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**5.01 ENVIRONMENTAL STATEMENT CHAPTER 3: ALTERNATIVES
AND DESIGN EVOLUTION**

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3 ALTERNATIVES AND DESIGN EVOLUTION

3.1 Introduction

3.1.1 Regulation 14(2)(d) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 ('the EIA Regulations') requires an Environmental Statement (ES) submitted with an application for development consent to contain:

“a description of the reasonable alternatives studied by the applicant, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment” (Ref. 3.1)

3.1.2 Schedule 4 of the EIA Regulations goes on to state that an ES must include *“a description of reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.”* (Ref. 3.2).

3.1.3 In line with the requirements of the EIA Regulations, this chapter sets out the reasonable alternatives considered by Luton Rising (a trading name of London Luton Airport Limited) (hereafter referred to as the Applicant) as part of the process in establishing the Proposed Development. It describes how the preferred option was selected over alternatives and what considerations were taken into account during the design evolution, including environmental or other issues raised.

3.1.4 In December 2017, the Applicant publicly launched its 'Vision for Sustainable Growth 2020-2050' for the airport (Ref. 3.3). Since then, the principles for the Proposed Development have been developed through an iterative process. Initially, an examination of strategic alternatives, was undertaken to identify a preferred strategic option. This used a process referred to as 'sifting' and was informed by Non-Statutory Consultation held in 2018. Subsequently, outline design development was undertaken, including optioneering of key aspects of the design, to define a single preferred option for presentation at Statutory Consultation in 2019.

3.1.5 Following the 2019 Statutory Consultation, the design principles of the Proposed Development were reviewed to reflect feedback received from the 2019 Statutory Consultation, growing focus on the climate emergency, impacts of COVID-19 and to confirm the affordability of the Proposed Development. Updated proposals were presented during an additional Statutory Consultation exercise in 2022. Since then, the Proposed Development has undergone some further refinement to take into account feedback from the 2022 Statutory Consultation and as a result of further design development.

3.1.6 **Inset 3.1** provides an overview of the process of scheme development from the Vision document in 2017 to the submission of the application for development consent. A description of each of the stages of design evolution is presented within this chapter. A description of the current proposals for the Proposed Development is provided within **Chapter 4** The Proposed Development of this ES [TR020001/APP/5.01].

Inset 3.1: Design evolution timeline

Year	2017		2018		2019		2020	2021	2022		2023
Design Evolution	LLAL Vision	Sift 1	Sift 2		Sift 3 Design Evolution		Design Evolution Back-check of sifts			Design Evolution	DCO Submission
Consultation				Non-Statutory Consultation		Statutory Consultation			Statutory Consultation		

3.1.7 Throughout scheme development, the design has been informed by the EIA process. In the preparation of this ES, full consideration has been given to the reasonable alternatives studied (in terms of engineering design, including technology, location, size and scale). Details of the reasoning behind the preferred option for the Proposed Development, taking into account environmental, social and economic effects, are described within this chapter.

3.1.8 The remainder of this chapter provides:

- a. an overview of the strategic alternatives considered, using the sifting process, including the main reasons for selecting the chosen strategic option and a comparison of the environmental effects of the main alternatives studied;
- b. a summary of design evolution leading up to the 2019 Statutory Consultation;
- c. a summary of design evolution leading up to the 2022 Statutory Consultation; and
- d. a summary of the design evolution leading up to the submission of the application for development consent.

3.2 Strategic alternatives

Overview

3.2.1 This section provides a summary of why a ‘no development’ option was ruled out and how strategic alternatives were considered through a sifting process (described below). The strategic alternatives comprised masterplan options that explored key principles around scale, location and existing constraints and opportunities. A summary of how feedback from the 2018 Non-Statutory Consultation informed the selection of the preferred strategic option is also provided.

No Development

3.2.2 International connectivity, underpinned by strong airports and airlines, is important to the success of the UK economy. It facilitates trade in goods and services, enables the movement of workers and tourists, and drives business innovation and investment.

3.2.3 The 2013 Aviation Policy Framework (Ref. 3.4) sets out the Government’s policy to allow the aviation sector to continue to make a significant contribution to economic growth across the country. The 2018 Airports National Policy Statement (ANPS) (Ref. 3.5) established the need for new airport capacity in the south east. Whilst the ANPS specifically relates to the provision of a new runway at Heathrow, the findings on the need for new airport capacity in the

south east are also relevant to London Luton Airport (refer to paragraphs 1.12 and 1.41 of the ANPS).

- 3.2.4 In June 2018, alongside the publication of the ANPS, the Government published a policy statement, entitled *'Beyond the Horizon. The future of UK Aviation: Making best use of existing runways'* (Ref. 3.6), giving policy support for all airports to make best use of their existing runways. Government's intention for the use of the aviation sector as a vehicle for growth for the UK economy was also reaffirmed in *'Aviation 2050'*, the consultation on a future aviation strategy in December 2018 (Ref. 3.7). The draft strategy supports regional growth and connectivity and states that: *"Airports are vital hubs for local economies, providing connectivity, employment, and a hub for local transport schemes"*.
- 3.2.5 In May 2022, the Government published *'Flightpath to the Future'* (Ref. 3.8), its strategy for recovery of the aviation sector, which confirmed the importance of aviation to economic recovery and growth and specifically made clear that the relevant planning policies relating to the development of airports are those contained in *'Beyond the Horizon. The future of UK Aviation: Making best use of existing runways'* (Ref. 3.6) and the ANPS (Ref. 3.5).
- 3.2.6 In July 2022, the Government published its *'Jet zero strategy: delivering net zero aviation by 2050'* (Ref. 3.9) which aims to decarbonise the aviation sector in a way that preserves the benefits of air travel and delivers clean growth of the UK sector by maximising the opportunities that decarbonisation can bring. Jet Zero also confirms that the Government's existing planning policy framework for airport development comprises the ANPS (Ref. 3.5) and *'Beyond the Horizon. The future of UK Aviation: Making best use of existing runways'* (Ref. 3.6), and that these documents have full effect for proposed airport development.
- 3.2.7 The documents referenced above are driven by forecasts of rising demand in air travel, the need for an integrated approach to the sector, and the departure of the UK from the European Union. The COVID-19 pandemic has had a major impact on the aviation industry. However, with recovery from the pandemic, the need for increased capacity in the south east remains (refer to the **Need Case** document [TR020001/APP/7.04] for further information).
- 3.2.8 Set against this context for growth, London Luton Airport has the potential to become the airport of choice for the north of London and the south east Midlands and, consequently, to bring greater benefits to the local, regional and national economy. In order to do this, the airport needs to be able to expand its landside and airside infrastructure to take greater advantage of the available capacity offered by its existing single runway. There is a clear need to plan for the airport's long-term future to ensure that the local and regional economy can benefit from this expected growth and it is the Applicant's responsibility to deliver this to the best of its ability.
- 3.2.9 As a result, a 'No Development' option has been discounted from the sifting process on the basis that it does not deliver the Applicant's aspirations to 'make best use' of the existing runway at London Luton Airport consistent with Government policy and does not allow for the airport to perform its role in bringing the economic benefits to the local and regional economy. Further information on the need for the Proposed Development is set out within the **Need Case** document [TR020001/APP/7.04].

Sift process

- 3.2.10 The Applicant published its 'Vision for Sustainable Growth 2020-2050' for the airport in December 2017 (Ref. 3.3). In its Vision, the Applicant identified the potential for the airport to handle up to 36-38 million passengers per annum (mppa) from the airport's single runway over the longer term. The Vision also set out the following key principles to guide any plans for future expansion:
- a. to make best use of the existing runway;
 - b. to maximise benefits to the local and sub-regional economy;
 - c. to deliver good levels of service to customers;
 - d. to minimise and mitigate environmental impacts in line with commitments to responsible and sustainable development; and
 - e. to support Luton Borough Council (LBC) in the delivery of the Luton Investment Framework (Ref. 3.10).
- 3.2.11 A number of strategic options to increase the capacity of the airport were subsequently developed and considered through a sift process. This process comprised three stages:
- a. Sift 1 – the purpose of the first sift was to undertake an initial appraisal of a long list of options to produce a short list of preferred options to recommend to the Applicant's Board. Options were considered against a set of high level, qualitative criteria and either recommended for further consideration and design development or discontinued to avoid abortive work;
 - b. Sift 2 – the purpose of the second sift was to appraise the options which remained under consideration after Sift 1. These options had the benefit of further research and understanding and some initial design development to inform the decision process, with some additional design and environmental information available for each option. The four reasonable alternatives that performed most strongly against the sift criteria after Sift 2 were presented at Non-Statutory Consultation during the summer of 2018; and
 - c. Sift 3 – following Non-Statutory Consultation and consideration of technical stakeholder and community feedback, a third round of the sift process was undertaken to identify the preferred option to take forward through the design development and EIA process.
- 3.2.12 A description of the Sift 1, 2 and 3 outcomes is provided within the **Design and Access Statement [TR020001/APP/7.03]**. A summary of the sift process and its key findings at each stage are also provided below.

Sift 1

- 3.2.13 Sift 1 was undertaken in Autumn 2017 and appraised seven scheme options, using a set of qualitative criteria based on the Vision and key strategic objectives for the project (refer to **Table 3.1**).
- 3.2.14 The options considered at Sift 1 included:
- a. Option 1 – new terminal and apron capacity to the north of the existing runway, either:

- i. Option 1a – a double terminal solution with a new terminal built on the long stay car park and part of Wigmore Valley Park with associated aprons to provide the required increase in capacity, resulting in the airport operating with two distinct terminals;
 - ii. Option 1b – a single terminal complex located on the west of the site, with the first phase built as a free-standing second terminal on the long stay car park land and part of Wigmore Valley Park, and with the existing terminal complex being incorporated/replaced to form a single new terminal complex in the longer term; or
 - iii. Option 1c – a single terminal complex located on the east of the site, with the first phase built as a free-standing second terminal on the existing Wigmore Valley Park, and with the existing terminal complex being replaced by a single new terminal complex in the longer term.
- b. Option 2 – new terminal, taxiways, aprons, stands, car parks and access capacity to the south of the existing runway.
- c. Option 3 – new terminal development with runway changes, either:
- i. Option 3a – realigning the runway, e.g. tilting its alignment towards the north-east / south-west;
 - ii. Option 3b – extending the existing runway eastwards, resulting in a longer single runway than at present; or
 - iii. Option 3c – adding a new second runway to the south of the existing runway.

3.2.15 Schematics of the options listed above are provided in **Inset 3.2**.

3.2.16 A scoring exercise of the above options was undertaken through a series of workshops with all of the project team's technical disciplines represented. The options were appraised against a set of strategic objectives, covering the following topics:

- a. Strategic Fit;
- b. Economic;
- c. Social;
- d. Sustainability and Environment;
- e. Surface Access;
- f. Deliverability;
- g. Operational Viability; and
- h. Cost.

3.2.17 These objectives were directly related to headings identified in the Airports Commission Appraisal Framework (Ref. 3.11) and guidance document (Ref. 3.12) on sift criteria. Whilst it was acknowledged that the Airports Commission guidance was developed specifically to allow comparison of three shortlisted options at Heathrow and Gatwick, the objectives were considered a relevant and appropriate starting point for the assessment of reasonable alternatives for the airport. The objectives were adapted to recognise Luton's local context and applied as a broad framework for the sift process for the airport, ensuring that all the relevant topic areas were considered. For this purpose, the strategic

objectives were regrouped and re-ordered from the Airports Commission guidance Phase 1 sift criteria headings and Phase 2 appraisal modules (Ref. 3.12), in order to reflect the priorities of the Applicant as an organisation.

