



Gatwick Airport Northern Runway Project

Environmental Statement

Appendix 3.5.2 North Terminal Roundabout Options Development

Book 5

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1 Introduction

- 1.1.1 This document forms ES Appendix 3.5.2 of the Environmental Statement (ES) prepared on behalf of Gatwick Airport Limited (GAL) for the proposal to make best use of Gatwick Airport's existing runways and infrastructure (referred to within this report as 'the Project').
- 1.1.2 The Preliminary Environmental Information Report (PEIR), presented for the Autumn 2021 Consultation, included an assessment of the impacts of the highway improvement works proposed as part of the Northern Runway Project. These highway works were developed following analysis and concept design that fed an option development process. A full description of the options considered through this process is provided in the **Consultation Report Appendices – Part B**, B.16 Preliminary Environmental Information Report, PEIR Appendix 12.9.1 Part 4 (Doc Ref 6.2).
- 1.1.3 GAL received a number of comments from key stakeholders to the Autumn 2021 consultation material that led to amendments to the highway works being proposed, specifically around North Terminal and the connections to Airport Way and A23 London Road. Relevant comments included those from National Highways and local highway authorities. These revised proposals are presented in the Summer 2022 consultation (**Consultation Report Appendices – Part C**, C1 Consultation Document (Doc Ref. 6.2)). To arrive at the new proposals GAL revisited the Option Development approach and consulted National Highways to ensure that a thorough and transparent process was used to evaluate options, with all relevant factors considered consistent with the Department for Transport's Transport Analysis Guidance (TAG) (Department for Transport, 2022). The layouts at the South Terminal Roundabout and Longbridge Roundabout remain similar to those presented in the PEIR.

2 Assessment of Options

2.1 Assessment Approach

- 2.1.1 The development of highway proposals requires a balance to be made between different, sometimes competing, factors. Each potential option was assessed against all these factors to arrive at a preferred mitigation design that achieves the best balance across all criteria.

- 2.1.2 The overriding requirement is to ensure the highway mitigation prioritises the safety of all users. At the same time, the design should deliver the capacity needed to operate efficiently and limit the potential impacts on the natural and built environment and on communities surrounding the airport. In summary, the option development process considers the following criteria:
 - highway operation and maintenance;
 - user experience;
 - effective design;
 - safety (during operation and construction);
 - airport operations;
 - construction;
 - environmental impacts; and
 - delivery.

Within each criterion are a series of sub-criteria, representing the potential impacts of the highway mitigation option being considered. These are listed in
- 2.1.3 Table 2.1.1. Whilst there is no pre-defined weighting attached to the sub-criteria there are a number that could be considered critical to the acceptability of the options considered. In addition to safety-related criteria, these include the permanent impact on the environment and if the impacts were to put at risk the consent of the Project overall.
- 2.1.4 Under each of the assessment criteria, all options were assessed using the following 'scoring' system. Further detail on this methodology is presented within **ES Chapter 3: Alternatives Considered**, Section 3.5, (Doc Ref. 5.1):
 - **Good** – likely to be acceptable and where risks can be mitigated.
 - **Relatively good** – still likely to be acceptable but not as good and with greater risks.
 - **Feasible** – requirements appear to be achievable by mitigation but with compromise.
 - **Less feasible** – achieving requirements may be problematic and may not be fully mitigated.
 - **High risk** – significant risks to achieving consent would remain even with mitigation.
 - **Unworkable** – does not meet critical requirements and cannot be mitigated.

Table 2.1.1: Assessment Criteria

Category	Sub-criteria
Highway operation and maintenance	Operational resilience (highways)
	Ability to futureproof (highways)
	Maintenance of infrastructure (inc. issues such as complexity and cost)
	Modelled traffic impacts on local road network, excluding the Strategic Road Network (SRN)
User Experience (Airport/non-Airport)	Modelled traffic impacts on wider network (SRN)
	Journey time reliability and delay
	Connectivity of highway layout (logical routes accommodated)
Design	Impact on essential and emergency services
	Wayfinding and legibility of layout
	Complexity of design and design risk (all disciplines)
Safety	Provision for walkers, cyclists, horse riders (as appropriate) and severance
	Compliance with standards
	Safety of road layout (design) (users inc. walking, cycling and horse riding)
	Safety during construction (users)
	Safety during construction (workforce)
Airport Operations	Safety during operation (workforce)
	Safety during maintenance (workforce)
	Impact on core operations and security
Construction	Impact on ancillary facilities and commercial tenants
	Resilience and futureproofing (airport)
	Complexity of construction
	Construction programme and risk
Environment	Construction impacts on airport operation
	Construction impacts on users (disruption)
	Environmental impacts of construction (temporary)
	Landscape/townscape
	Air quality
	Agriculture and recreation
	Ground conditions
	Water and flood risk
Noise and vibration	
Ecology and biodiversity	
Health and wellbeing	
Historic environment	

