 existing procedures.	No change to operational costs is attributable to maintaining the existing procedures.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; 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	No deployment costs applicable to extant procedures	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of 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 MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft arriving at MAN would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a potential increase in ATCO workload.	The 'do nothing' scenario assumes that current operations at MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft arriving at MAN would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a potential increase in ATCO workload.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing arrival arrangements do not enable continuous descent approaches 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.	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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing arrival arrangements do not enable continuous descent approaches 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may 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 at 7,000ft - Noise impact at 4,000ft - Greenhouse gas emissions - Fuel burn - Air Quality - Tranquility **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: **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 4,000ft - 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. 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.

Group	Impact	Level of Analysis	IAF 3 - OPTION 8A (MIRSI)		IAF 12 - OPTION 11A (MIRSI)	
			Option 8A has an IAF at 7,000ft to the north-west of the airport in the vicinity of the Middlebrook Retail Park (marked on VFR charts as Middlebrook Stadium), co-located with the IAF for option 05L/05R North 8A. It is designed to facilitate a CDA profile to all runways. From this location the route splits and heads east, to the south of Bury and Rochdale. Both routes then turn right to establish aircraft on final approach at 3,500ft for either Runway 23L or 23R. The descent gradient to the FAF is 2.84%/1.63° for Runway 23L and 2.76%/1.58° for Runway 23R. These gradients are below the optimum for low noise approaches but within the acceptable range for CDAs defined within ICAO guidance.		Option 11A has an IAF at 7,000ft to the north-west of the airport in the vicinity of Worsley, co-located with the IAF for option 05L/05R North 13. It is designed to facilitate a CDA profile to all runways. From this location the route splits and heads south-east overhead Farnworth, then heads east, just to the north of Prestwich overhead Oldham. Both routes then turn right to establish aircraft on final approach at 3,500ft for either Runway 23L or 23R. This option is included to provide a design option from an IAF created specifically for Runways 05L/05R (05L/05R 2,000ft FAF option 13), where design options were required that minimise the impact on LPL Runway 27 arrivals. The descent gradient to the FAF is 3.59%/2.05° for Runway 23L and 3.44%/1.97° for Runway 23R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.	
			Runway 23L	Runway 23R	Runway 23L	Runway 23R
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	From 7,000ft, this option is estimated to overfly approximately 122,500 households with an approximate population of 288,300. Taking account of 6,750 planned property developments, this option is estimated to overfly and impact a total population of 304,200. 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 34,900 households with an approximate population of 82,700. Taking account of 950 planned property developments, this option is estimated to overfly and impact total population of 85,000. 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.	From 7,000ft, this option is estimated to overfly approximately 109,500 households with an approximate population of 257,700. Taking account of 6,750 planned property developments, this option is estimated to overfly and impact a total population of 273,600. 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 27,200 households with an approximate population of 64,000. Taking account of 750 planned property developments, this option is estimated to overfly and impact total population of 65,800. 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.	From 7,000ft, this option is estimated to overfly approximately 119,400 households with an approximate population of 280,300. Taking account of 3,150 planned property developments, this option is estimated to overfly and impact a total population of 287,700. 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 24,400 households with an approximate population of 55,600. Taking account of 600 planned property developments, this option is estimated to overfly and impact total population of 56,900. 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.	From 7,000ft, this option is estimated to overfly approximately 109,900 households with an approximate population of 257,200. Taking account of 2,850 planned property developments, this option is estimated to overfly and impact a total population of 263,900. 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 19,100 households with an approximate population of 44,400. Taking account of 50 planned property developments, this option is estimated to overfly and impact total population of 44,500. 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.
Communities	Air Quality	Initial Options Appraisal: Qualitative	Option 8A L overflies eight AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.	Option 8A R overflies eight AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.	Option 11A L overflies eight AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.	Option 11A R overflies eight AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies fewer AQMAs.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Option 8A L has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 8A L is 65.00km (35.10nm). When compared to the 'do nothing' scenario, Option 8A L is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 8A R has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 8A R is 65.92km (35.60nm). When compared to the 'do nothing' scenario, Option 8A R is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 11A L has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 11A L is 57.16km (30.87nm). When compared to the 'do nothing' scenario, Option 11A L is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 11A R has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 11A R is 58.18km (31.42nm). When compared to the 'do nothing' scenario, Option 11A R is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 and is therefore deemed to be beneficial compared to the 'do nothing' scenario.	This option overflies no AONBs and one National Park. It 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 and is therefore deemed to be beneficial compared to the 'do nothing' scenario.	This option overflies no AONBs and one National Park. It 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 MAN 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 MAN 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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
General Aviation	Access	Initial Options Appraisal: Qualitative	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 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.	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	Option 8A L supports continuous descent approaches, 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 65.00km (35.10nm) long. When compared to the MIRSI 'do nothing' scenario, Option 8A L is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 8A R supports continuous descent approaches, 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 65.92km (35.60nm) long. When compared to the MIRSI 'do nothing' scenario, Option 8A R is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be of benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 11A L supports continuous descent approaches, 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 57.16km (30.87nm) long. When compared to the MIRSI 'do nothing' scenario, Option 11A L is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 11A R supports continuous descent approaches, 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 58.18km (31.42nm) long. When compared to the MIRSI 'do nothing' scenario, Option 11A R is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. 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.	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 for MAN 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 for MAN 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 for MAN 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 for MAN 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 anticipated to be 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 anticipated to be 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 anticipated to be 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 anticipated to be 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	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 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: **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 4,000ft - Greenhouse gas emissions - Fuel burn - Air Quality - Tranquility **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: **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 4,000ft - 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. 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: **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 4,000ft - Greenhouse gas emissions - Fuel burn - Air Quality - Tranquility **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: **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 4,000ft - 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. 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.