- 3.2.18 Options were qualitatively appraised by technical specialists using professional judgement by applying a seven-level scale of impact, adapted from the Department for Transport's Transport Analysis Guidance (WebTAG) (Ref. 3.13). These ranged from large, moderate, or slight beneficial through neutral to slight, moderate, or large adverse.
- 3.2.19 A summary of the strategic objectives, sub-criteria and appraisal outcomes is provided within **Table 3.1**.
- 3.2.20 In summary, all options were identified as having potential for beneficial impacts on economic and social sub-criteria, ranging from slight to large beneficial.
- 3.2.21 Across environmental sub-criteria, all options were identified as having the potential for adverse impacts, ranging from slight adverse to large adverse. No one option was identified that performed materially better than all the others in overall environmental terms. Option 3a performed the worst across the environmental sub-criteria, however, all other options received an equal rating in terms of the number and scale of adverse effects against the environment sub-criteria.
- 3.2.22 For landscape and carbon emissions sub-criteria, all options performed equally (large adverse) due to the scale of development outside the existing airfield and the increase in aircraft movements.
- 3.2.23 Options making use of the existing runway with terminals to the north of the runway (Options 1a, 1b and 1c, also referred to as the 'northern family of options') require expansion in proximity to existing communities in Luton. These options were ranked lower in terms of impacts on noise and air quality, and the loss of the Wigmore Park County Wildlife Site.
- 3.2.24 Option 2, comprising expansion to the south of the existing runway, performed better in terms of impacts on air quality, biodiversity and the local transport network, compared to the northern family of options. However, Option 2 would result in greater adverse effects on historic environment, due to a direct impact on the Someries Castle Scheduled Monument, and would require development in Green Belt, and compulsory acquisition of third party land.
- 3.2.25 Options 3a, 3b and 3c may have offered an opportunity for the amendment of flight paths and approaches, and perceived improvements to the community due to fewer direct impacts to local residents or the Wigmore Park County Wildlife Site. However, these potential opportunities did not outweigh the low scores received as a result of the policy presumption against inappropriate development in the Green Belt and in terms of the objective to-make best use of existing runways. All three options would have required development in the Green Belt and either realignment, extension or the provision of an entirely new runway. Options 3a, 3b and 3c also performed worse in terms of impacts on cultural heritage and climate change resilience, compared to Options 1a, 1b and 1c.
- 3.2.26 Overall, Options 1a, 1b and 1c and Option 2 performed well in terms of supporting emerging Government policy for maximising the use of existing runways, increasing airport capacity and delivering economic and social

benefits, with Options 1a and 1c performing best overall. On this basis, Options 1a, 1b, 1c and Option 2 were taken forward for further consideration at Sift 2. Options 3a, 3b and 3c were discontinued because they scored poorly in terms of compliance with planning policy and the objective to make best use of existing runways. These options also performed poorly on financial and technical viability as each entailed significant additional cost, buildability or operational challenges.

3.2.27 For further information on the Sift 1 appraisal, refer to the **Design and Access Statement [TR020001/APP/7.03]**.

Inset 3.2: Options tested in Sift 1



Table 3.1: Summary of Sift 1 results

Topic	Strategic Objective	Sift criterion	Option 1a	Option 1b	Option 1c	Option 2	Option 3a	Option 3b	Option 3c
Strategic Fit	O1: To make best use of the existing runway	S1: Consistent with, and supportive of emerging Government policy and wider objectives	Large beneficial	Large beneficial	Large beneficial	Large beneficial	Moderate adverse	Moderate adverse	Large adverse
	O2: To identify a scheme that is likely to be capable of being consented and secured through a DCO	S2: Consistent with national town planning policies	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate adverse	Moderate adverse	Moderate adverse	Large adverse
	O3: To provide additional capacity and connectivity in line with the assessment of need	S3: Increase capacity both airside and landside	Large beneficial	Large beneficial	Large beneficial	Large beneficial	Large beneficial	Large beneficial	Slight beneficial
Economic	O4: To maximise the potential economic benefits to the regional, sub-	S4 increase economic opportunities for the regional and	Large beneficial	Large beneficial	Large beneficial	Large beneficial	Large beneficial	Large beneficial	Moderate beneficial

Topic	Strategic Objective	Sift criterion	Option 1a	Option 1b	Option 1c	Option 2	Option 3a	Option 3b	Option 3c
	regional and local economies.	sub-regional economies							
		S5 Increase job opportunities for the local economy and surrounding area	Large beneficial	Large beneficial	Large beneficial	Large beneficial	Large beneficial	Large beneficial	Large beneficial
Social	O5: To maintain and where possible improve the quality of life for Luton's residents and the wider population	S6 Promote quality of life and minimise adverse impacts on communities	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Moderate beneficial	Slight beneficial	Slight beneficial
Environment	O6: To minimise environmental impacts and, where practicable, to actively mitigate and manage any potential environmental effects	S7 Noise impact	Large adverse	Large adverse	Large adverse	Large adverse	Moderate adverse	Large adverse	Large adverse
		S8 Air quality	Moderate adverse	Moderate adverse	Moderate adverse	Slight adverse	Slight adverse	Slight adverse	Slight adverse
		S9 Natural habitats and biodiversity	Moderate adverse	Moderate adverse	Moderate adverse	Slight adverse	Moderate adverse	Slight adverse	Slight adverse
		S10 Carbon emissions	Large adverse	Large adverse	Large adverse	Large adverse	Large adverse	Large adverse	Large adverse
		S11 Surface, groundwater and landfill	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Large adverse	Moderate adverse	Moderate adverse
		S12 Flood risk	Moderate adverse	Moderate adverse	Moderate adverse	Slight adverse	Slight adverse	Slight adverse	Slight adverse

Topic	Strategic Objective	Sift criterion	Option 1a	Option 1b	Option 1c	Option 2	Option 3a	Option 3b	Option 3c
		S13 Cultural heritage	Slight adverse	Slight adverse	Slight adverse	Large adverse	Large adverse	Large adverse	Large adverse
		S14 Landscape and visual	Large adverse	Large adverse	Large adverse	Large adverse	Large adverse	Large adverse	Large adverse
		S15 Climate change resilience	Slight adverse	Slight adverse	Slight adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse
Surface Access	O7: To maximise the number of passengers and workforce arriving at the airport on public transport	S16: Public transport modal share	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial
	O8: To minimise new build highway requirements	S17: Requirement for additional highway infrastructure	Slight adverse	Large adverse	Large adverse	Large adverse	Large adverse	Large adverse	Large adverse
	O9: To minimise impact on the wider highway network	S18: Impact on wider highway network	Large adverse	Large adverse	Large adverse	Moderate adverse	Large adverse	Large adverse	Moderate adverse
Deliverability	O10: To be technically viable, taking account of the needs of airport users, operators and phasing	S19: Technically viable	Neutral	Large adverse	Neutral	Neutral	Large adverse	Large adverse	Large adverse
		S20: Land	Neutral	Neutral	Neutral	Moderate adverse	Large adverse	Moderate adverse	Large adverse

Topic	Strategic Objective	Sift criterion	Option 1a	Option 1b	Option 1c	Option 2	Option 3a	Option 3b	Option 3c
Operational Viability	O11: To enhance the airport's system efficiency and resilience	S21: Provide appropriate levels of service	Neutral	Large adverse	Neutral	Moderate adverse	Large adverse	Slight adverse	Large beneficial
Cost	O12: To be affordable including any public expenditure that may be required and taking account of the needs of airport users and operators (Value for Money)	S22: Estimated cost	Slight adverse	Slight adverse	Slight adverse	Moderate adverse	Large adverse	Moderate adverse	Large adverse

Sift 2

- 3.2.28 For Sift 2, a more detailed appraisal of the four options taken forward from Sift 1 was undertaken based on a refined set of sub-criteria and further technical information generated as the project progressed (refer to **Table 3.2**). The four options taken forward from Sift 1 and appraised in Sift 2 were:
- a. Option 1a – two terminals to the north of the runway;
 - b. Option 1b – a single terminal to the north of the runway, located to the west of the site;
 - c. Option 1c – a single terminal to the north of the runway, located to the east of the site; and
 - d. Option 2 – second terminal to the south of the runway.
- 3.2.29 These options are shown in **Inset 3.3**.
- 3.2.30 The scoring criteria were modified from Sift 2 onwards to include an eighth level on the scoring scale, reflecting a situation where the potential impact of an option on a criterion was considered to be greater than 'Large Adverse', and where that impact could not be mitigated or worked around given current constraints. Such an outcome was recorded as 'Currently Unworkable'.
- 3.2.31 A series of workshops were undertaken with all technical disciplines represented to establish scoring for the four options. **Table 3.2** presents a summary of the scoring. The following overall conclusions were established:
- a. **Strategic Fit** (criteria S1-S3) - All of the options were capable of providing beneficial impacts to a greater or lesser degree, with the exception of Option 2 which was considered 'Currently Unworkable' as it was highly unlikely to be capable of securing the consents required. This was due to the entirety of land required to deliver all buildings and infrastructure being designated as Green Belt. The National Planning Policy Framework (NPPF) (Ref. 3.14) requires 'very special circumstances' for development to take place in the Green Belt. As long as other options with a lesser impact on Green Belt remain viable, this option was considered unlikely to meet that test. Both single terminal options, 1b and 1c, scored less well in terms of delivering the additional capacity and connectivity than the two terminal options, 1a and 2, due to the increased ability of the two terminal options to phase development in line with demand and the potential operational disruption of reconfiguring a single terminal.
 - b. **Economic** (criteria S4 and S5) – All of the options were considered capable of delivering benefits nationally and regionally (to both users and airlines) and locally in terms of increased job opportunities. The single terminal options, 1b and 1c, were likely to have less beneficial impacts than the two terminal options, due to their comparative disruption to the existing terminal operations.
 - c. **Social** (criterion S6) – All options were considered likely to maintain and improve the quality of life for residents of Luton and the wider area, with an overall appraisal of slight beneficial for all options.
 - d. **Sustainability and Environmental** (criteria S7-S15) – For the majority of the sustainability and environment criteria, all four options were

considered likely to contribute an adverse impact ranging from slight to large adverse. Option 2 scored worst in environmental terms due to a greater likely impact on noise levels, cultural heritage, landscape and visual impact, and land use. All other options received an equal rating in terms of the number and scale of adverse effects against the environment sub-criteria.

- e. **Surface Access** (criteria S16-S18) – The three northern options, Options 1a, 1b and 1c, were expected to produce positive increases in public transport modal share, whilst Option 2 would require a more difficult Luton DART design solution, which would also be less likely to be attractive to operators and users. Options 1b, 1c and 2 would require additional highway works compared to Option 1a. The single terminal options would require more significant infrastructure provision over and above what is currently proposed, compared to the two terminal options, though they were considered more attractive in public transport terms.
- f. **Deliverability** (criteria S19-S22) – The three northern options, Options 1a, 1b and 1c, all involve occupying part of the area underlain by landfill and would require earthworks to create a platform at an appropriate level, with cost implications. Both of the two terminal options scored more positively compared to the single terminal options, being considered more deliverable within the context of the current concession to 2031, as well as being more attractive to future concessionaires. However, Option 2 would require a large area of additional land beyond the Applicant's current land holdings which reduced its appraisal score.
- g. **Operational Viability** (criterion S23-S27) – All options were considered likely to deliver benefits in terms of enhancing system efficiency and resilience of the airport, as well as being attractive to airline operators. The two terminal options improved resilience but Option 2, with operations split either side of the runway, was deemed less efficient due to the need to cross the active runway. Two terminal options also could make it easier to safeguard existing levels of maintenance, business aviation and cargo activity, which could remain operational during construction.
- h. **Cost/benefit** (criterion S28) – All options were considered likely to deliver positive beneficial impacts, with both the two terminal options offering greater financial benefits than the single terminal options.