Category	Sub-criteria
Delivery	Climate change and greenhouse gases
	Socio-economic impact
	Cost and affordability
	Complexity of mitigation (inc. land and compensation costs)

2.1.5 The Autumn 2021 Consultation (**Consultation Report Appendices – Part B**, B.16 Preliminary Environmental Information Report, PEIR Appendix 12.9.1 Part 4 (Doc Ref 6.2)) included a summary of the options that were considered most closely before arriving at the previous preferred highway proposals. Considering the consultation responses, the assessment framework described above was used and each option revisited. GAL was assisted by National Highways who gave technical advice on safety, compliance with standards and impact on users.

2.1.6 The options reviewed were developed in concept and were not fully optimised in terms of design. However, they represented typical layout arrangements allowing impacts to be assessed under each of the evaluation criteria and for it to be clear where impacts differed between options. Variations of the options were also be considered. Typical variants were alternative junction types, removal or relocation of connections and options for how traffic merged or diverged where routes joined or split.

2.1.7 One of the reasons that this assessment approach was important for this part of the network was the physical constraints that exist for making changes to the highway layout. One objective for the preferred layout was to remove some of the conflicts between local non-airport traffic and airport traffic. This included how Airport Way and A23 London Road connected and allowed traffic to move freely in all directions. However, this could not easily be achieved due to the proximity of Riverside Garden Park to the north and significant airport assets such as the Inter-Terminal Transit System and Police Station to the south. The assessment process helped to highlight these competing issues to arrive at the best solution, even if this required some compromise.

2.2 Prior to presenting the PEIR information for the Autumn 2021 consultation five concept design solutions were evaluated to determine the preferred approach. In the descriptions that follow these are Options 1-5 in Assessment

2.2.1 Table 2.2.1 sets out a high-level summary of the options assessed during the Autumn 2021 and Summer 2022 periods of

consultation and sets out a brief description of the main impacts, which guided the evaluation.

2.2.2 Table 2.2.1. The review undertaken in consultation with National Highways included a sixth main option for the junction and connection arrangement around North Terminal, and the original five were revisited, some of which were assessed in more than one variant.

2.3 In addition, it was considered if the overall approach to connecting the A23 London Road and Airport Way in a similar way to the existing situation was the correct approach, or if a more fundamental change would achieve better results. These considerations were summarised as Option 7 and Option 8 in Assessment

2.3.1 Table 2.2.1 sets out a high-level summary of the options assessed during the Autumn 2021 and Summer 2022 periods of consultation and sets out a brief description of the main impacts, which guided the evaluation.

2.3.2 Table 2.2.1. It is noted however that from the outset these were considered to have disproportionate impacts on the environment and local communities such that a full evaluation of them was not undertaken.

2.3.3 **ES Chapter 3: Alternatives Considered** (Doc Ref. 5.1) sets out that these options (1-8) fall under the following three main options, as follows:

- Option M1: do minimum involves optimisation of the existing junction layout with at-grade solutions (Assessment)
- Table 2.2.1 sets out a high-level summary of the options assessed during the Autumn 2021 and Summer 2022 periods of consultation and sets out a brief description of the main impacts, which guided the evaluation.
- Table 2.2.1: Option 5);
- Option M2: grade separated junction predominantly within existing highway boundary (Assessment)
- Table 2.2.1 sets out a high-level summary of the options assessed during the Autumn 2021 and Summer 2022 periods of consultation and sets out a brief description of the main impacts, which guided the evaluation.
- Table 2.2.1: Options 1, 4 (and 4, Variant C)); and

- Option M3: grade separated junction not constrained by the existing highway boundary (Assessment)
- Table 2.2.1 sets out a high-level summary of the options assessed during the Autumn 2021 and Summer 2022 periods of consultation and sets out a brief description of the main impacts, which guided the evaluation.
- Table 2.2.1: Options 2, 3, 5, 6, 7 and 8).