Group	Impact	Level of Analysis	'DO NOTHING' BASELINE - ROSUN		IAF 5 - OPTION 3A (ROSUN)		IAF 4 - OPTION 7A (ROSUN)	
			For arrivals from the north, the 'do nothing' scenario in terms of today's operation is based around the existing ROSUN and MIRSI Holds. 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 generated based upon current operations where most arrivals are radar vectored from the Hold. In addition to the modal tracks, a polygon has also been created that represents an area where current operations and approaches to MAN 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. All data is based on current aircraft performance data and is calculated based on the distance between the Arrival End of Runway and the start of the modal track. For the purpose of the IOA, the change sponsor has elected to use the data aligned to the ROSUN 'do nothing' scenario for Options 3A, 6A, 7A as they most closely aligns to current operations and the positions of the IAFs that are being assessed.		Option 3A has an IAF at 7,000ft to the north of the airport in the vicinity of Hawkshaw approximately 2nm south of the ROSUN hold. From this location the route splits and heads south-east between Bury and Rochdale. Both routes then turn right to establish aircraft on final approach at 3,500ft for either Runway 23L or 23R. The descent gradient to the FAF is 3.35%/1.92° for Runway 23L and 3.3%/1.89° for Runway 23R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.		Option 7A has an IAF at 7,000ft to the north-west of the airport in the vicinity of Harwood. It is designed to facilitate a CDA profile to all runways. From this location the route splits and heads south-east between Bolton and Bury but overhead Oldham. Both routes then turn right to establish aircraft on final approach at 3,500ft for either Runway 23L or 23R. The descent gradient to the FAF is 3.64%/2.09° for Runway 23L and 3.53%/2.02° for Runway 23R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.	
			Runway 23L	Runway 23R	Runway 23L	Runway 23R	Runway 23L	Runway 23R
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes within the IOA, for Runway 23L, Northerly arrivals are compared to the ROSUN 'do nothing' scenario. For comparison purposes in the IOA, in terms of potential noise impact, the ROSUN 'do nothing' scenario for Runway 23L is estimated to overfly: From 7,000ft, this option is estimated to overfly approximately 171,200 households with an approximate population of 409,800. Taking account of 7,300 planned property developments, this option is estimated to overfly and impact a total population of 427,200. From 4,000ft, this option is estimated to overfly approximately 47,100 households with an approximate population of 109,500. Taking account of 1,650 planned property developments,	For comparison purposes within the IOA, for Runway 23R, Northerly arrivals are compared to the ROSUN 'do nothing' scenario. For comparison purposes in the IOA, in terms of potential noise impact, the ROSUN 'do nothing' scenario for Runway 23R is estimated to overfly: From 7,000ft, this option is estimated to overfly approximately 153,300 households with an approximate population of 368,800. Taking account of 5,350 planned property developments, this option is estimated to overfly and impact a total population of 381,600. From 4,000ft, this option is estimated to overfly approximately 38,200 households with an approximate population of 87,500. Taking account of 550 planned property developments, this option	From 7,000ft, this option is estimated to overfly approximately 74,000 households with an approximate population of 171,600. Taking account of 3,100 planned property developments, this option is estimated to overfly and impact a total population of 178,800. 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 23,850 households with an approximate population of 54,400. Taking account of 200 planned property developments, this option is estimated to overfly and impact total population of 54,900. 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.	From 7,000ft, this option is estimated to overfly approximately 62,200 households with an approximate population of 146,100. Taking account of 2,950 planned property developments, this option is estimated to overfly and impact a total population of 153,000. 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 19,650 households with an approximate population of 45,500. Taking account of 100 planned property developments, this option is estimated to overfly and impact total population of 45,700. 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.	From 7,000ft, this option is estimated to overfly approximately 102,950 households with an approximate population of 237,600. Taking account of 8,400 planned property developments, this option is estimated to overfly and impact a total population of 257,000. 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 24,450 households with an approximate population of 55,700. Taking account of 200 planned property developments, this option is estimated to overfly and impact total population of 56,200. 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.	From 7,000ft, this option is estimated to overfly approximately 84,800 households with an approximate population of 195,600. Taking account of 8,450 planned property developments, this option is estimated to overfly and impact a total population of 215,100. The potential noise impact on health and quality of life from 7,000ft is assessed as likely to affect more / fewer people than the 'do nothing' scenario. From 4,000ft, this option is estimated to overfly approximately 19,000 households with an approximate population of 44,000. Taking account of 50 planned property developments, this option is estimated to overfly and impact total population of 44,200. 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.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions, the majority of the extant procedures involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to MAN. For safety reasons, aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. In terms of AQMAs, the ROSUN 'do nothing' scenario overflies 7 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	No change to air quality is predicted in maintaining baseline conditions, the majority of the extant procedures involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to MAN. For safety reasons, aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. In terms of AQMAs, the ROSUN 'do nothing' scenario overflies 6 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	Option 3A L overflies six AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of benefit as it overflies less AQMAs.	Option 3A R overflies six AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore this option is deemed to be of equally beneficial as it overflies the same number of AQMAs.	Option 7A L overflies seven AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of equally beneficial as it overflies the same number of AQMAs.	Option 7A R overflies seven AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, 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 arrival operations do not enable continuous descent approaches to all runways at MAN 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 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 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 ROSUN 23L 'do nothing' scenario track is 54.13km (29.23nm) long.	Current arrival operations do not enable continuous descent approaches to all runways at MAN 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 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 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 ROSUN 23R 'do nothing' scenario track is 58.51km (31.59nm) long.	Option 3A L has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 3A L is 55.22km (29.82nm). When compared to the 'do nothing' scenario, Option 3A L is longer and is therefore expected to emit more greenhouse gases and this option is deemed to be of dis-benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 3A R has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 3A R is 55.54km (29.99nm). When compared to the 'do nothing' scenario, Option 3A R is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 7A L has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 7A L is 56.85km (30.69nm). When compared to the 'do nothing' scenario, Option 7A L is longer and is therefore expected to emit more greenhouse gases and this option is deemed to be of dis-benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 7A R has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 7A R is 57.61km (31.11nm). When compared to the 'do nothing' scenario, Option 7A R is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required 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 DVOR in December 2022.	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 DVOR in December 2022.	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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 ROSUN 'do nothing' scenario overflies no AONBs and one National Park.	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 ROSUN 'do nothing' scenario overflies no AONBs and one National Park.	This option overflies no statutorily identified tranquillity receptors (AONBs or National Parks), nor any identified through community engagement and is therefore deemed to be beneficial compared to the 'do nothing' scenario.	This option overflies no AONBs and one National Park. It 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 deemed to be beneficial compared to the 'do nothing' scenario.	This option overflies no AONBs and one National Park. It 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 MAN 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 MAN 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 MAN 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 MAN 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 MAN 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 MAN 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 MAN will maintain their current level of access under extant operational arrangements.	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of MAN will maintain their current level of access under extant operational arrangements.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 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 General Aviation/airlines.	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for General Aviation/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 MAN procedures for arrivals do not support continuous descent approaches. Fuel burn is expected to be greater due to tactical ATC intervention and periods of level flight in the approach phase. In the case of the ROSUN 23L 'do nothing' scenario the track length is 54.13km (29.23nm) long.	The existing MAN procedures for arrivals do not support continuous descent approaches. Fuel burn is expected to be greater due to tactical ATC intervention and periods of level flight in the approach phase. In the case of the ROSUN 23R 'do nothing' scenario the track length is 58.51km (31.59nm) long.	Option 3A L supports continuous descent approaches, 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 55.22km (29.82nm) long. When compared to the ROSUN 23L 'do nothing' scenario, Option 3A L is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be a dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 3A R supports continuous descent approaches, 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 55.54km (29.99nm) long. When compared to the ROSUN 23R 'do nothing' scenario, Option 3A R is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 7A L supports continuous descent approaches, 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 56.85km (30.69nm) long. When compared to the ROSUN 23L 'do nothing' scenario, Option 7A L is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be a dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 7A R supports continuous descent approaches, 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 57.61km (31.11nm) long. When compared to the ROSUN 23R 'do nothing' scenario, Option 7A R is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. 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.	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 for MAN 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.	It is not proportionate for MAN 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 for MAN 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 for MAN 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 for MAN 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 for MAN 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 MAN 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.	No additional infrastructure is required at MAN 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 anticipated to be 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 anticipated to be 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 anticipated to be 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 anticipated to be 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 existing procedures.	No change to operational costs is attributable to maintaining the existing procedures.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; 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	No deployment costs applicable to extant procedures	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of 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 MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft arriving at MAN would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a potential increase in ATCO workload.	The 'do nothing' scenario assumes that current operations at MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft arriving at MAN would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a potential increase in ATCO workload.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing arrival arrangements do not enable continuous descent approaches 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.	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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing arrival arrangements do not enable continuous descent approaches 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may 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 at 7,000ft - Noise impact at 4,000ft - Air Quality - Tranquility **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: **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 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:** - Greenhouse gas emissions - Fuel burn **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 4,000ft - Tranquility **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:** - Air Quality **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 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.

