



Stage 2 Summary Document

Stage 2 Develop and Assess

Appendix A –
Design
Options
Evolution



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Design Options Evolution

1.1 Introduction

Tables 2 and 3 show the evolution of the design options through Stage 2 of the CAP1616 process. A Full Options Appraisal (FOA), in Stage 3, will consider the shortlist of design options identified from the work in Stage 2.

1.2 Design Options Report (DOR)

The first step in refining the comprehensive list of design options was the consideration of viability, as presented in the DOR. The DOR divided the design options into three categories, as shown in table 1 below. This process is explained in full in section 5.11 of the DOR and section 16 of the Stage 2 Summary Document.

Table 1 Viability Classification

Classification	Criteria	Outcome
Unviable	Would not comply with PANS-OPS design criteria or did not have a supporting safety justification for non-compliance.	Not progressed to DPE.
Viable but poor fit	Failed to meet the requirements of the three design principles with which all design options 'must' comply (Safety, Programme and Continuity).	Not progressed to full DPE, although a rationale and initial evaluation against the three 'must have' design principles is included in both the DOR and the DPE.
Viable and good fit	Expected to meet the three design principles with which all design options 'must' comply (Safety, Programme and Continuity).	Progressed to full DPE.

1.3 Design Principle Evaluation (DPE)

The DPE considered all Viable and Good Fit design options, to assess their alignment against the design principles. Those options that best aligned with the design principles were accepted and progressed to the Initial Options Appraisal (IOA). The acceptance/rejection process is described at section 4 of the DPE.

1.4 Initial Options Appraisal (IOA)

This IOA serves as the foundation for a fuller and more quantitative assessment later in the CAP1616 process. The IOA assessed the merits of the accepted DPE design options (including do minimum options) compared to a baseline do nothing scenario. For the IOA, required at Step 2B, high-level criteria were determined and a qualitative assessment or, if available and proportionate, quantitative analysis against each design option was conducted. The design options progressed to the IOA were tested against the criteria contained in CAP1616 (Appendix E, Table E2) and areas of tranquillity and biodiversity have been mapped for further assessment at Stage 3. To further support the evaluation of options, a quantitative element was introduced to the assessments of some measures. For further details see section 2 of the IOA.

Following the completion of the IOA assessment, each design option was annotated with a RAG (red, amber, green) status. The classification of options was based on the professional judgement of the assessor/change sponsor, considering each design option's overall performance against the defined criteria. The colouring of these options as Preferred, Favourable, Acceptable, Alternate and Rejected is explained in section 7 in the IOA. Design options categorised as Preferred, Favourable, Acceptable or Alternate form the shortlisted design options.

Table 2 – Departures

Runway 27 - East Departures					
Runway	Envelope	No.	Design Options Report	Design Principle Evaluation	Initial Options Appraisal
27	East	1	Viable and good fit	Rejected	-
27	East	2	Viable and good fit	Rejected	-
27	East	3	Viable and good fit	Rejected	-
27	East	4	Viable and good fit	Rejected	-
27	East	5	Viable and good fit	Rejected	-
27	East	6	Viable and good fit	Rejected	-
27	East	A7	Viable but poor fit	-	-
27	East	B8	Viable but poor fit	-	-

Runway 27 - North Departures					
Runway	Envelope	No.	Design Options Report	Design Principle Evaluation	Initial Options Appraisal
27	North	1	Viable and good fit	Accepted	Preferred
27	North	2	Viable and good fit	Accepted	Rejected
27	North	3	Viable and good fit	Accepted	Rejected
27	North	4	Viable and good fit	Accepted	Rejected
27	North	5	Viable and good fit	Accepted	Favourable
27	North	6	Viable and good fit	Accepted	Acceptable
27	North	7	Viable and good fit	Accepted	Rejected
27	North	8	Viable and good fit	Accepted	Rejected
27	North	A9	Viable but poor fit	-	-
27	North	B10	Viable but poor fit	-	-
27	North	C11	Viable but poor fit	-	-
27	North	D12	Viable but poor fit	-	-
27	North	E13	Viable but poor fit	-	-