2.3.4 An appraisal of the three main options for the North Terminal Roundabout (Options M1-M3), was carried out in **ES Appendix 3.5.1: Options Appraisal Tables** (Doc Ref. 5.3). For each category a 'scoring' system was used to qualitatively assess each design and /or layout option using professional judgement and experience of the site and surrounding area. The scoring system allowed for a consistent approach to be applied to each category. The full appraisal was based on a five-scale Red, Amber, Green (RAG) approach.

2.3.5 It is worth noting that the analysis of future traffic flows, made up by both airport and non-airport traffic showed that some improvements and extra capacity would be needed to roads in this area, notwithstanding the commitment to increasing the proportion of trips that would access the airport by public transport. This is necessary to support the safe and efficient movement of traffic up to 2047, which are key parts of the option assessment reflected in our preferred option set out in **ES Chapter 3: Alternatives Considered** (Doc Ref. 5.1).

2.4 Assessment

2.4.1 Table 2.2.1 sets out a high-level summary of the options assessed during the Autumn 2021 and Summer 2022 periods of consultation and sets out a brief description of the main impacts, which guided the evaluation.

Table 2.2.1: Assessment Summary



Illustration	Assessment Summary
	<p>Options in brackets refer to the three main options set out in ES Chapter 3: Alternatives Considered, Section M. Off-Airport Highways: North Terminal Roundabout (Doc Ref. 5.1).</p> <p>Option 1 (Option M2) This option retained all the existing connectivity but placed the A23 London Road Westbound on a flyover and extended the North Terminal Roundabout largely within the highway boundary.</p> <ul style="list-style-type: none"> Performed well in terms of the environmental criteria considered (see Table 2.1.1) and in providing connectivity but poorly in terms of construction and had a critical failure in terms of safety due to the design of merges and diverges in a very constrained area.
	<p>Option 2 (Option M3) Similar to Option 1 but removed the constraint of not widening north into Riverside Garden Park. Introduced considerable negative impacts on the Riverside Garden Park, identified in several of the environmental topics, including landscape, recreation, ecology, noise, and flood risk and did not remove the highway design safety failure.</p>






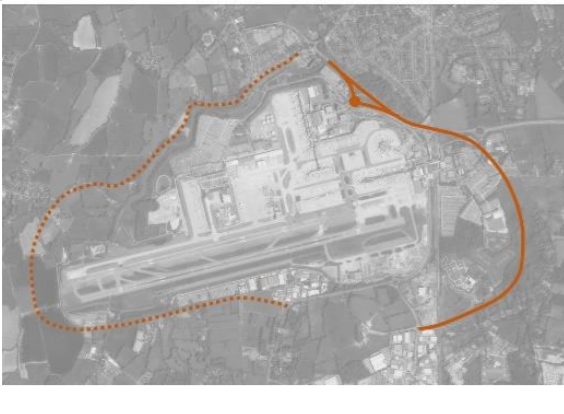

Illustration	Assessment Summary
	<p>Options in brackets refer to the three main options set out in ES Chapter 3: Alternatives Considered, Section M. Off-Airport Highways: North Terminal Roundabout (Doc Ref. 5.1).</p> <p>Option 3 (Option M3) Similar to Option 1 but removed the constraint of not widening south into airport operational areas. As with Option 2, the additional negative impacts, this time on airport operations and existing premises, were significant and did not remove the highway design safety failure.</p>
	<p>Option 4 (presented in Autumn 2021 PEIR) (Option M2) Introduced a new signalised junction on the A23 London Road and converted North Terminal Roundabout into a signalised intersection, with a flyover for westbound Airport Way traffic towards A23 London Road. Performed well against operational and construction criteria and against environmental and land impacts but some significant design safety concerns due to the unusual junction arrangement proposed.</p>
	<p>Option 4 Variant C (presented in Summer 2022 Consultation) (Option M2) Variation on Option 4, returning to a roundabout layout at North Terminal and relocating eastbound Airport Way traffic via A23 London Road. Similar benefits to Option 4 (see above) but with an improved design that performed better in terms of safety and compliance with standards (note, this option was subject to further refinement to optimise its design)</p> <p>Overall, this was considered the best option for the North Terminal Junction improvements.</p>