IOA Shortlist Assessment	Based on the IOA Shortlist Assessment methodology, Option 1 A 1 has been Rejected.	Based on the IOA Shortlist Assessment methodology, Option 1 A 4 has been Rejected.	Based on the IOA Shortlist Assessment methodology, Option 8 A 1 has been Rejected.	Based on the IOA Shortlist Assessment methodology, Option 8 A 4 has been Rejected.	Based on the IOA Shortlist Assessment methodology, Option 11 A 1 has been deemed the Acceptable option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 11A 4 has been deemed the Favourable option within this design envelope.			Based on the IOA Shortlist Assessment methodology, Option 3A 1 has been deemed the Preferred option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 3A 4 has been deemed the Acceptable option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 7A 1 has been deemed the Favourable option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 7A 4 has been deemed the Preferred option within this design envelope.
OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	REJECTED	REJECTED	REJECTED	REJECTED	ACCEPTABLE	FAVOURABLE			PREFERRED	ACCEPTABLE	FAVOURABLE	PREFERRED

MAG MAN ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TABLE

Arrival Envelope: Runway 23 South 3,000ft (Baseline DAYNE)

Option	Description
'DO NOTHING' BASELINE	For arrivals from the south, the 'do nothing' scenario in terms of today's operation is based around the existing DAYNE 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 generated based upon current operations where most arrivals are radar vectored from the Hold. In addition to the modal tracks, a polygon has also been created that represents an area where current operations and approaches to MAN 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. All data is based on current aircraft performance data and is calculated based on the distance between the Arrival End of Runway and the start of the modal track.
IAF TURKY - OPTION 1B	Option 1B has an IAF at 7,000ft to the south-east of the airport in the vicinity of Danebridge. It is designed to facilitate a CDA profile to all runways. From this location the route splits and heads north-east, just to the west of Whaley Bridge and then overhead Glossop. Both routes then turn left to establish aircraft on final approach at 3,000ft for either Runway 23L or 23R. The descent gradient to the FAF is 3.78%/2.17° for Runway 23L and 3.63%/2.08° for Runway 23R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.
IAF TURKY - OPTION 2B	Option 2B has an IAF at 7,000ft to the south-east of the airport in the vicinity of Sutton. It is designed to facilitate a CDA profile to all runways. From this location the route overflies Macclesfield, splits, and heads north-east, just to the west of Whaley Bridge and then overhead Glossop. Both routes then turn left to establish aircraft on final approach at 3,000ft for either Runway 23L or 23R. The descent gradient to the FAF is 3.38%/1.94° for Runway 23L and 3.26%/1.87° for Runway 23R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.
IAF 8 - OPTION 6B	Option 6B has an IAF at 7,000ft to the south-east of the airport co-located with the DAYNE hold. It is designed to facilitate a CDA profile to all runways. From this location the route splits and heads north-east, to the west of Whaley Bridge and then overhead Glossop. Both routes then turn left to establish aircraft on final approach at 3,000ft for either Runway 23L or 23R. The descent gradient to the FAF is 4.12%/2.36° for Runway 23L and 3.94%/2.26° for Runway 23R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.
IAF 9 - OPTION 7B	Option 7B has an IAF at 7,000ft to the south-east of the airport in the vicinity of Goyt Valley. It is co-located with the IAF for the 05L/R option 8B and is designed to facilitate a CDA profile to all runways. From this location the route splits and heads north-east, just to the west of Whaley Bridge and then overhead Glossop. Both routes then turn left to establish aircraft on final approach at 3,000ft for either Runway 23L or 23R. The descent gradient to the FAF is 5.5%/3.15° for Runway 23L and 5.19%/2.97° for Runway 23R. These gradients are just above the range for low noise approaches but are still within the acceptable range for CDAs defined within ICAO guidance.
IAF 10 - OPTION 8B	Option 8B has an IAF at 7,000ft to the south-east of the airport in the vicinity of the Roaches. It is co-located with the IAF for the 05L/05R option 9B and is designed to facilitate a CDA profile to all runways. From this location the route splits and heads north-east, just to the west of Whaley Bridge and then overhead Glossop. Both routes then turn left to establish aircraft on final approach at 3,000ft for either Runway 23L or 23R. The descent gradient to the FAF is 4.14%/2.37° for Runway 23L and 3.95%/2.26° for Runway 23R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.
IAF 7 - OPTION 9B	Option 9B has an IAF at 7,000ft to the south-east of the airport, just to the north of Leek. It is co-located with the IAF for the 05L/05R option 6B and is designed to facilitate a CDA profile to all runways. From this location the route splits and heads north-east between Macclesfield and Buxton, overhead Whaley Bridge and Glossop. Both routes then turn left to establish aircraft on final approach at 3,000ft for either Runway 23L or 23R. The descent gradient to the FAF is 3.33%/1.91° for Runway 23L and 3.21%/1.84° for Runway 23R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.