Runway 27 - North West Departures					
Runway	Envelope	No.	Design Options Report	Design Principle Evaluation	Initial Options Appraisal
27	North West	1	Viable and good fit	Rejected	-
27	North West	1A	Viable and good fit	Rejected	-
27	North West	2	Viable and good fit	Rejected	-
27	North West	3	Viable and good fit	Rejected	-
27	North West	4	Viable and good fit	Rejected	-
27	North West	5	Viable and good fit	Rejected	-
27	North West	6	Viable and good fit	Rejected	-
27	North West	7	Viable and good fit	Rejected	-
27	North West	8	Viable and good fit	Rejected	-
27	North West	9	Viable and good fit	Rejected	-
27	North West	10	Viable and good fit	Accepted	Favourable
27	North West	11	Viable and good fit	Accepted	Acceptable

Runway	Envelope	No.	Design Options Report	Design Principle Evaluation	Initial Options Appraisal
27	North West	12	Viable and good fit	Rejected	-
27	North West	13	Viable and good fit	Accepted	Rejected
27	North West	14	Viable and good fit	Accepted	Rejected
27	North West	15	Viable and good fit	Accepted	Preferred
27	North West	A16	Viable but poor fit	-	-
27	North West	B17	Viable but poor fit	-	-
27	North West	C18	Viable but poor fit	-	-

Runway 27 - South Departures

Runway	Envelope	No.	Design Options Report	Design Principle Evaluation	Initial Options Appraisal
27	South	1	Viable and good fit	Accepted	Rejected
27	South	1A	Viable and good fit	Accepted	Rejected
27	South	2	Viable and good fit	Accepted	Rejected
27	South	3	Viable and good fit	Rejected	-
27	South	4	Viable and good fit	Accepted	Preferred
27	South	5	Viable and good fit	Accepted	Rejected
27	South	6	Viable and good fit	Accepted	Rejected
27	South	7	Viable and good fit	Accepted	Acceptable
27	South	8	Viable and good fit	Accepted	Rejected
27	South	9	Viable and good fit	Accepted	Rejected
27	South	10	Viable and good fit	Accepted	Favourable
27	South	11	Viable and good fit	Accepted	Rejected
27	South	A12	Viable but poor fit	-	-
27	South	B13	Viable but poor fit	-	-
27	South	C14	Viable but poor fit	-	-
27	South	D15	Viable but poor fit	-	-

Runway 27 - South East Departures

Runway	Envelope	No.	Design Options Report	Design Principle Evaluation	Initial Options Appraisal
27	South East	1	Viable and good fit	Rejected	-
27	South East	2	Viable and good fit	Accepted	Rejected
27	South East	3	Viable and good fit	Rejected	-
27	South East	4	Viable and good fit	Accepted	Acceptable
27	South East	5	Viable and good fit	Accepted	Favourable
27	South East	6	Viable and good fit	Rejected	-
27	South East	7	Viable and good fit	Accepted	Preferred
27	South East	12	Viable and good fit	Rejected	-
27	South East	13	Viable and good fit	Rejected	-
27	South East	14	Viable and good fit	Rejected	-
27	South East	15	Viable and good fit	Accepted	Favourable
27	South East	16	Viable and good fit	Accepted	Preferred
27	South East	17	Viable and good fit	Rejected	-
27	South East	18	Viable and good fit	Accepted	Acceptable
27	South East	A8	Viable but poor fit	-	-

Runway	Envelope	No.	Design Options Report	Design Principle Evaluation	Initial Options Appraisal
27	South East	B9	Viable but poor fit	-	-
27	South East	C10	Viable but poor fit	-	-
27	South East	D11	Viable but poor fit	-	-

Runway 27 - South West Departures

Runway	Envelope	No.	Design Options Report	Design Principle Evaluation	Initial Options Appraisal
27	South West	1	Viable and good fit	Rejected	-
27	South West	2	Viable and good fit	Rejected	-
27	South West	3	Viable and good fit	Rejected	-
27	South West	4	Viable and good fit	Accepted	Preferred
27	South West	5	Viable and good fit	Rejected	-
27	South West	6	Viable and good fit	Rejected	-
27	South West	7	Viable and good fit	Rejected	-
27	South West	9	Viable and good fit	Accepted	Favourable
27	South West	A8	Viable but poor fit	-	-
27	South West	B10	Viable but poor fit	-	-
27	South West	C11	Viable but poor fit	-	-