3.2.32 The four options were then ranked from 'most preferred' to 'least preferred'. Option 2, the southern option, was considered the least preferred option due to a substantially greater number of criteria scoring 'large adverse', and a 'Currently Unworkable' scoring on the conformity to national and local planning policies (due to development outside of Luton's Local Plan LLP6 strategic allocation boundary and lack of sufficient compelling justification for development in the Green Belt). Option 1a was ranked the most preferred, scoring most positively across the sub-criteria and therefore was selected as the preferred option for further development.

3.2.33 For further information on the Sift 2 appraisal, refer to the **Design and Access Statement [TR020001/APP/7.03]**.

Inset 3.3 : Options tested in Sift 2

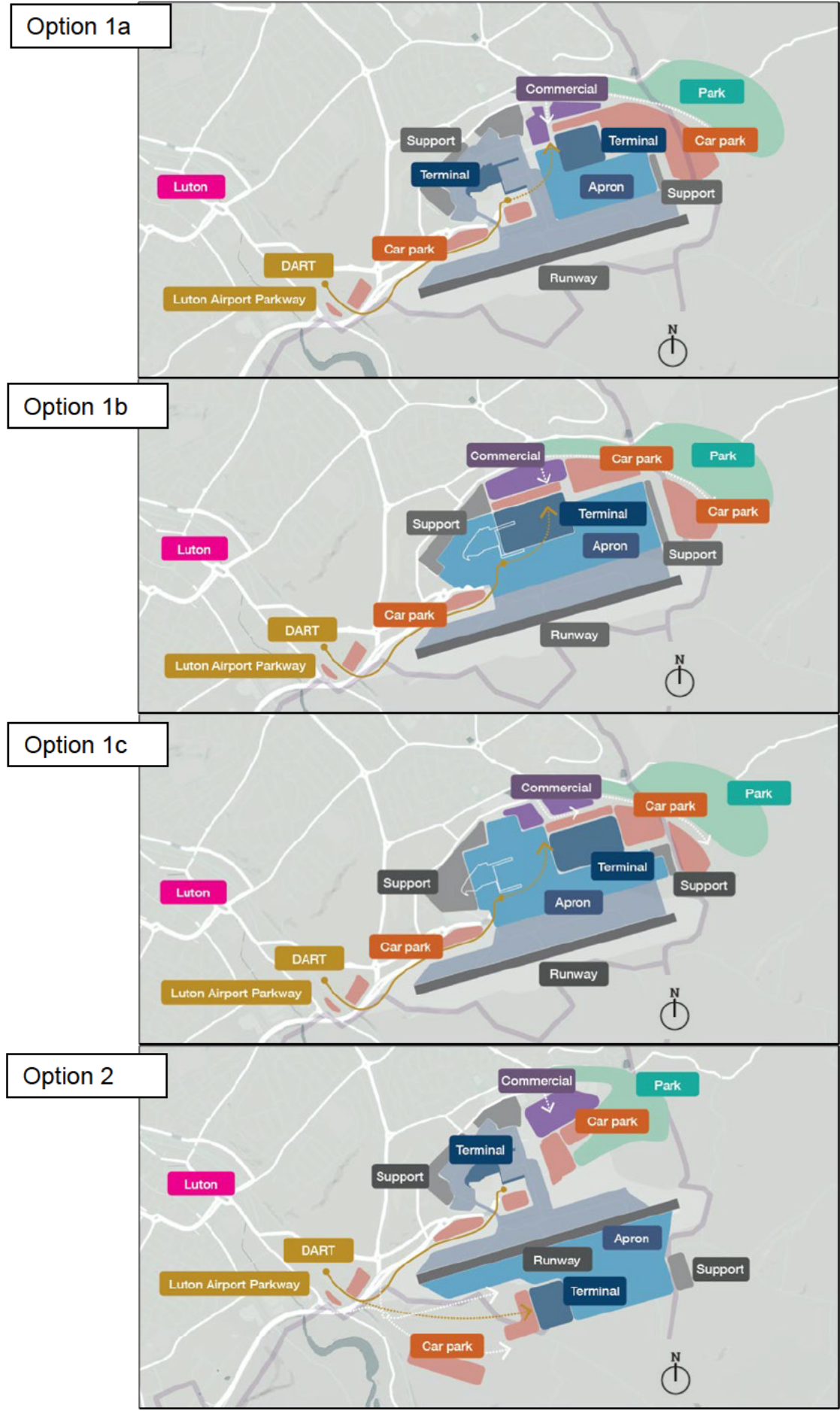


Table 3.2: Summary of Sift 2 results

Topic	Strategic objective	Sift criterion	Option 1a	Option 1b	Option 1c	Option 2
Strategic Fit	O1: Compliance with Government Aviation Policy	S1: Consistent with making best use of the existing runway	Large beneficial	Large beneficial	Large beneficial	Large beneficial
	O2: To identify a scheme that is likely to be capable of being consented and secured through a DCO	S2: In broad conformity with national and local town planning policies and capable of attracting the consents required	Moderate beneficial	Moderate beneficial	Moderate beneficial	Currently unworkable
	O3: To provide additional capacity and connectivity in line with the assessment of need	S3: Increase capacity both airside and landside to achieve target increase up to 36-38 mppa	Large beneficial	Slight adverse	Moderate beneficial	Large beneficial
Economic	O4: To maximise the potential economic benefits to the regional, sub-regional and local economies.	S4 Deliver economic benefits nationally and regionally	Large beneficial	Slight beneficial	Moderate beneficial	Large beneficial
		S5 Increase job opportunities for the people of Luton and surrounding area	Large beneficial	Large beneficial	Large beneficial	Moderate beneficial
Social	O5: To maintain and where possible improve the quality of life for Luton's residents and the wider population	S6 Promote positive benefits and minimise adverse impacts on local communities	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial
Environment	O6: To minimise environmental impacts and, where practicable, to actively mitigate and manage any potential environmental effects	S7 Noise impact	Moderate adverse	Moderate adverse	Moderate adverse	Large adverse
		S8 Air quality	Moderate adverse	Moderate adverse	Moderate adverse	Slight adverse
		S9 Natural habitats and biodiversity	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse
		S10 Carbon emissions	Large adverse	Large adverse	Large adverse	Large adverse
		S11 Water resources	Slight adverse	Slight adverse	Slight adverse	Neutral
		S12 Flood risk	Neutral	Neutral	Neutral	Neutral

Topic	Strategic objective	Sift criterion	Option 1a	Option 1b	Option 1c	Option 2
		S13 Cultural heritage	Slight adverse	Slight adverse	Slight adverse	Large adverse
		S14 Landscape and visual impact and environmental land use	Moderate adverse	Moderate adverse	Moderate adverse	Large adverse
		S15 Climate change	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial
Surface Access	O7: To maximise the number of passengers and workforce arriving at the airport on public transport	S16: Public transport modal share	Slight beneficial	Moderate beneficial	Moderate beneficial	Slight adverse
	O8: To minimise new build highway requirements	S17: Requirement for additional highway infrastructure	Moderate adverse	Large adverse	Large adverse	Large adverse
	O9: To minimise impact on the wider highway network	S18: Impact on wider highway network	Moderate adverse	Large adverse	Large adverse	Large adverse
Deliverability	O10: To be technically viable, taking account of the needs of airport users, operators and phasing	S19: Deliverable within the context of the current concession to 2031	Moderate beneficial	Moderate adverse	Slight adverse	Large beneficial
		S20: Attractive to future concessionaires	Large beneficial	Slight adverse	Slight beneficial	Large beneficial
		S21: Feasibility of landfill, earthworks and ground conditions	Large adverse	Large adverse	Large adverse	Slight adverse
		S22: Additional land required beyond current Applicant's holdings	Moderate beneficial	Moderate beneficial	Moderate beneficial	Large adverse

Topic	Strategic objective	Sift criterion	Option 1a	Option 1b	Option 1c	Option 2
Operational Viability	O11: To enhance the airport's system efficiency and resilience	S23: Operational effectiveness	Moderate beneficial	Moderate beneficial	Large beneficial	Moderate beneficial
		S24: System resilience	Large beneficial	Moderate beneficial	Moderate beneficial	Large beneficial
		S25: Attractiveness to airline operators	Moderate beneficial	Moderate beneficial	Moderate beneficial	Slight beneficial
		S26: Safeguarding for expansion	Moderate beneficial	Moderate beneficial	Moderate beneficial	Slight beneficial
		S27: Safeguarding existing levels of MRO, Business, Aviation and Cargo activity	Large beneficial	Moderate beneficial	Moderate beneficial	Large beneficial
Cost	O12: To be affordable including any public expenditure that may be required and taking account of the needs of airport users and operators (Value for Money)	S28: Estimated cost benefit	Large beneficial	Moderate beneficial	Moderate beneficial	Large beneficial

Sift 3

- 3.2.34 The outcomes of the Sift 2 exercise were shared with the public during Non-Statutory Consultation, which took place over 10 weeks between June and August 2018. As part of the consultation, feedback was sought from the local authorities, relevant organisations and the public on the options considered at Sift 2, the sifting process and the results of the analysis. The Non-Statutory Consultation Feedback Report (included as an appendix to the **Consultation Report [TR020001/APP/6.02]**) describes the process and provides a summary of the feedback received.
- 3.2.35 Two principal themes which emerged from the consultation were opposition to the development within the present Wigmore Valley Park as part of the northern family of options, and the scale of the development. This feedback was used to inform a further appraisal, Sift 3.
- 3.2.36 In line with the consultation feedback, the two main changes for appraisal at Sift 3 were:
- a. development of a new sub-option, Option 1d, which retains Wigmore Valley Park in its current location; and
 - b. revision of the Sift 2 option layouts to achieve a reduced target capacity of 32 mppa, as opposed to 36-38 mppa originally considered in Sift 1 and Sift 2. The reduced target capacity for the expansion of the airport to 32 mppa was informed by the consultation responses on this issue and further technical work, which indicated that the scale of highway capacity enhancement required to achieve 36-38 mppa would be beyond the scope of what the Applicant could reasonably deliver.
- 3.2.37 Sift 3 was also used as an opportunity to “back-check” the Sift 1 and Sift 2 process to review whether appraisals would change in light of the information received through consultation feedback.
- 3.2.38 **Inset 3.4** shows the options considered at Sift 3 and **Table 3.3** provides a summary of the overall appraisal outcomes.
- 3.2.39 Option 2, despite being the least preferred option previously, was included in the exercise to back-check Sift 2 results. The resulting score re-confirmed Option 2 remained ‘Currently Unworkable’, due to lack of compelling justification for extensive development in the Green Belt.
- 3.2.40 The remaining options of the northern terminal family (Options 1a, 1b, 1c and 1d) were compared and found Option 1d to be the least preferred option on the basis of the overall score. This was due to a number of adverse impacts, including the large extent of works required on greenfield land within the Green Belt, and on land outside of Applicant’s ownership, which rendered the option ‘Currently Unworkable’.
- 3.2.41 Environmental criteria for Option 1d identified poor performance for landscape and visual impacts (S14) due to the scale of development in a rural setting. The orientation and location of development further to the east was also considered to bring construction and operational impacts closer to new noise and heritage receptors (S7 and S13 respectively).
- 3.2.42 Option 1d scored similarly to Option 1b (slight beneficial) for economic criteria (S4 and S5) in comparison to others, largely because of increased costs

affecting producer benefits and creating lower connectivity benefits. Its distance from Luton was also considered to affect ease of accessibility. For the remaining environmental sub-criteria (S8-S12 and S15), Option 1d performed similarly to 1a-1c.

3.2.43 The reduction in volume of passenger throughput did not change the results of the appraisal, with Option 2 and Option 1d remaining 'Currently Unworkable', and Option 1a performing best. This reflects the fact that the footprint and scale of development remain largely similar despite the reduction of passenger throughput. Option 1a remained the preferred option ahead of Options 1b and 1c, as the latter two variants would have required further highway works and were considered more difficult to deliver within the context of the existing concession.