'DO NOTHING' BASELINE

Group	Impact	Level of Analysis	Runway 23L	Runway 23R
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes within the IOA, for Runway 23L, Southerly arrivals are compared to the DAYNE 'do nothing' scenario. In terms of potential noise impact, the DAYNE 'do nothing' scenario for Runway 23L is estimated to overfly: From 7,000ft, this option is estimated to overfly approximately 65,500 households with an approximate population of 147,700. Taking account of 700 planned property developments, this option is estimated to overfly and impact a total population of 149,300. From 4,000ft, this option is estimated to overfly approximately 34,600 households with an approximate population of 77,000. Taking account of 250 planned property developments, this option is estimated to overfly and impact total population of 77,600.	For comparison purposes within the IOA, for Runway 23R, Southerly arrivals are compared to the DAYNE 'do nothing' scenario. In terms of potential noise impact, the DAYNE 'do nothing' scenario for Runway 23L is estimated to overfly: From 7,000ft, this option is estimated to overfly approximately 60,200 households with an approximate population of 135,900. Taking account of 650 planned property developments, this option is estimated to overfly and impact a total population of 137,400. From 4,000ft, this option is estimated to overfly approximately 36,600 households with an approximate population of 84,100. Taking account of 50 planned property developments, this option is estimated to overfly and impact total population of 84,200.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions, the majority of the extant procedures involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to MAN. For safety reasons, aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. In terms of AQMAs, the DAYNE 23L'do nothing' scenario overflies 3 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	No change to air quality is predicted in maintaining baseline conditions, the majority of the extant procedures involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to MAN. For safety reasons, aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. In terms of AQMAs, the DAYNE 23R 'do nothing' scenario overflies 3 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival operations do not enable continuous descent approaches to all runways at MAN 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 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 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 DAYNE 23L 'do nothing' scenario track is 62.74km (33.88nm) long.	Current arrival operations do not enable continuous descent approaches to all runways at MAN 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 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 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 DAYNE 23R 'do nothing' scenario track is 41.04km (22.16nm) long.
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 DVOR in December 2022.	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 DVOR in December 2022.
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 DAYNE 'do nothing' scenario overflies no AONBs and one National Park.	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 DAYNE 'do nothing' scenario overflies no AONBs and one National Park.
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 MAN 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 MAN 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 MAN will maintain their current level of access under extant operational arrangements.	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of MAN 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 General Aviation/airlines.	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for General Aviation/airlines.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing MAN procedures for arrivals do not support continuous descent approaches. Fuel burn is expected to be greater due to tactical ATC intervention and periods of level flight in the approach phase. In the case of the DAYNE 23L 'do nothing' scenario the track length is 62.74km (33.88nm) long.	The existing MAN procedures for arrivals do not support continuous descent approaches. Fuel burn is expected to be greater due to tactical ATC intervention and periods of level flight in the approach phase. In the case of the DAYNE 23R 'do nothing' scenario the track length is 41.04km (22.16nm) long.
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.	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 for MAN 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.	It is not proportionate for MAN 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 MAN 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.	No additional infrastructure is required at MAN 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 existing procedures.	No change to operational costs is attributable to maintaining the existing procedures.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures	No deployment costs applicable to extant procedures
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft arriving at MAN would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented),	The 'do nothing' scenario assumes that current operations at MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft arriving at MAN would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented),
		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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing arrival arrangements do not enable continuous descent approaches 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.	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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing arrival arrangements do not enable continuous descent approaches 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.

Options – Communities: Noise impact on health and quality of life

Option	Runway 23L	Runway 23R
IAF TURKY - OPTION 1B	From 7,000ft, this option is estimated to overfly approximately 31,250 households with an approximate population of 70,300. Taking account of 600 planned property developments, this option is estimated to overfly and impact a total population of 71,600. 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 26,100 households with an approximate population of 59,000. Taking account of zero planned property developments, this option is estimated to overfly and impact total population of 59,000. 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.	From 7,000ft, this option is estimated to overfly approximately 29,250 households with an approximate population of 66,000. Taking account of 850 planned property developments, this option is estimated to overfly and impact a total population of [illegible]
IAF TURKY - OPTION 2B	From 7,000ft, this option is estimated to overfly approximately 53,400 households with an approximate population of 117,800. Taking account of 1,050 planned property developments, this option is estimated to overfly and impact a total population of [illegible]	From 7,000ft, this option is estimated to overfly approximately 50,600 households with an approximate population of 111,900. Taking account of 1,200 planned property developments, this option is estimated to overfly and impact a total population of [illegible]
IAF 8 - OPTION 6B	From 7,000ft, this option is estimated to overfly approximately 35,150 households with an approximate population of 78,800. Taking account of 550 planned property developments, this option is estimated to overfly and impact a total population of 80,100. [illegible]	From 7,000ft, this option is estimated to overfly approximately 31,450 households with an approximate population of 70,800. Taking account of 800 planned property developments, this option is estimated to overfly and impact a total population of 72,600. [illegible]
IAF 9 - OPTION 7B	From 7,000ft, this option is estimated to overfly approximately 37,600 households with an approximate population of 84,300. Taking account of 550 planned property developments, this option is estimated to overfly and impact a total population of 85,500. [illegible]	From 7,000ft, this option is estimated to overfly approximately 33,550 households with an approximate population of 75,300. Taking account of 800 planned property developments, this option is estimated to overfly and impact a total population of 77,100. [illegible]
IAF 10 - OPTION 8B	From 7,000ft, this option is estimated to overfly approximately 32,900 households with an approximate population of 73,900. Taking account of 600 planned property developments, this option is estimated to overfly and impact a total population of 75,300. [illegible]	From 7,000ft, this option is estimated to overfly approximately 30,500 households with an approximate population of 68,700. Taking account of 850 planned property developments, this option is estimated to overfly and impact a total population of 70,700. [illegible]
IAF 7 - OPTION 9B	From 7,000ft, this option is estimated to overfly approximately 28,600 households with an approximate population of 64,400. Taking account of 550 planned property developments, this option is estimated to overfly and impact a total population of 65,600. [illegible]	From 7,000ft, this option is estimated to overfly approximately 27,200 households with an approximate population of 61,600. Taking account of 750 planned property developments, this option is estimated to overfly and impact a total population of 63,200. [illegible]

Options – remaining criteria (Air Quality to Safety Assessment)

Option	Runway 23L	Runway 23R
IAF TURKY - OPTION 1B	[illegible]	[illegible]
IAF TURKY - OPTION 2B	[illegible]	[illegible]
IAF 8 - OPTION 6B	[illegible]	[illegible]
IAF 9 - OPTION 7B	[illegible]	[illegible]
IAF 10 - OPTION 8B	[illegible]	[illegible]
IAF 7 - OPTION 9B	[illegible]	[illegible]