Runway 27 - West Departures

Runway	Envelope	No.	Design Options Report	Design Principle Evaluation	Initial Options Appraisal
27	West	1	Viable and good fit	Rejected	-
27	West	2	Viable and good fit	Rejected	-
27	West	3	Viable and good fit	Accepted	Rejected
27	West	4	Viable and good fit	Accepted	Favourable
27	West	5	Viable and good fit	Accepted	Preferred
27	West	6	Viable and good fit	Accepted	Acceptable
27	West	A7	Viable but poor fit	-	-
27	West	B8	Viable but poor fit	-	-
27	West	C9	Viable but poor fit	-	-
27	West	D10	Viable but poor fit	-	-

Runway 09 - East Departures

Runway	Envelope	No.	Design Options Report	Design Principle Evaluation	Initial Options Appraisal
09	East	1	Viable and good fit	Accepted	Rejected
09	East	2	Viable and good fit	Rejected	-
09	East	3	Viable and good fit	Accepted	Acceptable
09	East	4	Viable and good fit	Accepted	Favourable
09	East	5	Viable and good fit	Accepted	Preferred
09	East	A6	Viable but poor fit	-	-
09	East	B7	Viable but poor fit	-	-
09	East	C8	Viable but poor fit	-	-
09	East	D9	Viable but poor fit	-	-

Runway	Envelope	No.	Design Options Report	Design Principle Evaluation	Initial Options Appraisal
09	East	E10	Viable but poor fit	-	-
09	East	F10	Viable but poor fit	-	-

Runway 09 - North Departures

Runway	Envelope	No.	Design Options Report	Design Principle Evaluation	Initial Options Appraisal
09	North	1	Viable and good fit	Accepted	Rejected
09	North	1A	Viable and good fit	Accepted	Favourable
09	North	2	Viable and good fit	Accepted	Rejected
09	North	3	Viable and good fit	Accepted	Rejected
09	North	4	Viable and good fit	Accepted	Preferred
09	North	5	Viable and good fit	Accepted	Acceptable
09	North	6	Viable and good fit	Accepted	Rejected
09	North	A7	Viable but poor fit	-	-
09	North	B8	Viable but poor fit	-	-
09	North	C9	Viable but poor fit	-	-
09	North	D10	Viable but poor fit	-	-
09	North	E11	Viable but poor fit	-	-

Runway 09 - North West Departures

Runway	Envelope	No.	Design Options Report	Design Principle Evaluation	Initial Options Appraisal
09	North West	1A	Viable and good fit	Accepted	Rejected
09	North West	2	Viable and good fit	Accepted	Preferred
09	North West	3	Viable and good fit	Accepted	Rejected
09	North West	4	Viable and good fit	Accepted	Rejected
09	North West	5	Viable and good fit	Accepted	Acceptable
09	North West	6	Viable and good fit	Accepted	Rejected
09	North West	7	Viable and good fit	Rejected	-
09	North West	8	Viable and good fit	Accepted	Rejected
09	North West	9	Viable and good fit	Accepted	Favourable
09	North West	10	Viable and good fit	Accepted	Rejected
09	North West	11	Viable and good fit	Rejected	-
09	North West	A12	Viable but poor fit	-	-
09	North West	B13	Viable but poor fit	-	-
09	North West	C14	Viable but poor fit	-	-

Runway 09 - South Departures

Runway	Envelope	No.	Design Options Report	Design Principle Evaluation	Initial Options Appraisal
09	South	1	Viable and good fit	Accepted	Acceptable
09	South	1A	Viable and good fit	Accepted	Rejected
09	South	2	Viable and good fit	Rejected	-
09	South	3	Viable and good fit	Accepted	Rejected
09	South	4	Viable and good fit	Rejected	-

Runway	Envelope	No.	Design Options Report	Design Principle Evaluation	Initial Options Appraisal
09	South	5	Viable and good fit	Rejected	-
09	South	6	Viable and good fit	Accepted	Preferred
09	South	7	Viable and good fit	Rejected	-
09	South	8	Viable and good fit	Accepted	Favourable
09	South	9	Viable and good fit	Rejected	-
09	South	10	Viable and good fit	Accepted	Rejected
09	South	11	Viable and good fit	Rejected	-
09	South	12	Viable and good fit	Rejected	-
09	South	13	Viable and good fit	Accepted	Rejected
09	South	14	Viable and good fit	Accepted	Rejected
09	South	15	Viable and good fit	Rejected	-
09	South	16	Viable and good fit	Accepted	Rejected
09	South	17	Viable and good fit	Rejected	-
09	South	A18	Viable but poor fit	-	-
09	South	B19	Viable but poor fit	-	-
09	South	C20	Viable but poor fit	-	-
09	South	D21	Viable but poor fit	-	-