3.2.44 Based on all of the available evidence, the Sift 3 process led to the selection of the preferred option, Option 1a, to be developed further and taken forward to the 2019 Statutory Consultation. For further information on the Sift 3 appraisal, refer to the **Design and Access Statement [TR020001/APP/7.03]**.

Inset 3.4: Options tested in Sift 3



Table 3.3: Summary of Sift 3 results

Topic	Strategic option	Sift criterion	Option 1a	Option 1b	Option 1c	Option 1d	Option 2
Strategic Fit	O1: Compliance with Government Aviation Policy	S1: Consistent with making best use of the existing runway	Large beneficial	Large beneficial	Large beneficial	Large beneficial	Large beneficial
	O2: To identify a scheme that is likely to be capable of being consented and secured through a DCO	S2: In broad conformity with national and local town planning policies and capable of attracting the consents required	Moderate beneficial	Moderate beneficial	Moderate beneficial	Currently Unworkable	Currently Unworkable
	O3: To provide additional capacity and connectivity in line with the assessment of need	S3: Increase capacity both airside and landside to achieve target increase up to 32 mppa	Large beneficial	Slight adverse	Moderate beneficial	Moderate adverse	Large beneficial
Economic	O4: To maximise the potential economic benefits to the regional, sub-regional and local economies.	S4 Deliver economic benefits nationally and regionally	Large beneficial	Slight beneficial	Moderate beneficial	Moderate beneficial	Large beneficial
		S5 Increase job opportunities for the people of Luton and surrounding area	Large beneficial	Large beneficial	Large beneficial	Moderate beneficial	Moderate beneficial
Social	O5: To maintain and where possible improve the quality of life for Luton's residents and the wider population	S6 Promote positive benefits and minimise adverse impacts on local communities	Slight beneficial	Slight beneficial	Slight beneficial	Neutral	Slight beneficial
Environment	O6: To minimise environmental impacts and, where practicable, to actively mitigate and manage any potential environmental effects	S7 Noise impact	Moderate adverse	Moderate adverse	Moderate adverse	Large adverse	Large adverse
		S8 Air quality	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Slight adverse
		S9 Natural habitats and biodiversity	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse

Topic	Strategic option	Sift criterion	Option 1a	Option 1b	Option 1c	Option 1d	Option 2
		S10 Carbon emissions	Large adverse	Large adverse	Large adverse	Large adverse	Large adverse
		S11 Water resources	Slight adverse	Slight adverse	Slight adverse	Slight adverse	Neutral
		S12 Flood risk	Neutral	Neutral	Neutral	Neutral	Neutral
		S13 Cultural heritage	Slight adverse	Slight adverse	Slight adverse	Moderate adverse	Large adverse
		S14 Landscape and visual impact and environmental land use	Moderate adverse	Moderate adverse	Moderate adverse	Large adverse	Large adverse
		S15 Climate change	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial
Surface Access	O7: To maximise the number of passengers and workforce arriving at the airport on public transport	S16: Public transport modal share	Slight beneficial	Moderate beneficial	Moderate beneficial	Slight adverse	Slight adverse
	O8: To minimise new build highway requirements	S17: Requirement for additional highway infrastructure	Moderate adverse	Large adverse	Large adverse	Moderate adverse	Large adverse
	O9: To minimise impact on the wider highway network	S18: Impact on wider highway network	Moderate adverse	Large adverse	Large adverse	Moderate adverse	Large adverse
Deliverability	O10: To be technically viable, taking account of the needs of airport users, operators and phasing	S19: Deliverable within the context of the current concession to 2031	Moderate beneficial	Moderate adverse	Slight adverse	Moderate beneficial	Large beneficial
		S20: Attractive to future concessionaires	Large beneficial	Slight adverse	Slight beneficial	Moderate adverse	Large beneficial
		S21: Feasibility of landfill, earthworks and ground conditions	Large adverse	Large adverse	Large adverse	Moderate adverse	Slight adverse
		S22: Additional land required beyond current Applicant's holdings	Moderate beneficial	Moderate beneficial	Moderate beneficial	Large adverse	Large adverse

Topic	Strategic option	Sift criterion	Option 1a	Option 1b	Option 1c	Option 1d	Option 2
Operational Viability	O11: To enhance the airport's system efficiency and resilience	S23: Operational effectiveness	Moderate beneficial	Moderate beneficial	Large beneficial	Moderate adverse	Moderate beneficial
		S24: System resilience	Large beneficial	Moderate beneficial	Moderate beneficial	Slight beneficial	Large beneficial
		S25: Attractiveness to airline operators	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate adverse	Slight beneficial
		S26: Safeguarding for expansion	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Slight beneficial
		S27: Safeguarding existing levels of MRO, Business, Aviation and Cargo activity	Large beneficial	Moderate beneficial	Moderate beneficial	Large beneficial	Large beneficial
Cost	O12: To be affordable including any public expenditure that may be required and taking account of the needs of airport users and operators (Value for Money)	S28: Estimated cost benefit	Large beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Large beneficial

3.3 Design evolution up to the 2019 Statutory Consultation

Overview

3.3.1 Following Sift 3, Option 1a (the preferred option from the sifting process) was then the subject of a number of optioneering exercises to consider alternative design solutions. Key design components were selected for optioneering, on the basis of their potential to affect the footprint, feasibility and cost of the Proposed Development. These included:

- a. landform – the earthworks solution required to deliver the expansion to the airfield and landside facilities;
- b. drainage – the approach to water treatment;
- c. car parks – the location, scaling and makeup of car parks to continue to serve the airport;
- d. fuel farm – options to deliver fuels to aircraft; and
- e. terminal, apron and supporting facilities – location and configuration of terminal, apron and supporting facilities.

3.3.2 A comparison of the potential impacts, including environmental effects, for the options considered was undertaken in liaison with the project team. A summary of each of these appraisals is provided below, including the key environmental considerations. Further information on the design evolution is provided within the **Design and Access Statement [TR020001/APP/7.03]**.

3.3.3 In addition to the design appraisals, mitigation was embedded within the design through the iterative EIA process and following technical stakeholder engagement. The outcome of the design appraisals and the iterative EIA process was presented at the 2019 Statutory Consultation, which ran from 16 October to 16 December 2019. Design development following the 2019 Statutory Consultation is discussed within **Sections 3.4 and 3.5** of this chapter.

Landform appraisal

3.3.4 The purpose of this appraisal was to identify a preferred earthworks solution and consider a range of alternative sources for fill material needed to create a suitable site platform on which to construct the airport extension. Seven alternative options were considered, with varying scales of earthworks required. Sources of fill material ranged from full import to complete excavation from a local source.

3.3.5 Options which required partial or total importation of fill material and consequently required additional truck movements were discounted. In addition, options with excavation close to the north of the Main Application Site boundary (as defined in **Chapter 2 [TR020001/APP/5.01]** and shown on **Figure 2.2** of this ES **[TR020001/APP/5.03]**) were discontinued. These options would have resulted in additional and avoidable adverse environmental effects, due to the potential visual intrusion to sensitive receptors to the north, irreversible impacts to the landscape character, and the potential loss of public open space.

- 3.3.6 The preferred landform option performed best in terms of environmental effects, as it retained land along the northern part of the Main Application Site, thereby reducing the potential landscape effects and retaining open space for local communities. The preferred option also performed well in relation to constructability and operational impacts, compared to the other options.

Drainage appraisal

- 3.3.7 The drainage appraisal focused on the treatment and disposal of surface water from the Proposed Development, as well as the catchment area to be treated. The appraisal was split into considering the treatment type and catchment area, each with two options for consideration.
- 3.3.8 With regard to the treatment type, an option for a forced aeration reed bed lagoon was considered and subsequently discounted on the basis that it would create a large open water body which may attract birds and other wildlife near to the runway, and, therefore, pose a risk to the operation of the airport. Instead, a water treatment plant (WTP), comprising an underground storage system and a surface WTP which discharges to an infiltration basin was selected. Both options were considered neutral from the perspective of other environmental impacts (e.g. with regards to impacts on air quality, health and community, land take, noise and vibration and water resources). The preferred option selected was, therefore, the WTP.
- 3.3.9 With regard to the catchment area, the two options considered whether the drainage system should include hardstanding within the Proposed Development area only (excluding the existing drainage system already present at the airport) or whether all existing and proposed airport hardstanding should be combined (diverting existing drainage at the airport to the proposed treatment and disposal system). The appraisal exercise did not identify considerable differentiators between the two options due to environmental impacts. The preferred option was therefore selected based upon sequencing constraints, and the minimisation of potential disruption to existing operations. The preferred catchment area was considered to include the new hardstanding only.

Fuel farm appraisal

- 3.3.10 The Proposed Development will require an increase in the volume of fuel supplied to the Main Application Site. The design options for the fuel farm required three key elements to be considered: supply, storage and distribution of fuel. These included nine options for fuel supply (by fuel truck or various pipe connections); three options for fuel storage in relation to new and existing fuel, with two of those farms at either apron or ground level; and three options for fuel distribution focusing on fuel bowser delivery or hydrant system or a combination of both.
- 3.3.11 In terms of fuel supply, the appraisal concluded that the preferred option would be a single new fuel farm to the east of the airport, which has a direct connection to the existing fuel pipeline. This option was ranked as the most favourable alternative in terms of its overall environmental impacts, as it would remove the majority of fuel supply vehicles from the local road network and limit construction impacts due to a relatively short pipeline route. The option ranked

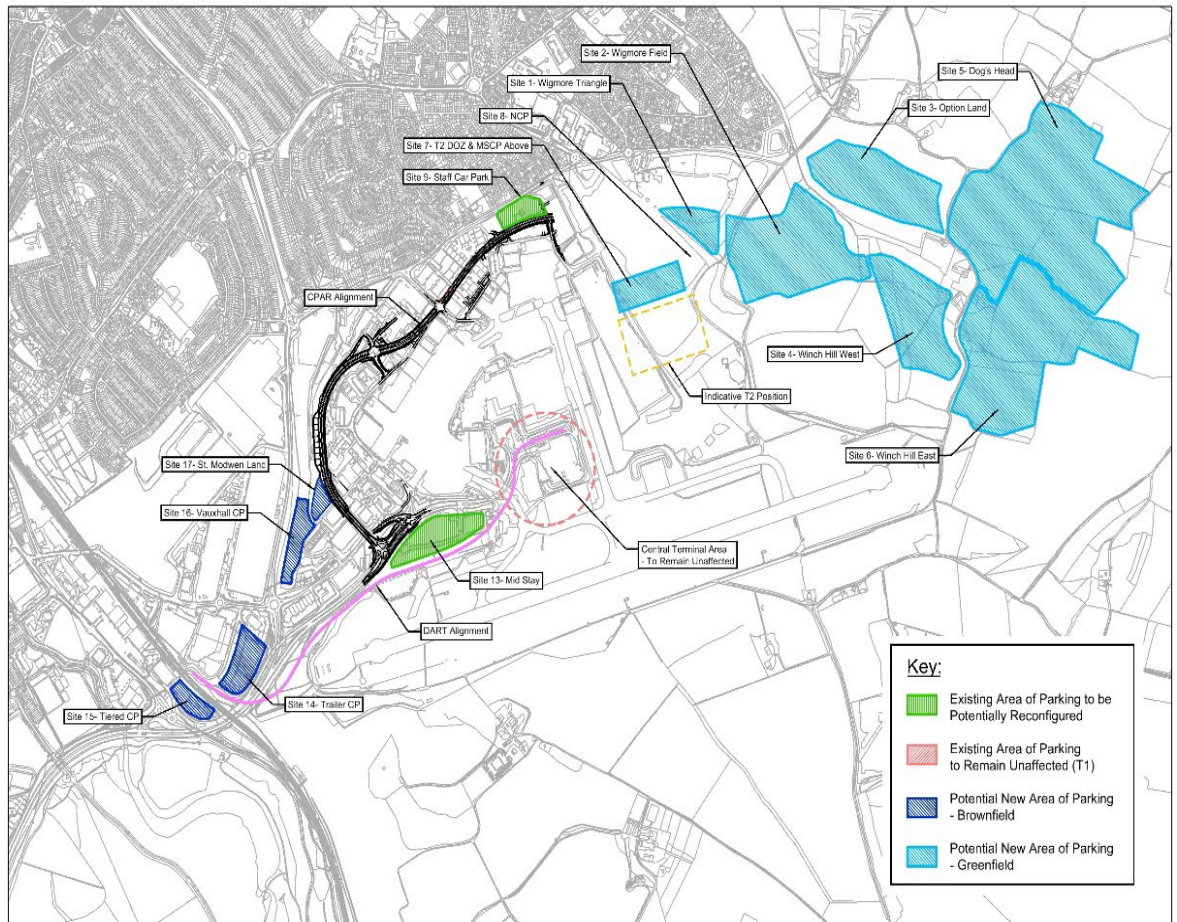
as the most favourable in environmental terms, despite the need for a limited amount of underground pipeline construction being required within the Green Belt. This is because to avoid construction within Green Belt all together would have required for all fuel to be delivered to the Main Application Site by fuel supply vehicles via road, which in turn would be associated with greater adverse environmental impacts. Further information on impacts on Green Belt is provided within the **Planning Statement [TR020001/APP/7.01]**.