Summary of Analysis

Option	Runway 23L	Runway 23R
IAF TURKY - OPTION 1B	When compared to the 'do nothing' scenario, this option performs: **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 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:** - Greenhouse gas emissions - Fuel burn - Air Quality - Tranquility **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 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. 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.
IAF TURKY - OPTION 2B	[illegible]	[illegible]
IAF 8 - OPTION 6B	[illegible]	[illegible]
IAF 9 - OPTION 7B	[illegible]	[illegible]
IAF 10 - OPTION 8B	[illegible]	[illegible]
IAF 7 - OPTION 9B	[illegible]	[illegible]

IOA Shortlist Assessment

Option	Runway	IOA Shortlist Assessment	OPTION SHORTLIST CLASSIFICATION FOR STAGE 3
Option 1B	23L	Based on the IOA Shortlist Assessment methodology, Option 1B L has been deemed the Favourable option within this design envelope.	FAVOURABLE
Option 1B	23R	Based on the IOA Shortlist Assessment methodology, Option 1B R has been deemed the Favourable option within this design envelope.	FAVOURABLE
Option 2B	23L	Based on the IOA Shortlist Assessment methodology, Option 2B L has been Rejected.	REJECTED
Option 2B	23R	Based on the IOA Shortlist Assessment methodology, Option 2B R has been Rejected.	REJECTED
Option 6B	23L	Based on the IOA Shortlist Assessment methodology, Option 6B L has been Rejected.	REJECTED
Option 6B	23R	Based on the IOA Shortlist Assessment methodology, Option 6B R has been Rejected.	REJECTED
Option 7B	23L	Based on the IOA Shortlist Assessment methodology, Option 7B L has been Rejected.	REJECTED
Option 7B	23R	Based on the IOA Shortlist Assessment methodology, Option 7B R has been Rejected.	REJECTED
Option 8B	23L	Based on the IOA Shortlist Assessment methodology, Option 8B L has been deemed the Acceptable option within this design envelope.	ACCEPTABLE
Option 8B	23R	Based on the IOA Shortlist Assessment methodology, Option 8B R has been deemed the Acceptable option within this design envelope.	ACCEPTABLE
Option 9B	23L	Based on the IOA Shortlist Assessment methodology, Option 9B L has been deemed the Preferred option within this design envelope.	PREFERRED
Option 9B	23R	Based on the IOA Shortlist Assessment methodology, Option 9B R has been deemed the Preferred option within this design envelope.	PREFERRED

MAG MAN ACP - INITIAL OPTIONS APPRAISAL - FULL ANALYSIS TABLE

Arrival Envelope: Runway 23 South 3,500ft (Baseline DAYNE)

Group	Impact	Level of Analysis	'DO NOTHING' BASELINE – Runway 23L	'DO NOTHING' BASELINE – Runway 23R
			For arrivals from the south, the 'do nothing' scenario in terms of today's operation is based around the existing DAYNE 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 generated based upon current operations where most arrivals are radar vectored from the Hold. In addition to the modal tracks, a polygon has also been created that represents an area where current operations and approaches to MAN 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. All data is based on current aircraft performance data and is calculated based on the distance between the Arrival End of Runway and the start of the modal track.	
Communities	Noise impact on health and quality of life	Initial Options Appraisal: Qualitative	For comparison purposes within the IOA, for Runway 23L, Southerly arrivals are compared to the DAYNE 'do nothing' scenario. In terms of potential noise impact, the DAYNE 'do nothing' scenario for Runway 23L is estimated to overfly: From 7,000ft, this option is estimated to overfly approximately 65,500 households with an approximate population of 147,700. Taking account of 700 planned property developments, this option is estimated to overfly and impact a total population of 149,300. From 4,000ft, this option is estimated to overfly approximately 34,600 households with an approximate population of 77,000. Taking account of 250 planned property developments, this option is estimated to overfly and impact total population of 77,600.	For comparison purposes within the IOA, for Runway 23R, Southerly arrivals are compared to the DAYNE 'do nothing' scenario. In terms of potential noise impact, the DAYNE 'do nothing' scenario for Runway 23L is estimated to overfly: From 7,000ft, this option is estimated to overfly approximately 60,200 households with an approximate population of 135,900. Taking account of 650 planned property developments, this option is estimated to overfly and impact a total population of 137,400. From 4,000ft, this option is estimated to overfly approximately 36,600 households with an approximate population of 84,100. Taking account of 50 planned property developments, this option is estimated to overfly and impact total population of 84,200.
Communities	Air Quality	Initial Options Appraisal: Qualitative	No change to air quality is predicted in maintaining baseline conditions, the majority of the extant procedures involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to MAN. For safety reasons, aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. In terms of AQMAs, the DAYNE 23L'do nothing' scenario overflies 3 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.	No change to air quality is predicted in maintaining baseline conditions, the majority of the extant procedures involves overflight above 1,000ft, other than the areas in the immediate vicinity or final approach to MAN. For safety reasons, aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. In terms of AQMAs, the DAYNE 23R 'do nothing' scenario overflies 3 AQMAs. Overflight of these AQMAs occurs when the aircraft is above 1,000ft.
Wider Society	Greenhouse Gas impact	Initial Options Appraisal: Qualitative	Current arrival operations do not enable continuous descent approaches to all runways at MAN 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 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 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 DAYNE 23L 'do nothing' scenario track is 62.74km (33.88nm) long.	Current arrival operations do not enable continuous descent approaches to all runways at MAN 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 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 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 DAYNE 23R 'do nothing' scenario track is 41.04km (22.16nm) long.
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 DVOR in December 2022.	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 DVOR in December 2022.
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 DAYNE 'do nothing' scenario overflies no AONBs and one National Park.	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 DAYNE 'do nothing' scenario overflies no AONBs and one National Park.
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 MAN 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 MAN 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 MAN will maintain their current level of access under extant operational arrangements.	No change to existing airspace arrangements. Any General Aviation users of airspace in the vicinity of MAN 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 General Aviation/airlines.	No increase to effective capacity anticipated for continued use of extant procedures, therefore no economic benefit for General Aviation/airlines.
General Aviation / commercial airlines	Fuel burn	Initial Options Appraisal: Qualitative	The existing MAN procedures for arrivals do not support continuous descent approaches. Fuel burn is expected to be greater due to tactical ATC intervention and periods of level flight in the approach phase. In the case of the DAYNE 23L 'do nothing' scenario the track length is 62.74km (33.88nm) long.	The existing MAN procedures for arrivals do not support continuous descent approaches. Fuel burn is expected to be greater due to tactical ATC intervention and periods of level flight in the approach phase. In the case of the DAYNE 23R 'do nothing' scenario the track length is 41.04km (22.16nm) long.
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.	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 for MAN 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.	It is not proportionate for MAN 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 MAN 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.	No additional infrastructure is required at MAN 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 existing procedures.	No change to operational costs is attributable to maintaining the existing procedures.
Airport / Air navigation service provider	Deployment costs	Initial Options Appraisal: Qualitative	No deployment costs applicable to extant procedures	No deployment costs applicable to extant procedures
Safety Assessment	Safety Assessment	Initial Options Appraisal: Qualitative	The 'do nothing' scenario assumes that current operations at MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft arriving at MAN would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a potential increase in ATCO workload.	The 'do nothing' scenario assumes that current operations at MAN are safe including use of the extant conventional procedures. Following the removal of ground-based navigational aids supporting the existing SIDs, aircraft arriving at MAN would continuously require radar vectoring (should CAP1781 or a commercial agreement to maintain the existing navigational aid not be implemented), resulting in a potential 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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing arrival arrangements do not enable continuous descent approaches 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.	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 DVOR beacons in December 2022, which would have a significant impact on capacity and resilience. The existing arrival arrangements do not enable continuous descent approaches 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 MAN operations are safe. Following the removal of the DVORs, it is acknowledged that ATCO workload may increase due to the enduring requirement for radar vectoring.
			IOA Shortlist Assessment OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	