Runway 09 - West Departures

Runway	Envelope	No.	Design Options Report	Design Principle Evaluation	Initial Options Appraisal
09	West	1	Viable and good fit	Accepted	Rejected
09	West	2	Viable and good fit	Accepted	Favourable
09	West	3	Viable and good fit	Accepted	Rejected
09	West	4	Viable and good fit	Rejected	-
09	West	5	Viable and good fit	Accepted	Rejected
09	West	6	Viable and good fit	Accepted	Acceptable
09	West	7	Viable and good fit	Accepted	Preferred
09	West	A8	Viable but poor fit	-	-
09	West	B9	Viable but poor fit	-	-
09	West	C10	Viable but poor fit	-	-

Table 3 – Arrivals

Runway 27 - North - Arrival Transitions					
Runway	Envelope	No.	Design Options Report	Design Principle Evaluation	Initial Options Appraisal
27	North	01	Viable and good fit	Accepted	Preferred
27	North	02	Viable and good fit	Accepted	Rejected
27	North	03	Viable and good fit	Accepted	Favourable
27	North	04	Viable and good fit	Accepted	Acceptable
27	North	05	Viable and good fit	Accepted	Rejected
27	North	06	Viable and good fit	Accepted	Rejected
27	North	07	Viable and good fit	Accepted	Favourable
27	North	08	Viable and good fit	Accepted	Preferred
27	North	09	Viable and good fit	Accepted	Favourable
27	North	10	Viable and good fit	Accepted	Rejected
27	North	11	Viable and good fit	Accepted	Favourable
27	North	12	Viable and good fit	Accepted	Preferred
27	North	13	Viable and good fit	Accepted	Acceptable
27	North	14	Viable and good fit	Accepted	Rejected
27	North	15	Viable and good fit	Accepted	Favourable
27	North	16	Viable and good fit	Accepted	Rejected
27	North	17	Viable and good fit	Accepted	Acceptable
27	North	18	Viable and good fit	Accepted	Rejected
27	North	19	Viable and good fit	Accepted	Favourable
27	North	20	Viable and good fit	Accepted	Preferred
27	North	21	Viable and good fit	Accepted	Preferred
27	North	22	Viable and good fit	Accepted	Favourable
27	North	23	Viable and good fit	Accepted	Rejected
27	North	24	Viable and good fit	Accepted	Acceptable
27	North	25	Viable and good fit	Accepted	Preferred
27	North	26	Viable and good fit	Accepted	Acceptable
27	North	27	Viable and good fit	Accepted	Acceptable
27	North	28	Viable and good fit	Accepted	Preferred
27	North	29	Viable and good fit	Accepted	Rejected
27	North	30	Viable and good fit	Accepted	Acceptable

Runway 27 - South - Arrival Transitions					
Runway	Envelope	No.	Design Options Report	Design Principle Evaluation	Initial Options Appraisal
27	South	01	Viable and good fit	Accepted	Favourable
27	South	02	Viable and good fit	Accepted	Preferred
27	South	03	Viable and good fit	Rejected	-
27	South	04	Viable and good fit	Accepted	Acceptable
27	South	05	Viable and good fit	Accepted	Acceptable
27	South	06	Viable and good fit	Accepted	Favourable
27	South	07	Viable and good fit	Accepted	Rejected
27	South	08	Viable and good fit	Accepted	Rejected
27	South	09	Viable and good fit	Accepted	Rejected

Runway	Envelope	No.	Design Options Report	Design Principle Evaluation	Initial Options Appraisal
27	South	10	Viable and good fit	Rejected	-
27	South	11	Viable and good fit	Accepted	Rejected
27	South	12	Viable and good fit	Accepted	Preferred
27	South	13	Viable and good fit	Accepted	Acceptable
27	South	14	Viable and good fit	Accepted	Preferred
27	South	15	Viable and good fit	Accepted	Acceptable
27	South	16	Viable and good fit	Accepted	Favourable
27	South	19	Viable and good fit	Accepted	Rejected
27	South	20	Viable and good fit	Accepted	Preferred
27	South	21	Viable and good fit	Accepted	Rejected
27	South	22	Viable and good fit	Accepted	Favourable
27	South	23	Viable and good fit	Accepted	Rejected
27	South	24	Viable and good fit	Accepted	Alternate
27	South	A17	Viable but poor fit	-	-
27	South	B18	Viable but poor fit	-	-