- 3.3.12 Following the appraisal, the preferred option for fuel storage was to retain existing Terminal 1 fuel stored at the Terminal 1 fuel farm, and Terminal 2 fuel stored at the new fuel farm. This option was selected, as it was considered to be particularly resilient in operational terms with two fuel farms. In addition, this option limited the amount of construction required, and was therefore, more favourable in environmental terms. The other two options for fuel storage, which either included the expansion of the existing fuel farm at Terminal 1 or the construction of an entirely new fuel farm at Terminal 2 and the closure of the existing facility, were considered to be less favourable, both in terms of operational resilience and overall environmental impacts, due to the extent of construction required.
- 3.3.13 In terms of fuel distribution, the preferred option was to combine a hydrant system and bowser delivery within the airfield instead of the alternative options of either just delivering fuel by bowser across the airport or providing a hydrant system to all stands in Terminal 1 and Terminal 2. The preferred option minimised the number of fuel delivery vehicles within the airfield and benefitted from reduced costs, as a result of avoiding the need for construction or retrofitting of hydrant systems within the existing Terminal 1 apron.

Car parking appraisal

- 3.3.14 The appraisal for the potential car parking strategy was split into two parts: first, car parking locations and typologies; and secondly, different combinations of parking sites and typologies were considered.
- 3.3.15 Seventeen sites were considered as potential locations for car parking associated with the airport, as shown in **Inset 3.5**. For each location, car parking options were then considered in four typologies:
- a. surface level parking;
 - b. block parking – surface level parking with higher density of spaces;
 - c. decked parking – two level parking solution; and
 - d. multi-storey car parking – more than two levels.

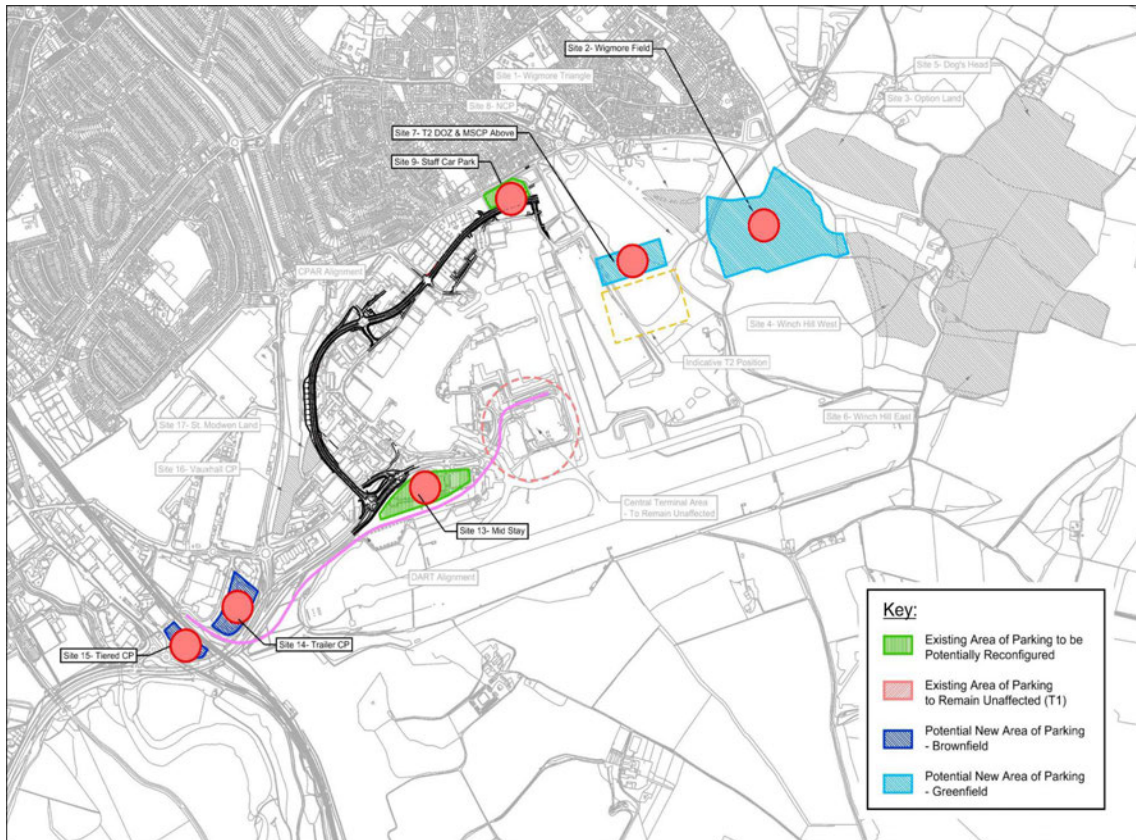
Inset 3.5: Alternative sites considered for car parking (to be adapted to align with design evolution for the layout of Terminal 2, apron and supporting facilities)



- 3.3.16 Locations that were existing parking locations or brownfield sites with existing access were preferred. These options minimised land use change and loss of areas of high ecological value in comparison to the alternatives, and were not located within the Green Belt.
- 3.3.17 Potential parking typologies for each site were identified on the basis of operational requirements. Multi-storey car parking was considered as the least suitable typology of car parking for the majority of locations, as a result of potential visual impacts and cost implications.
- 3.3.18 The parking locations and typologies were then taken forward to be considered in combination, based on what would be suitable operationally. The preferred option, shown in **Inset 3.6** performed well economically and operationally, representing the best balance of use and type; optimising the use of commercial land and cost, whilst providing a good balance of short, mid and employee provision at both terminals. This combination option also made use of two brownfield sites adjacent to the Midland Mainline railway line, and two of the existing airport car parks, reducing the area of greenfield construction required.

3.3.19 In comparison with alternative combinations of sites and typologies, the preferred option minimised environmental impacts through the removal of car parking locations on Green Belt land (Sites 3, 4, 5 and 6) and allowed further land within the existing Wigmore Valley Park to be retained through the removal of Site 1. Other environmental impacts were not considered to be a key differentiator in the consideration of the alternative combinations.

Inset 3.6: Proposed car parking locations following design appraisal (to be adapted to align with design evolution for the layout of Terminal 2, apron and supporting facilities)



Terminal, apron and supporting facilities

3.3.20 Following the outcome of the appraisal of the main design component options, three development layouts to deliver 32 mppa were considered, including a western, central or eastern Terminal 2 location.

3.3.21 The appraisal included consideration of the nature, scale and the particular site for the resulting passenger terminal arrangements including the necessary support facilities. The location of the passenger terminal was considered in detail together with the resulting aircraft apron and arrangement of airport support facilities. The various permutations of these facilities during their phased delivery to 32 mppa, and their impact on airport operations and the provision of displaced open space were considered in this exercise.

- 3.3.22 The preferred layout selected as a result of the detailed appraisal comprised the western option. The new terminal would be located on the existing long stay car park which overlays the historic landfill site. The associated airport and terminal supporting facilities would be located close to the new terminal.
- 3.3.23 This option was selected based on a number of key findings:
- a. construction of the buildings and platform from a western to eastern direction provides a logical construction sequence in terms of earthworks and terminal construction;
 - b. the construction of the Luton DART extension from Terminal 1 to the western Terminal 2 option provides the shortest route; and
 - c. there is no anticipated upgrade or realignment required to the existing Luton DART system (noting that an extension of the existing Luton DART system is proposed to connect to the new terminal).
- 3.3.24 All three options for the development layouts were considered to score equally with regards to environment criteria for air quality, climate change, ecology, noise and vibration and waste and resources. However, the selected western option (1A) scored best overall, as it minimised visual disturbance, impacts on land use, historic environment, landfill contamination and health and community, with its location further away from sensitive receptors both to the north and east, compared to the alternatives.

3.4 Design evolution up to the 2022 Statutory Consultation

Overview

- 3.4.1 The outcome of the 2019 Statutory Consultation, including how feedback received was taken into account, is summarised within the **Consultation Report [TR020001/APP/6.01]**. In total, 3,501 formal responses were received during the 2019 Statutory Consultation. A summary of the most commented on themes from the 2019 Statutory Consultation is provided below:
- a. need case and demand forecasts;
 - b. flightpaths and fleet mix;
 - c. climate change;
 - d. noise;
 - e. air quality;
 - f. impacts on the natural environment and local communities;
 - g. employment and economics;
 - h. surface access; and
 - i. Wigmore Valley Park.
- 3.4.2 Subsequently, a strategic review of the Proposed Development was undertaken to consider:
- a. 2019 Statutory Consultation feedback, as summarised above;

- b. Growing focus on the climate emergency and LBC commitment to making Luton carbon-neutral town by 2040;
- c. impacts of COVID-19 pandemic; and
- d. the affordability of the Proposed Development.