Impact	IAF TURKY - OPTION 1A – Runway 23L	IAF TURKY - OPTION 1A – Runway 23R	IAF TURKY - OPTION 2A – Runway 23L	IAF TURKY - OPTION 2A – Runway 23R
	Option 1A has an IAF at 7,000ft to the south-east of the airport in the vicinity of Sutton. It is designed to facilitate a CDA profile to all runways. From this location the route splits and heads north-east, just to the west of Whaley Bridge and then overhead Glossop. Both routes then turn left to establish aircraft on final approach at 3,500ft for either Runway 23L or 23R. The descent gradient to the FAF is 3.15%/1.80° for Runway 23L and 3.02%/1.73° for Runway 23R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.		Option 2A has an IAF at 7,000ft to the south-east of the airport in the vicinity of Sutton. It is designed to facilitate a CDA profile to all runways. From this location the route overflies Macclesfield, splits and heads north-east, just to the west of Whaley Bridge and then overhead Glossop. Both routes then turn left to establish aircraft on final approach at 3,500ft for either Runway 23L or 23R. The descent gradient to the FAF is 2.83%/1.62° for Runway 23L and 2.73%/1.56° for Runway 23R. These gradients are below the optimum for low noise approaches but just within the acceptable range for CDAs defined within ICAO guidance.	
Noise impact on health and quality of life	From 7,000ft, this option is estimated to overfly approximately 25,000 households with an approximate population of 55,800. Taking account of 600 planned property developments, this option is estimated to overfly and impact a total population of 57,200. 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 19,500 households with an approximate population of 43,800. Taking account of zero planned property developments, this option is estimated to overfly and impact total population of 43,800. 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.	From 7,000ft, this option is estimated to overfly approximately 22,600 households with an approximate population of 51,800. Taking account of 600 planned property developments, this option is estimated to overfly and impact a total population of 53,200. 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 17,000 households with an approximate population of 39,600. Taking account of zero planned property developments, this option is estimated to overfly and impact total population of 39,600. 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.	From 7,000ft, this option is estimated to overfly approximately 47,450 households with an approximate population of 104,200. Taking account of 950 planned property developments, this option is estimated to overfly and impact a total population of 106,300. 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 21,450 households with an approximate population of 47,800. Taking account of zero planned property developments, this option is estimated to overfly and impact total population of 47,800. 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.	From 7,000ft, this option is estimated to overfly approximately 46,450 households with an approximate population of 103,100. Taking account of 950 planned property developments, this option is estimated to overfly and impact a total population of 105,200. 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 20,600 households with an approximate population of 47,200. Taking account of zero planned property developments, this option is estimated to overfly and impact total population of 47,200. 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.
Air Quality	Option 1A L overflies three AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be equally beneficial as it overflies the same number of AQMAs.	Option 1A R overflies three AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be equally beneficial as it overflies the same number of AQMAs.	Option 2A L overflies six AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of is-benefit as it overflies more AQMAs.	Option 2A R overflies six AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be of is-benefit as it overflies more AQMAs.
Greenhouse Gas impact	Option 1A L has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 1A L is 61.17km (33.03nm). When compared to the 'do nothing' scenario, Option 1A L is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 1A R has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 1A R is 62.38km (33.68nm). When compared to the 'do nothing' scenario, Option 1A R is longer and is therefore expected to emit more greenhouse gases and this option is deemed to be of dis-benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 2A L has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 2A L is 61.10km (32.99nm). When compared to the 'do nothing' scenario, Option 2A L is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 2A R has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 2A R is 62.32km (33.65nm). When compared to the 'do nothing' scenario, Option 2A R is longer and is therefore expected to emit more greenhouse gases and this option is deemed to be of dis-benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.
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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid will significantly increase operational resilience through the introduction of PBN.
Tranquillity	This option overflies no AONBs and one National Park. It is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no AONBs and one National Park. It is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no AONBs and one National Park. It is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no AONBs and one National Park. It is therefore comparable to the 'do nothing' scenario and assessed as neutral.
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 MAN 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 MAN 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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
Access	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.
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.
Fuel burn	Option 1A L supports continuous descent approaches, 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 61.17km (33.03nm) long. When compared to the 'do nothing' scenario, Option 1A L is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 1A R supports continuous descent approaches, 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 62.38km (33.68nm) long. When compared to the 'do nothing' scenario, Option1A R is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 2A L supports continuous descent approaches, 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 61.10km (32.99nm) long. When compared to the 'do nothing' scenario, Option 2A L is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 2A R supports continuous descent approaches, 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 62.32km (33.65nm) long. When compared to the 'do nothing' scenario, Option 2A R is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.
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.
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 for MAN 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 for MAN 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 for MAN 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 for MAN to assess the 'other costs' to commercial airlines of flying PBN procedures.
Infrastructure costs	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is anticipated to be 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 anticipated to be 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 anticipated to be 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 anticipated to be required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Operational costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Deployment costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 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: **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 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:** - Greenhouse gas emissions - Fuel burn **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 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. 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:** - Air Quality **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 4,000ft - 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. 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 - Air Quality **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 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. 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 1A L has been deemed the Favourable option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 1A R has been deemed the Favourable option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 2A L has been Rejected.	Based on the IOA Shortlist Assessment methodology, Option 2A R has been Rejected.
OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	FAVOURABLE	FAVOURABLE	REJECTED	REJECTED