Runway 09 - North - Arrival Transitions

Runway	Envelope	No.	Design Options Report	Design Principle Evaluation	Initial Options Appraisal
09	North	01	Viable and good fit	Accepted	Preferred
09	North	02	Viable and good fit	Accepted	Acceptable
09	North	03	Viable and good fit	Accepted	Rejected
09	North	04	Viable and good fit	Accepted	Alternate
09	North	4A	Viable and good fit	Accepted	Favourable
09	North	05	Viable and good fit	Accepted	Rejected
09	North	06	Viable and good fit	Accepted	Rejected
09	North	07	Viable and good fit	Accepted	Preferred
09	North	08	Viable and good fit	Accepted	Acceptable
09	North	8A	Viable and good fit	Accepted	Favourable
09	North	09	Viable and good fit	Accepted	Preferred
09	North	10	Viable and good fit	Accepted	Acceptable
09	North	10A	Viable and good fit	Accepted	Favourable
09	North	11	Viable and good fit	Accepted	Preferred
09	North	12	Viable and good fit	Accepted	Acceptable
09	North	12A	Viable and good fit	Accepted	Favourable
09	North	13	Viable and good fit	Accepted	Rejected
09	North	14	Viable and good fit	Accepted	Alternate
09	North	15	Viable and good fit	Accepted	Preferred
09	North	16	Viable and good fit	Accepted	Favourable
09	North	17	Viable and good fit	Accepted	Favourable
09	North	18	Viable and good fit	Accepted	Rejected
09	North	19	Viable and good fit	Accepted	Preferred
09	North	20	Viable and good fit	Accepted	Rejected
09	North	20A	Viable and good fit	Accepted	Acceptable
09	North	21	Viable and good fit	Accepted	Preferred
09	North	22	Viable and good fit	Accepted	Acceptable

Runway	Envelope	No.	Design Options Report	Design Principle Evaluation	Initial Options Appraisal
09	North	22A	Viable and good fit	Accepted	Favourable
09	North	23	Viable and good fit	Accepted	Rejected
09	North	24	Viable and good fit	Accepted	Alternate
09	North	25	Viable and good fit	Accepted	Rejected
09	North	26	Viable and good fit	Accepted	Alternate
09	North	27	Viable and good fit	Accepted	Rejected
09	North	28	Viable and good fit	Accepted	Acceptable
09	North	29	Viable and good fit	Accepted	Rejected
09	North	30	Viable and good fit	Accepted	Alternate

Runway 09 - South - Arrival Transitions

Runway	Envelope	No.	Design Options Report	Design Principle Evaluation	Initial Options Appraisal
09	South	01	Viable and good fit	Accepted	Preferred
09	South	02	Viable and good fit	Accepted	Acceptable
09	South	03	Viable and good fit	Accepted	Rejected
09	South	04	Viable and good fit	Accepted	Rejected
09	South	05	Viable and good fit	Accepted	Preferred
09	South	06	Viable and good fit	Accepted	Favourable
09	South	07	Viable and good fit	Accepted	Alternate
09	South	08	Viable and good fit	Accepted	Rejected
09	South	09	Viable and good fit	Accepted	Rejected
09	South	10	Viable and good fit	Accepted	Rejected
09	South	11	Viable and good fit	Accepted	Acceptable
09	South	12	Viable and good fit	Accepted	Rejected
09	South	13	Viable and good fit	Accepted	Preferred
09	South	14	Viable and good fit	Accepted	Favourable
09	South	15	Viable and good fit	Accepted	Preferred
09	South	16	Viable and good fit	Accepted	Favourable
09	South	17	Viable and good fit	Rejected	-
09	South	18	Viable and good fit	Accepted	Favourable
09	South	21	Viable and good fit	Accepted	Acceptable
09	South	22	Viable and good fit	Accepted	Rejected
09	South	23	Viable and good fit	Accepted	Acceptable
09	South	24	Viable and good fit	Accepted	Rejected
09	South	A19	Viable but poor fit	-	-
09	South	B20	Viable but poor fit	-	-