3.4.3 As a result of this review, a number of changes were made to the proposals. These included, but are not limited to the below:

- a. Adjustment to phasing to take into account a revised passenger demand forecast, in light of COVID-19 recovery, the climate emergency with the potential to impact on demand for flights and planning policy, Brexit and its impact on demand for flights and destinations; and regional changes including acceleration of the East West Rail scheme between Oxford and Cambridge.
- b. A revised sustainability vision and objectives for all of the Applicant's operations including the airport. Within the context of the application for development consent for the Proposed Development, this included a commitment to Green Controlled Growth, in response to the challenges posed by the climate emergency. This new approach seeks to manage the growth and operation of the airport through the coming decades within definitive environmental limits. It will put in place a set of binding limits for surface access, air quality, noise and GHG emissions preventing the airport from expanding unless it can do so within defined limits. Further details on the Green Control Growth proposals are provided with the application [TR020001/APP/7.08].
- c. Revised layout of the Proposed Development to reduce the extent of construction works required. This included a reduced Terminal 2 footprint, reduced footprints of car parks, reconfigured taxiways and reduced footprint of aircraft stands, to limit both the extent of engineered pavements and the extent of works required on the former landfill. The revised layout had the following benefits:
 - i. the revised layout substantially decreased the extent of the platform and earthworks required, resulting in a saving of approximately 2,000,000 m³ in material from being excavated. This equates to a saving of approximately 80,000 vehicle movements, reducing air pollution, GHG emissions and construction noise. In addition, excavation and treatment of landfill material is reduced;
 - ii. as a result of the reduced extent of the platform, impacts on the site of an Iron Age / Roman enclosure to the east of Winch Hill were avoided, whereas the previous iteration of the Proposed Development would have removed these remains;
 - iii. the reduced land take minimised habitat loss and impacts on important ecological features;
 - iv. a greater extent of the Winch Hill ridgeline was retained, including mature woodland/ hedgerow vegetation, which would screen the Proposed Development from visual receptors;

- v. the reduced extent of construction on the former landfill area minimised contamination risks and ground stability risks associated with exposing former landfill materials and the placement of buildings and infrastructure on this area of land;
 - vi. the extent of earthworks and trackout was reduced, thereby, reducing impacts associated with dust deposition and soiling of surfaces; and
 - vii. the reduced extent of construction delivered significant cost savings and improved the deliverability of the Proposed Development.
- d. The inclusion of the entirety of the new Airport Access Road providing access to the east of the airport (previously referred to as the Century Park Access Road) within the scope of the Proposed Development and improvements to the Airport Way/Percival Way junction. Phase 1 of the new road providing access to the east of the Main Application Site was included in the Proposed Development in addition to Phase 2, which was included as part of the scheme presented in the 2019 Statutory Consultation. This changed the site boundary for the Proposed Development and additional buildings need to be demolished as a result (albeit these buildings would have previously also been demolished, but under a separate consent (application ref.: 17/02300/EIA)). This change was made in order to enable the delivery of the new road providing access to the east of the Main Application Site in time to benefit the Proposed Development.
- e. Changes to Terminal 1 and supporting infrastructure included the provision of Fixed Electrical Ground Power (FEGP), or other zero emission power units, to Terminal 1 stands and additional storage for the reuse of water in Terminal 1. Both of these changes provided environmental benefits in terms of climate change resilience, impacts on water resources and the reduction of GHG emissions.
- f. In addition to the reduced footprint of Terminal 2, other changes included a revised layout of the coach station for the new terminal. In addition, Terminal 2 was committed as a net zero building, with further sustainable design measures proposed, including solar and geothermal energy provision. These changes provided benefits in terms of enhancing access by public transport, climate change resilience, and the reduction of GHG emissions.
- g. Car parking layouts were reconfigured, however, the design principles established prior to 2019 Statutory Consultation, as described within **Section 3.3** of this chapter, did not change. The revised proposals for car parking also included additional solar energy production on car parks, with battery storage and distribution, contributing to the reduction of GHG emissions from the operation of the Proposed Development.
- h. In line with consultation feedback, the replacement open space provision was expanded closer to the existing Wigmore Valley Park, benefitting local communities.

- i. Other changes to the Proposed Development include alterations to the existing Engine Run Up Bay (ERUB) during assessment Phase 1, its temporary relocation during assessment Phase 2a and its construction in a new permanent location during assessment Phase 2b. The size of the ERUB was also reduced compared to the proposals at 2019 Statutory Consultation. The revised proposals reduced the extent of earthworks required, minimised cost and landscape and visual effects due to reduced heights.
- j. Further design development concluded that the relocation of the fire training ground would not be required until assessment Phase 2b and a new surface movement radar tower was introduced at the south eastern boundary of the Main Application Site to monitor new apron cul-de-sacs.

Sift 2 and Sift 3 Back-check

- 3.4.4 A back-check of the Sift 2 and Sift 3 appraisals was undertaken to consider whether the changes described above, specifically the inclusion of the new road providing access to the east of the airport, would alter the scoring of Sift 2 and Sift 3 appraisals. At the time of Sifts 2 and 3, the new road providing access to the east of the airport was assumed to have been built out as part of the New Century Park planning application (ref.: 17/02300/EIA, now renamed Green Horizons Park) prior to and separate from the Proposed Development.
- 3.4.5 For the majority of the Sift criteria, there would not be a change to the Sift 2 and Sift 3 appraisals with the inclusion of the new road providing access to the east of the airport within the Proposed Development, except for the strategic objectives relating to surface access, deliverability and affordability.
- 3.4.6 For *S17 Requirements for additional highway infrastructure* and *S18 Impact on wider highway network*, in both Sift 2 and Sift 3, Option 1a was considered to perform better than the other options under consideration at the time, with an appraisal rating of Moderate Adverse compared to Large Adverse for the other options.
- 3.4.7 The inclusion of the new road providing access to the east of the airport within the Proposed Development would require a substantial amount of highway infrastructure and traffic management to be provided to construct the road in its entirety. As such, the back-check concluded that Options 1a and 1d would be appraised as having a Large Adverse impact instead, similar to the other options.
- 3.4.8 For *S22 Additional land required beyond current Applicant's holdings*, the inclusion of the Airport Access Road is likely to require additional pockets of land outside of Applicant's current ownership and will need to be acquired from owners and leaseholders. As such, the ratings for Options 1a, 1b and 1c would be altered from a Moderate Beneficial to Slight Beneficial in the Sifts 2 and 3.
- 3.4.9 For *S28 Estimated cost benefit*, the requirement to provide the new road providing access to the east of the airport within the Proposed Development would downgrade the appraisal level for Option 1a and 2 from Large Beneficial to Slight Beneficial, as this is a substantial amount of cost to be added to the

cost plan for the highway infrastructure. However, the reduced extent of the platform would also reduce costs associated with the construction of this option. The other Options, 1b, 1c and 1d would be reduced from Moderate Beneficial to Neutral.

- 3.4.10 No other substantial changes to the appraisals were identified as a result of the inclusion of the new road providing access to the east of the airport, and other changes made to the design, as listed within **paragraph 3.4.3** of this chapter.
- 3.4.11 Overall, even taking into account the downward adjustments for the surface access and affordability criteria, the back-check concluded that Option 1a would have remained the preferred option in both Sift exercises. The emerging proposals, based on the evolution of Option 1a, therefore, continued to be the preferred option and basis for the emerging Proposed Development.
- 3.4.12 Further information on the Sift 2 and Sift 3 back check is provided within the **Design and Access Statement [TR020001/APP/7.03]**.

3.5 Design evolution up to the submission of the application for development consent

Overview

- 3.5.1 The outcome of the 2022 Statutory Consultation, including how feedback received has been taken into account, is summarised within the **Consultation Report [TR020001/APP/6.01]**. In total, 3,790 responses were received during the 2022 Statutory Consultation.
- 3.5.2 As a result of the feedback from 2022 Statutory Consultation and further design development, a number of changes were made to the Proposed Development. These include, but are not limited to the below:
- a. Minor changes to Terminal 1 building, including the removal of a bussing lounge, extension of a departure lounge and baggage hall, addition of a south pier and canopy. These changes were made following feedback from the current operator.
 - b. Addition of a 33kV substation in the proposed car park P9 north of the Airport Access Road, and subsequent changes to P7 and P9 car park layouts. These changes were made due to the change to the delivery programme, resulting in less available electrical capacity, from predicted increase in demand from other users in Luton, including increased demand due to the transition to Electric Vehicles, linked to the banning of sales of petrol and diesel vehicles from 2030.
 - c. Construction of the surface movement radar tower during assessment Phase 1, rather than assessment Phase 2a. This change has been made following feedback from National Air Traffic Services (NATS), the Air Traffic Services Provider at the airport, and the changes to Terminal which will impede Air Traffic Control sight lines.
- 3.5.3 The scale and nature of the above changes is limited and as such they do not affect the results of the Sifting exercises, which established the preferred option.

No back-check exercise of the Sifting process has, therefore, been considered to be necessary.

Summary of Environmental Design Measures in the ES

3.5.4 Through the iterative EIA process and technical stakeholder engagement, environmental measures have been embedded within the design of the Proposed Development. **Table 3.4** below presents a summary of the measures embedded within the Proposed Development to avoid or reduce environmental effects and demonstrates how the need to mitigate effects was taken into account in identifying the preferred option, and thereby, how the preferred option facilitates better environmental outcomes.

3.5.5 In addition to the measures embedded within the design, there are a number of standard industry practice measures (referred to as ‘good practice’) and commitments and plans (referred to as ‘additional mitigation’) that are proposed to mitigate the effects of the Proposed Development. These measures are summarised throughout this ES within the relevant technical chapters (**Chapters 6 to 20 [TR020001/APP/5.01]**).

Table 3.4: Summary of embedded measures within the ES

Topic	Embedded Design Measures
Agricultural land quality and farm holdings	Neutral grassland provided as part of the Proposed Development will improve soil health and, if required, can be returned to agricultural use by future generations.
Air Quality	<ul style="list-style-type: none"> a. Implementation of phased working to reduce the magnitude and extent of air quality impacts and covering of odorous materials during construction. b. Use of the new Airport Access Road for operational road traffic and construction traffic to be routed away from sensitive receptors. c. The Proposed Development includes a new fuel pipeline connection which will reduce the number of heavy goods vehicles (HGVs) delivering fuel to the Main Application Site, and the related emissions.
Biodiversity	<ul style="list-style-type: none"> a. The landscape design for the Proposed Development will include large areas of habitat creation; areas of habitat creation will be designed and managed to ensure their target condition exceeds that of the habitats lost and thereby contributes to achieving at least a 10% net gain in biodiversity (refer to the Biodiversity Net Gain (BNG) Report, Appendix 8.5 of this ES [TR020001/APP/5.02]). b. Much of the habitat creation is included within a large area of provision of open space, which will be created within the northeast of the Main Application Site. This provision of open space will connect to the retained areas of Wigmore

Topic	Embedded Design Measures
	<p>Park. This area of open space will include habitat creation measures to mitigate for those habitats lost within Wigmore Park County Wildlife Site. The Replacement habitat once established will mitigate for the loss of these foraging, dispersal and shelter habitats which are used by a range of species, including badger, bats, birds, reptiles, amphibians and invertebrate species. Whilst the provision of open space will be open to the public, other areas of habitat provision will not be. In addition, the provision of open space is designed with footpaths to direct the public away from habitats in the rest of the area.</p> <p>c. Additional areas of embedded habitat creation include areas of habitat with the Terminal Approach within and around Dairyborn Scarp District Wildlife Site. This would replace habitats lost with scrub, neutral meadow grassland, and exposed chalk on lower lying shallow slopes, along with management of existing woodland. Landscape restoration will comprise species rich hedgerows with trees adjacent to Winch Hill Road and on the eastern boundary to the east of the road in assessment Phase 1. Further landscape restoration within assessment Phase 2b will include regrading and providing mitigation on top and to the east of the platform embankment east of the runway, by creating amenity grassland, broadleaved woodland, neutral meadow grassland and calcareous grassland, along with additional species rich hedgerows with trees.</p> <p>d. The measures to establish, manage and monitor areas of habitat creation within the Proposed Development are detailed within the Outline Landscape and Biodiversity Management Plan (LBMP) (Appendix 8.2 of this ES [TR020001/APP/5.02]).</p> <p>e. Grassland habitats [REDACTED] will continue to be managed from now and through to operation of the Proposed Development, at a short sward height to avoid the establishment of rough grassland and scrub. This would continue to discourage encroachment of Roman snail [REDACTED] where they would be at risk of being killed without additional mitigation. As such, given their legal protection, any encroachment would subsequently represent a constraint to the construction and operation of the Proposed Development.</p>