Impact	IAF 8 - OPTION 6A – Runway 23L	IAF 8 - OPTION 6A – Runway 23R	IAF 9 - OPTION 7A – Runway 23L	IAF 9 - OPTION 7A – Runway 23R
	Option 6A has an IAF at 7,000ft to the south-east of the airport co-located with the DAYNE hold. It is designed to facilitate a CDA profile to all runways. From this location the route splits and heads north-east, to the west of Whaley Bridge and then overhead Glossop. Both routes then turn left to establish aircraft on final approach at 3,500ft for either Runway 23L or 23R. The descent gradient to the FAF is 3.41%/1.96° for Runway 23L and 3.27%/1.87° for Runway 23R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.		Option 7A has an IAF at 7,000ft to the south-east of the airport in the vicinity of Goyt Valley. It is co-located with the IAF for the 05L/05R option 8A and is designed to facilitate a CDA profile to all runways. From this location the route splits and heads north-east, just to the west of Whaley Bridge and then overhead Glossop. Both routes then turn left to establish aircraft on final approach at 3,500ft for either Runway 23L or 23R. The descent gradient to the FAF is 4.48%/2.57° for Runway 23L and 4.24%/2.43° for Runway 23R. These gradients are optimal for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.	
Noise impact on health and quality of life	From 7,000ft, this option is estimated to overfly approximately 27,200 households with an approximate population of 60,900. Taking account of 600 planned property developments, this option is estimated to overfly and impact a total population of 62,200. 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 21,650 households with an approximate population of 48,900. Taking account of 50 planned property developments, this option is estimated to overfly and impact total population of 49,000. 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.	From 7,000ft, this option is estimated to overfly approximately 23,400 households with an approximate population of 53,500. Taking account of 500 planned property developments, this option is estimated to overfly and impact a total population of 54,600. 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 17,850 households with an approximate population of 41,500. Taking account of zero planned property developments, this option is estimated to overfly and impact total population of 41,500. 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.	From 7,000ft, this option is estimated to overfly approximately 29,650 households with an approximate population of 66,200. Taking account of 700 planned property developments, this option is estimated to overfly and impact a total population of 67,700. 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 21,600 households with an approximate population of 48,600. Taking account of 150 planned property developments, this option is estimated to overfly and impact total population of 48,900. 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.	From 7,000ft, this option is estimated to overfly approximately 24,850 households with an approximate population of 56,600. Taking account of 550 planned property developments, this option is estimated to overfly and impact a total population of 57,800. 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 17,100 households with an approximate population of 39,600. Taking account of zero planned property developments, this option is estimated to overfly and impact total population of 39,600. 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.
Air Quality	Option 6A L overflies three AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be equally beneficial as it overflies the same number of AQMAs.	Option 6A R overflies three AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be equally beneficial as it overflies the same number of AQMAs.	Option 7A L overflies three AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be equally beneficial as it overflies the same number of AQMAs.	Option 7A R overflies three AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be equally beneficial as it overflies the same number of AQMAs.
Greenhouse Gas impact	Option 6A L has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 6A L is 54.62km (29.49nm). When compared to the 'do nothing' scenario, Option 6A L is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 6A R has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 6A R is 55.83km (30.14nm). When compared to the 'do nothing' scenario, Option 6A R is longer and is therefore expected to emit more greenhouse gases and this option is deemed to be of dis-benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 7A L has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 7A L is 51.27km (27.68m). When compared to the 'do nothing' scenario, Option 7A L is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 7A R has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 7A R is 52.47km (28.33nm). When compared to the 'do nothing' scenario, Option 7A R is longer and is therefore expected to emit more greenhouse gases and this option is deemed to be of dis-benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.
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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid will significantly increase operational resilience through the introduction of PBN.
Tranquillity	This option overflies no AONBs and one National Park. It is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no AONBs and one National Park. It is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no AONBs and one National Park. It is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no AONBs and one National Park. It is therefore comparable to the 'do nothing' scenario and assessed as neutral.
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 MAN 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 MAN 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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
Access	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.
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.
Fuel burn	Option 6A L supports continuous descent approaches, 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 54.62km (29.49nm) long. When compared to the 'do nothing' scenario, Option 6A L is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 6A R supports continuous descent approaches, 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 55.83km (30.14nm) long. When compared to the 'do nothing' scenario, Option 6A R is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 7A L supports continuous descent approaches, 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 51.27km (27.68m).long. When compared to the 'do nothing' scenario, Option 7A L is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option7A R supports continuous descent approaches, 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 52.47km (28.33nm) long. When compared to the 'do nothing' scenario, Option 7A R is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.
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.
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 for MAN 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 for MAN 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 for MAN 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 for MAN to assess the 'other costs' to commercial airlines of flying PBN procedures.
Infrastructure costs	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is anticipated to be 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 anticipated to be 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 anticipated to be 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 anticipated to be required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Operational costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Deployment costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 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: **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 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:** - Greenhouse gas emissions - Fuel burn **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 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. 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: Better in the following areas: - Noise impact at 7,000ft - Noise impact at 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:** - Greenhouse gas emissions - Fuel burn **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 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. 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 6A L has been Rejected.	Based on the IOA Shortlist Assessment methodology, Option 6A R has been Rejected.	Based on the IOA Shortlist Assessment methodology, Option 7A L has been Rejected.	Based on the IOA Shortlist Assessment methodology, Option 7A R has been Rejected.
OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	REJECTED	REJECTED	REJECTED	REJECTED