Topic	Embedded Design Measures
	<p>f. The Proposed Development has incorporated a buffer of semi-natural habitats, at least 15m in width, around areas of ancient woodland within or adjacent to the Proposed Development. No ground works will be permitted within this buffer to ensure trees within ancient woodland are protected from root damage and soil compaction.</p> <p>g. The Proposed Development has been designed to retain veteran/ancient trees where possible. Where such trees have been retained within or directly adjacent to the Proposed Development, a buffer zone will be established to protect the roots. The buffer zone around an ancient or veteran tree will be at least 15 times larger than the diameter of the tree, the buffer will also be at least 5m from the edge of the tree’s canopy (if that area is larger than 15 times diameter). Veteran trees offer important habitats for a range of species including rare saproxylic invertebrates and fungi. Felled dead wood from potential veteran/ancient trees that could be lost will be kept in as large sections as possible and incorporated into the landscape design of the new areas of habitat creation within the open space. Large sections of felled trunks will be reinstalled vertically in the ground within the habitat creation areas to create ‘monoliths’, where possible, which will encourage the deadwood to decay in a similar way to how it would naturally as standing deadwood in-situ.</p> <p>h. The Proposed Development will incorporate an area of new habitat, within the area of provision of open space in the eastern section of the Main Application Site, and newly created habitat in the north east of the Main Application Site, to mitigate the loss of grassland supporting orchids. This replacement habitat will be designed with consideration to soil conditions, geology and local topography, and will be managed to replicate the requirements of the orchid species present.</p> <p>i. Where woodland and hedgerow belts are being retained within the Proposed Development design, the adjacent arable margins will also be retained. These margins will be managed to encourage retention and proliferation of the notable arable plant species and invertebrates that have been identified within the survey area.</p> <p>j. The Proposed Development will incorporate artificial bat roosting provision on buildings and retained trees to mitigate the roosting opportunities lost to the Proposed Development.</p>

Topic	Embedded Design Measures
	<p>k. The landscape mitigation has been designed to be appropriate given its proximity to the airport and the potential that certain types of habitat creation could attract additional birds and thereby increase the bird strike risk. Newly created habitats will be managed appropriately for their proximity to the airport’s airspace to ensure the risk of bird strike does not significantly increase (a Bird Strike Risk Assessment is provided as Appendix 8.4 of this ES [TR020001/APP/5.02]).</p> <p>l. As far as possible, Off-site Car Parks at Luton Parkway will be designed to minimise loss of adjacent Luton Parkway Verges District Wildlife Site and areas that could support protected species and important habitats.</p>
Climate Change Resilience	<p>Design and Materials:</p> <p>a. All new buildings and assets will either be designed for the climatic conditions projected for the end of their design life, using appropriate design guidance where available or adaptive capacity will be built into the designs.</p> <p>b. Use of construction materials (as far as practicable) with superior properties which offer increased tolerance to fluctuating temperatures, heavy precipitation and other extreme weather events such as storms.</p> <p>c. Adequate Heating, Ventilation and Air Conditioning (HVAC) systems will be provided to mitigate any impacts on thermal comfort of staff and passengers, as a result of increased average and summer temperatures and the frequency of heatwaves.</p> <p>d. Passive strategies for heating, cooling and lighting will be incorporated into design, where appropriate, for thermal efficiency, taking climate change into account to reduce summer cooling and winter heating.</p> <p>e. Terminal 2 buildings will be designed to at least ‘BREEAM Excellent’ standard, or equivalent at the time of detailed design, to be energy efficient with appropriate installations and equipment together with thermally efficient materials and shading. Other new buildings will be designed to ‘BREEAM Excellent’ standard except where the building typology dictates that it is not practical.</p> <p>f. Pavements and taxiway surfaces will be designed to accommodate future climate change conditions e.g. temperature increases.</p>

Topic	Embedded Design Measures
	<p>g. New de-icing facilities are incorporated into the Proposed Development to mitigate any impacts associated with increased extreme cold weather events.</p> <p>h. Sensitive telecoms equipment would be fitted with lightning protection as per latest design standards.</p> <p>i. To reduce potential impacts associated with storms and high winds, the design of electrical facilities and utilities corridors does not include any overhead lines or cables. Design of buried services will include flexible conduits at least within areas over the landfill, where some degree of settlement is expected.</p> <p>j. New underground utilities will not be laid at shallow depths to avoid damage due to temperature extremes during excavations.</p> <p>k. Energy centre and new sub-stations will be above the ground level in enclosed structures which will offer protection from high winds and provide the opportunity for climate/temperature control.</p> <p>l. Assets would be maintained to detect deterioration and damage caused by extreme weather events.</p> <p>m. On-site rescue and firefighting service are the first-responders for any incident within the airport boundary.</p> <p>Water Resources:</p> <p>a. The drainage design for the Proposed Development would accommodate for surface water flows during 1 in 100 years storm event, accounting for an increase in precipitation of 40% due to climate change, in accordance with relevant guidance. The drainage design would also minimise effects with regards to water availability for retained habitats. Refer to Drainage Design Statement (Appendix 20.4 of this ES [TR020001/APP/5.02]) for further information.</p> <p>b. Sustainable Drainage Systems (SuDS) will be provided, suitable for extreme rainfall events.</p> <p>c. Water efficiencies are built into the Proposed Development through the Drainage Design Statement (Appendix 20.4 of this ES [TR020001/APP/5.02]). These include reduction of demand and foul water discharge, reduction in use of potable water in applications where non-potable water can be used, use of water efficient appliances and equipment within the terminal.</p>

Topic	Embedded Design Measures
	<p>d. A Water Cycle Strategy has been prepared (provided as Appendix 20.5 of this ES [TR020001/APP/5.02]) and includes consideration of measures to minimise water use and maximise water reuse (e.g. such as rainwater harvesting).</p> <p>Landscaping:</p> <p>a. Landscape planting will take into consideration climate change in the selection of appropriate species for planting and habitat creation and provide adequate monitoring post-planting, as presented in the Outline LBMP (Appendix 8.2 of this ES [TR020001/APP/5.02]).</p> <p>b. New trees and planting would be provided in Replacement Open Space to provide areas of shade and cooling.</p> <p>Soils:</p> <p>a. The requirements for consideration of climate change impacts on groundwater levels, soil moisture content and precipitation are included in the construction and design of earthworks and structures.</p> <p>b. Suitable drainage to maintain dry foundation, and better slopes to drain surface water and prevent ponding will be specified.</p> <p>Construction</p> <p>a. In addition, the Code of Construction Practice (CoCP) (Appendix 4.2 of this ES [TR020001/APP/5.02]) sets out measures to be implemented by the contractors to minimise any impacts with regards to climate change resilience and in-combination climate impacts during construction.</p>
Cultural Heritage	<p>a. During the preparation of the design proposals, a number of different options were assessed. These included alternative locations of the proposed buildings, car parks and other hard standing areas as well as variations in height of the new buildings. Areas that have been subject to previous disturbance, such as the landfill site and previously landscaped areas within the existing airport have been identified. The Proposed Development will utilise previously disturbed areas for multi-storey, block, and surface parking car parking, offices and hotel facilities, expansion of Terminal 2, and for extensions to the existing airfield. Utilising previously disturbed areas avoids the risk of physically impacting buried archaeological remains.</p>

Topic	Embedded Design Measures
	<ul style="list-style-type: none"> b. The Proposed Development design seeks to enhance the historic landscape by including provision for the planting of hedgerows and hedgerow trees that are in-keeping with the historic landscape character of the area. c. Measures described for noise and landscape and visual impacts are also relevant to minimising effects on heritage assets.
Economics and Employment	<ul style="list-style-type: none"> a. The CoCP (Appendix 4.2 of this ES [TR020001/APP/5.02]) seeks to minimise disruption to ongoing airport operations and therefore minimise effects on airport or other employment. b. Similarly, the design of the Proposed Development has been configured to minimise disruption to local businesses. c. The Proposed Development’s design keeps adverse effects on employment generated through the Green Horizons Park (application reference 17/02300/EIA LBC) to a minimum. d. Measures described for air quality, noise and traffic and transport impacts above are also relevant to minimising effects on local businesses and employees.
Greenhouse Gas (GHG) Emissions	<ul style="list-style-type: none"> a. During construction, measures to reduce waste generated and resource use will be applied, including designing out waste workshops, recycling of demolition waste on-site, recycling and use on-site of existing landfill material, balancing cut and fill and setting waste targets. b. The lead contractor will develop and implement a Carbon Efficiency Plan to minimise carbon emissions and set targets to minimise potable water use during construction; c. The new terminal building will utilise efficient building design, such as heat pumps and storage of heat using water storage facilities; d. Measures incorporated into the design to reduce waste include adequate provision for internal and external waste storage and setting municipal waste recycling targets; e. The new Terminal 2 building will be designed to deliver net zero within the new building over its lifecycle, include equator-facing glazing to minimise heat gain, maximise daylighting, incorporate greywater recovery and re-use, and increase airtightness and reduce thermal bridges.

Topic	Embedded Design Measures
	<ul style="list-style-type: none"> f. The design has the flexibility to allow for battery storage for electricity to be accommodated in the future and incorporates stormwater capture and treatment. g. Options for low carbon renewable energy generation/or procurement, and options to encourage the future uptake of low and zero carbon fuels for both vehicles using the airport and aircraft e.g. inclusion of EV charging points in car parks, inclusion of infrastructure for sustainable aviation fuels will be implemented where feasible. h. Delivery of a landscaping strategy to offset any loss of vegetation in relation to the Proposed Development. i. The Applicant’s surface access strategy provides the medium to long term direction for a shift away from private car use to public transport. Where private cars are used, it will encourage low/zero carbon private transport options e.g. electric vehicles. j. Steps to reduce emissions from aircraft during the landing and take-off (LTO) cycle will be considered as part of the airport’s operational strategy. For example, single/reduced engine taxiing, electric towing, review/minimise use of auxiliary power units (APU), reduce emissions due to aircraft idling and hold. k. Operator to facilitate any future Sustainable Aviation Fuels (SAFs) mandate and encourage the adoption of more efficient aircraft through operating policy/strategy. l. LLAOL to encourage the take up of more efficient aircraft through operating policy/strategy and to encourage the take up of SAFs through operating policy/strategy. m. No new fossil fuel heating or generator equipment to be purchased after 2025, where permissible and where practical alternatives are available, excluding emergency repairs. n. Mitigation measures have been integrated (embedded) into the design for the purpose of minimising effects related to waste and resources including designing the development in a manner that facilitates the reuse of acceptable material arisings.
Health and Community	<ul style="list-style-type: none"> a. Measures to reduce adverse effects with regards to air quality, traffic and transport, noise and vibration, economics and employment, and landscape and visual disturbance, also reduce effects on health and communities.

Topic	Embedded Design Measures
Landscape and Visual	<ul style="list-style-type: none"> a. The design of the Proposed Development has evolved to avoid impacts upon the ancient woodland at Winch Hill Wood, retain mature woodland/hedgerow vegetation and coniferous plantation woodland along the ridgeline of Winch Hill, retain an area of mature woodland to the north of Dairyborn Escarpment and retain (in part) hedgerow on the retained northern part of Wigmore Valley Park. Existing vegetation impacted by the Proposed Development would also only be removed when necessary to facilitate works for construction in a specific assessment phase. b. The design of the Proposed Development has evolved also to avoid excavation on the ridgeline of Winch Hill or in land occupied by a site of an Iron Age and Roman settlement-related activity, located within the field immediately to the south east of Wigmore Valley Park. c. The design additionally retains the existing entrance and eastern part of Wigmore Valley Park and integrates it into the proposed enhancement work, to be provided in the retained northern part of the existing park. d. The Replacement Open Space would be designed to include a number of features to avoid and/or minimise landscape and visual effects, such as: <ul style="list-style-type: none"> i. the restoration of boundary hedgerows where necessary adjoining Darley Road and Winch Hill Road; ii. the planting of screening hedgerows and woodland to the south west of Public Right of Way (PRoW) Kings Walden 041, where forming part of the Chiltern Way; iii. the planting of boundary hedgerows and hedgerow trees for screening purposes, adjoining future excavation areas on the south west boundary of the Replacement Open Space; iv. the planting of woodland on the ridgeline of Winch Hill, between the retained mature woodland/hedgerow vegetation and coniferous plantation and the retained hedgerow vegetation on the south east boundary of the existing Wigmore Valley Park, to provide screening and improve connectivity; v. planting of hedgerow trees within restored and screening hedgerow at regular spacings; and vi. creation of improved meadow and mown grassland within the area of replacement parkland;

Topic	Embedded Design Measures
	<ul style="list-style-type: none"> e. Delivery of the Replacement Open Space would also protect the functionality of the PRoW network, provide secure parkland areas, include street furniture agreed with relevant stakeholders, circulation routes and provide at least as large of an area as may be affected by the proposed works ahead of any site clearance works. f. Excavated material considered unsuitable for use under the aviation platform would be used elsewhere, including to construct an earth bund on the south west boundary of the retained part of Wigmore Valley Park, for regrading the existing play area at Wigmore Valley Park, restoring the landform to the west of Winch Hill Road and overlying the proposed infiltration tank to the east of Winch Hill Road. g. Restoration of connectivity between public footpath FP38 and public bridleway BW37 through the Replacement Open Space. h. The visual impact of the proposed buildings would be reduced through the use of muted surface finishes on proposed building elevations and where feasible, airfield equipment. i. Further planting for landscape restoration and screening purposes.
<p>Major Accidents and Disasters</p>	<ul style="list-style-type: none"> a. The Drainage Design Statement for the Proposed Development (Appendix 20.4 of this ES [TR020001/APP/5.02]) has been developed to accommodate surface water flows for up to a 1 in 100 years storm event, accounting for an increase in precipitation of 40% with climate change. b. An analysis of engineered slopes has been undertaken as part of the earthworks design and slopes with a gradient have been specified which would mitigate the risk of slope failure on-site. Where this is not possible, an engineered solution would be provided. c. Measures described for Water Resources and Geology and Soils would also prevent major accident hazards with regards to contamination risks and ground stability. d. Where applicable, the highway design of the Proposed Development has been developed to the standards set out within the Design Manual for Roads and Bridges (DMRB) (Ref. 3.15). Road Safety Audits in line with the requirements of the DMRB would be carried out to inform further design development.

Topic	Embedded Design Measures
	<ul style="list-style-type: none"> e. The layout of the Proposed Development would be developed in consultation with the airport’s existing fire safety and emergency resilience officers. A fire hydrant system will connect to all new aircraft stands and the existing number of emergency water tanks around the runway would be retained. A three minute response time for the onsite rescue and firefighting service would be maintained by the Proposed Development’s design. f. The design of the fuel farm will incorporate measures to mitigate the risk of fire and explosion. g. The design of the Proposed Development would incorporate uninterruptible power sources, which provide emergency power for critical infrastructure, if mains power fails. h. The design of the Proposed Development has been developed to not increase risk of bird strike, for example through the avoidance of open water features within the drainage design and via measures included within the landscape design. i. The Proposed Development would be designed in compliance with all relevant health and safety legislation, standards and guidance. j. The Proposed Development includes a direct connection between the Fuel Storage Facility and the existing fuel pipeline to the east of the Main Application Site. This will provide the opportunity for fuel to be delivered to site via pipeline, reducing the need for fuel to be transported to the airport via road, and therefore, removing hazardous loads from the public road network. k. The Proposed Development will provide facilities for the on-site police service and rendezvous points for emergency services. An isolation bay has been incorporated within the airfield design, where aircraft can be directed, if required, in case of a threat or for disease control. l. The design of extended Luton DART includes emergency means of egress from trains and station platforms.
Noise and Vibration	<ul style="list-style-type: none"> a. Measures would be adopted in line with the ICAO Balanced Approach to Aircraft Noise Management (Ref. 3.16) and the London Luton Airport Noise Action Plan 2019-2023 (Ref. 3.17) to reduce aircraft noise as far as reasonably practicable. An Operational Noise Management (Explanatory Note) has been prepared to

Topic	Embedded Design Measures
	<p>describe how the Balanced Approach is currently adopted at the airport and any additional measures that would be adopted as part of the application for development consent; this is provided as Appendix 16.2 to this ES [TR020001/APP/5.02].</p> <ul style="list-style-type: none"> b. The Noise Envelope is a legally binding framework to monitor, manage and control aircraft noise, including a defined mechanism to share the noise reduction benefits of future technological improvements in aircraft between the airport and local communities. The Noise Envelope will be secured as part of the DCO through Green Controlled Growth (see Green Controlled Growth Explanatory Note [TR020001/APP/7.07]) and will be a legally binding framework of limits and controls to manage aircraft noise. c. New building infrastructure would screen receptors to the north of the Proposed Development from ground-based operational noise sources. In addition, the design of the Proposed Development has been developed to minimise distances between the runway and Terminal 2 stands so that noise emissions from taxiing aircraft are minimised. d. The new ERUB will provide enhanced levels of screening of engine testing activities over the current set up. e. For Terminal 2, new stands will be fitted with Fixed Electrical Ground Power so aircraft can connect directly to the mains electricity supply, negating the need for ground power units and therefore, eliminating a noise source. f. An acoustic barrier at a height of 4m is included in the Proposed Development to screen receptors from ground noise. The location of the barrier moves per assessment phase as new airport infrastructure extends to the east. In the final layout, the barrier extends along the security fence between the Terminal 2 building and the ERUB. g. Fixed plant will be designed, constructed, operated and maintained in order to meet the relevant noise level criteria as described in Appendix 16.3 Fixed Plant Noise Management Plan [TR020001/APP/5.02]. h. In order to avoid significant adverse impacts on health and quality of life from surface access noise the Proposed Development is committed to improving accessibility to the airport, particularly by public transport. Further information on the sustainable transport strategy is detailed in the Surface Access Strategy [TR020001/APP/7.12] and Travel Plan [TR020001/APP/7.12].

Topic	Embedded Design Measures
	<ul style="list-style-type: none"> i. The Airport Access Road would be constructed with a low noise, thin surface course system meeting the requirements of a Level 3 surface as specified in Table 9/17 of the Manual Contract Documents for Highway Works (MCHW) Volume 1 Specification for Highway Works Series 900.
Soils and Geology	<ul style="list-style-type: none"> a. The Outline Remediation Strategy (for former Eaton Green Landfill Site) (Appendix 17.5 of the ES [TR020001/APP/5.02]) sets out gas and leachate management and protection measures for buildings and services. b. The design of the landform has been through several iterations, and a primary aim has been to minimise disturbance to the former landfill thereby reducing risks associated with excavation and reuse of waste. The cut and fill balance for the Proposed Development has been optimised to minimise the amount of landfill material that would require excavation, including building the apron on the landfill, and thereby reducing potential exposure of construction workers and adjacent site users to contaminants within the waste during construction. c. The geotechnical design takes into account issues which may affect the stability, settlement and integrity to ensure they do not impact the Proposed Development.
Traffic and Transport	<ul style="list-style-type: none"> a. Extension of the Luton DART system to serve the new terminal. b. Proposed Off-site Highway Intervention works have been defined to reduce the adverse impact of the additional traffic on road users. c. Major highway works proposed within the airport to provide adequate access to the new terminal and cater for the growth in road traffic within the airport perimeter. d. Provision of the Airport Access Road as part of the application for development consent.
Waste and Resources	<ul style="list-style-type: none"> a. Designing the Proposed Development in a manner that facilitates the reuse of acceptable material arisings, for example those associated with earthworks cuttings and other excavations. b. The inclusion of land within the Order Limits for the temporary on-site storage of soils, excavated materials and other materials.

Topic	Embedded Design Measures
	<ul style="list-style-type: none"> c. The appropriate sizing of construction compounds to enable the segregation and storage of waste, and to facilitate offsite recovery. d. The retention of existing infrastructure within the design where feasible, to minimise the need for the demolition of components and infrastructure and the associated generation of waste material. e. Design of adequate provision for internal and external waste storage to allow waste segregation during operation. f. Other measures include achieving an earthworks cut and fill balance, reuse of excavated materials and the recycling of demolition and construction materials, where practicable, importing alternative (recycled and secondary) aggregate and other materials during construction, where practicable, producing a Materials Management Plan and Site Waste Management Plan, setting recycled content targets and waste recovery targets during construction.
<p>Water Resources and Flood Risk</p>	<p>The embedded design measures contained within the drainage design include but are not limited to the below (refer to the Drainage Design Statement (Appendix 20.4 of this ES [TR020001/APP/5.02]) for further information):</p> <ul style="list-style-type: none"> a. The drainage design has been developed to accommodate the volume and rate of water generated by a 1 in 100 year return period storm event, including a 40% uplift to allow for potential increases in rainfall due to climate change. SuDS will be utilised, where possible. b. The drainage design for the Main Application Site includes measures to maximise water reuse such as greywater reuse and rainwater harvesting (also refer to Appendix 20.5 Water Cycle Strategy of this ES [TR020001/APP/5.02]). c. The design of the Proposed Development has been developed in cognisance of the groundwater levels, with no excavations proposed below the groundwater level. This embedded mitigation limits the potential for groundwater lowering impacts which could lead to a reduction in baseflow to receptors or derogation of existing abstractions. d. The main drainage infrastructure for the Proposed Development will include the installation of the new WTP, attenuation tanks and infiltration tanks for the Proposed Development. The infiltration tanks are to be located underground to avoid bird strike risk.

Topic	Embedded Design Measures
	<ul style="list-style-type: none"> e. Inline pollution prevention measures such as full retention separators will be utilised for all runoff from aprons, taxiways and the runway, whilst permeable paving comprising bio-membranes will be utilised beneath car parks. f. Real-time monitoring of contaminants within surface water runoff will be provided. When trigger levels of these contaminants are exceeded, surface water would then be diverted to a storage tank and from there into a treatment facility at a controlled rate. g. The new fire training ground will be served by an isolated drainage system. Contaminated run-off will be collected and either directed into the existing public foul sewerage system (subject to the necessary consents) or tankered away for appropriate treatment. h. The storage tanks at the new fuel farm will be surrounded by a bund in line with legislation and best practice guidance. Surface water from within the operational fuel farm area will drain through hydrocarbon interceptors with sensors to monitor water quality. i. A surface water management system has been provided for the Airport Access Road that is able to accommodate a 1 in 100 year return period storm event plus a 40% uplift for climate change, which is compliant with contemporary standards of sustainable drainage design. The runoff will be collected in an engineered pipework system, attenuated and discharged in accordance with the hierarchy of discharge. j. The works at each Off-site Highway Intervention sites will be designed in line with accepted highway design standards to ensure no unacceptable increase in flood risk or potentially significant effect on local water quality.

3.6 Conclusion

- 3.6.1 The consideration of alternative options and design evolution for the Proposed Development has been informed by the potential for likely significant environmental effects to arise from the Proposed Development and the need to mitigate effects. Both have been taken into account in identifying the preferred option.
- 3.6.2 Full consideration has been given to feedback received from each consultation stage and the technical engagement undertaken with statutory stakeholders.

- 3.6.3 This chapter has set out the reasonable alternatives considered in establishing the Proposed Development and described how the preferred option was selected over alternatives. It has described what considerations were taken into account during the design evolution, including environmental or other issues raised, and is in compliance with the EIA Regulations.
- 3.6.4 Option 1A was selected as the preferred strategic option and developed into the Proposed Development, as described in **Chapter 4** of this ES **[TR020001/APP/5.01]**.

GLOSSARY AND ABBREVIATIONS

Term	Definition
ANPS	Airports National Policy Statement
CWS	County Wildlife Site
DART	Direct Air to Rail Transit
EIA	Environmental Impact Assessment
FEGP	Fixed Electrical Ground Power
GHG	Greenhouse Gases
ICAO	International Civil Aviation Organisation
km	Kilometre
LBC	Luton Borough Council
LLAOL	London Luton Airport Operations Limited
m	Metre
m ²	Metre squared
m ³	Metre cubed
mppa	million passengers per annum
PEIR	Preliminary Environmental Information Report
PRoW	Public Rights of Way
SuDS	Sustainable Drainage Systems
UK	United Kingdom
WTP	Water Treatment Plant

REFERENCES

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