Impact	IAF 10 - OPTION 8A – Runway 23L	IAF 10 - OPTION 8A – Runway 23R	IAF 7 - OPTION 9A – Runway 23L	IAF 7 - OPTION 9A – Runway 23R
	Option 8A has an IAF at 7,000ft to the south-east of the airport in the vicinity of the Roaches. It is co-located with the IAF for the 05L/05R option 9A and is designed to facilitate a CDA profile to all runways. From this location the route splits and heads north-east, just to the west of Whaley Bridge and then overhead Glossop. Both routes then turn left to establish aircraft on final approach at 3,500ft for either Runway 23L or 23R. The descent gradient to the FAF is 3.42%/1.96° for Runway 23L and 3.28%/1.88° for Runway 23R. These gradients are within the optimum range for low noise approaches and within the acceptable range for CDAs defined within ICAO guidance.		Option 9A has an IAF at 7,000ft to the south-east of the airport, just to the north of Leek. It is co-located with the IAF for the 05L/05R option 6A and is designed to facilitate a CDA profile to all runways. From this location the route splits and heads north-east between Macclesfield and Buxton, overhead Whaley Bridge and Glossop. Both routes then turn left to establish aircraft on final approach at 3,500ft for either Runway 23L or 23R. The descent gradient to the FAF is 2.78%/1.59° for Runway 23L and 2.69%/1.54° for Runway 23R. These gradients are below the optimum range for low noise approaches but just within the acceptable range for CDAs defined within ICAO guidance.	
Noise impact on health and quality of life	From 7,000ft, this option is estimated to overfly approximately 26,250 households with an approximate population of 58,700. Taking account of 600 planned property developments, this option is estimated to overfly and impact a total population of 60,000. 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 20,350 households with an approximate population of 45,700. Taking account of zero planned property developments, this option is estimated to overfly and impact total population of 45,700. 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.	From 7,000ft, this option is estimated to overfly approximately 23,800 households with an approximate population of 54,400. Taking account of 600 planned property developments, this option is estimated to overfly and impact a total population of 55,800. 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 17,850 households with an approximate population of 41,300. Taking account of zero planned property developments, this option is estimated to overfly and impact total population of 41,300. 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.	From 7,000ft, this option is estimated to overfly approximately 21,950 households with an approximate population of 48,800. Taking account of 500 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 17,800 households with an approximate population of 39,900. Taking account of zero planned property developments, this option is estimated to overfly and impact total population of 39,900. 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.	From 7,000ft, this option is estimated to overfly approximately 20,350 households with an approximate population of 46,900. Taking account of 500 planned property developments, this option is estimated to overfly and impact a total population of 48,000. 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 15,950 households with an approximate population of 37,400. Taking account of zero planned property developments, this option is estimated to overfly and impact total population of 37,400. 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.
Air Quality	Option 8A L overflies three AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be equally beneficial as it overflies the same number of AQMAs.	Option 8A R overflies three AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be equally beneficial as it overflies the same number of AQMAs.	Option 9A L overflies three AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be equally beneficial as it overflies the same number of AQMAs.	Option 9A R overflies three AQMAs, having said that, as per CAP1616, para B74, due to mixing and dispersion, the impact on air quality above 1,000ft is not likely to be significant. There are areas within the immediate area surrounding the airport that may be overflown below 1,000ft; however, for safety reasons, this is unavoidable, as aircraft are required to establish a safe and stable flight profile during the final approach phases of flight. Therefore, overall, when compared to the 'do nothing' scenario, this option is deemed to be equally beneficial as it overflies the same number of AQMAs.
Greenhouse Gas impact	Option 8A L has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 8A L is 58.56km (31.62nm). When compared to the 'do nothing' scenario, Option 8A L is shorter and is therefore expected to emit less greenhouse gases and this option is deemed to be of benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 8A R has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 8A R is 59.78km (32.28nm). When compared to the 'do nothing' scenario, Option 8A R is longer and is therefore expected to emit more greenhouse gases and this option is deemed to be of dis-benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 9A L has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 9A L is 65.76km (35.51nm). When compared to the 'do nothing' scenario, Option 9A L is longer and is therefore expected to emit more greenhouse gases and this option is deemed to be of dis-benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.	Option 9A R has been designed to support continuous descent approach operations. An element of tactical radar vectoring may still be required to manage aircraft separation distances. The track mileage of Option 9A R is 66.97km (36.16nm). When compared to the 'do nothing' scenario, Option 9A R is longer and is therefore expected to emit more greenhouse gases and this option is deemed to be of dis-benefit. More in-depth analysis at Stage 3 is required to confirm the exact volumes of greenhouse gases released.
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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid 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 air or on the ground). The reduction of the reliance on outdated ground-based navigational aid will significantly increase operational resilience through the introduction of PBN.
Tranquillity	This option overflies no AONBs and one National Park. It is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no AONBs and one National Park. It is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no AONBs and one National Park. It is therefore comparable to the 'do nothing' scenario and assessed as neutral.	This option overflies no AONBs and one National Park. It is therefore comparable to the 'do nothing' scenario and assessed as neutral.
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 MAN 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 MAN 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 MAN 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 MAN will be assessed in Stage 3 of the ACP process by Subject Matter Experts.
Access	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.	No adverse impact to General Aviation access is anticipated 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 will be reviewed as part of Stage 3 activities.
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.
Fuel burn	Option 8A L supports continuous descent approaches, 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 58.56km (31.62nm)58.56km (31.62nm) long. When compared to the 'do nothing' scenario, Option 8A L is shorter and at this stage it is assumed that it will require a smaller amount of fuel burn, therefore, this option is deemed to be beneficial in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 8A R supports continuous descent approaches, 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 59.78km (32.28nm) long. When compared to the 'do nothing' scenario, Option 8A R is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 9A L supports continuous descent approaches, 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 65.76km (35.51nm) long. When compared to the 'do nothing' scenario, Option 9A L is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.	Option 9A R supports continuous descent approaches, 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 66.97km (36.16nm) long. When compared to the 'do nothing' scenario, Option 9A R is longer and at this stage it is assumed that it will require a larger amount of fuel burn, therefore, this option is deemed to be of dis-benefit in terms of fuel burn. More in-depth analysis will be carried out in Stage 3 to confirm.
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.
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 for MAN 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 for MAN 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 for MAN 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 for MAN to assess the 'other costs' to commercial airlines of flying PBN procedures.
Infrastructure costs	There are no expected additional infrastructure costs. All options relate to the implementation of PBN and no additional infrastructure is anticipated to be 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 anticipated to be 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 anticipated to be 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 anticipated to be required as the introduction of PBN reduces the reliance on ground infrastructure, in particular ground-based navigation aids are no longer needed.
Operational costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some operational costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Deployment costs	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.	ATC at MAN is contracted out to a third-party organisation. This existing commercial contract between MAN and their chosen ANSP is considered to be an ongoing cost. Some deployment costs are anticipated with respect to the implementation of new procedures and training of controllers; however, these cannot be identified at this stage of the ACP process.
Safety Assessment	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 3 and 4 of the CAP1616 process to confirm the exact nature of all hazards and mitigations.	The only hazard that was identified was a potential conflict with MAN proposed SIDs that could cause a possible loss of horizontal/vertical separation, causing an increase in ATCO workload. This hazard can be mitigated through the design process. Further assessment will be conducted at Stage 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: **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 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:** - Greenhouse gas emissions - Fuel burn **Better in the following areas:** - Noise impact at 7,000ft - Noise impact at 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. 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 at 7,000ft - Noise impact at 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. 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 at 7,000ft - Noise impact at 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. 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 8A L has been deemed the Acceptable option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 8A R has been deemed the Acceptable option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 9A L has been deemed the Preferred option within this design envelope.	Based on the IOA Shortlist Assessment methodology, Option 9A R has been deemed the Preferred option within this design envelope.
OPTION SHORTLIST CLASSIFICATION FOR STAGE 3	ACCEPTABLE	ACCEPTABLE	PREFERRED	PREFERRED