Illustration	Assessment Summary
	<p>Options in brackets refer to the three main options set out in ES Chapter 3: Alternatives Considered, Section M. Off-Airport Highways: North Terminal Roundabout (Doc Ref. 5.1).</p> <p>Option 5 (Option M1) Introduction of an additional roundabout to separate the flows to and from Airport Way and A23 London Road without the need for grade separation, but no separation of airport and non-airport traffic.</p> <ul style="list-style-type: none"> Maintained good performance against environmental criteria (Table 2.1.1) by using airport land but this severely compromised airport operations. The shorter links between roundabouts also limited capacity and futureproofing.
	<p>Option 6 (Option M3) Additional roundabout introduced in Riverside Garden Park to provide separation between A23 London Road and Airport Way traffic, with a westbound flyover to separate some airport and non-airport traffic. Performed well in terms of resilience and futureproofing but with some construction difficulties due to level differences. Considerable impact on environmental topics, especially landscape, recreation, ecology, noise, and flood risk, which may not have been able to be adequately mitigated.</p>
	<p>Option 7 (Option M3) Consideration of re-routing of the A23 to the east or west of the airport to remove the physical conflicts between the A23 London Road and Airport Way in the vicinity of North Terminal. Was not subject to the full assessment due to the disproportionate impact on surrounding land, properties, and communities, which it was considered would make it difficult to achieve consent for a Development Consent Order (DCO) which included this option.</p>

<p>Illustration</p>	<p>Assessment Summary</p> <p>Options in brackets refer to the three main options set out in ES Chapter 3: Alternatives Considered, Section M. Off-Airport Highways: North Terminal Roundabout (Doc Ref. 5.1).</p>
	<p>Option 8 (Option M3)</p> <p>Reconfiguring of the airport access from the M23 and focusing capacity on South Terminal to remove conflicts at North Terminal and reduce traffic flow. Was not subject to the full assessment due to the potential impacts on the key motorway junction and difficulties for construction. It was not clear if the airport operational constraints this would create could be resolved successfully compared with other options.</p>

- Each option was considered independently and assessed as being between good and unworkable using all the assessment criteria listed in

2.4.2 Table 2.1.1. Working through the assessment it was possible to screen certain options and variants out on the basis that other options achieved the same or better scores against the assessment criteria without some of the negative impacts to surrounding land and property assets. An example is in the differences between Options 1, 2 and 3. These provide very similar highway layouts but have different constraints to the north and south. It was found that relaxing the constraint of not widening the highway into Riverside Garden Park (Option 2) or encroaching on existing airport assets (Option 3) created several negative impacts without gaining significant benefits in terms of highway layout and safety. As a result, Options 2 and 3 were screened out and Option 1 was retained.

2.4.3 Option 4, which was the scheme presented in the Autumn 2021 Consultation and assessed in the PEIR, minimised the impacts on the environment and surrounding land but raised several important safety concerns and departures from design standards. Through discussions with key stakeholders it was concluded that the design needed to be amended so a number of variants were considered, including reverting to a roundabout layout rather than a signalised intersection.

2.4.4 Options 5 and 6 explored the degree to which expanding the highway boundary, either further into Riverside Garden Park, or within the airport boundary, would lead to a much better and safer highway layout, that still met future traffic needs. In the case of Option 6, which created a new roundabout in Riverside Garden Park, it was felt that the negative environmental and community impacts were too great.

2.4.5 It was clear that Options 7 and 8 were not suitable as they would have considerably wider impacts than the other options. It was considered that they would only be relevant if the assessment concluded that none of the other options, which focus on North Terminal Roundabout, A23 London Road and Airport Way only, could achieve the main objectives for the scheme.

2.4.6 The option assessment concluded that Options 1, 4 and 5 offered the best solutions considering all criteria but that significant modification of the layouts would be required to ensure a safe and optimum design. In terms of overall capacity and safety a variation on Option 4 (Variant C) was considered to offer the best

balance considering all the assessment criteria and closely conformed to design standards.

2.4.7 This new junction arrangement at North Terminal, which retains many of the features of the option presented in PEIR but has a few key differences, is considered to be the optimum solution. This was the option consulted upon in the Summer 2022 Consultation (refer to **Consultation Report Appendices – Part C, C.1** Consultation Document (Doc Ref 6.2)) and is retained for the DCO application. The main differences from the option assessed in the PEIR are as follows:

- Use of a signalised roundabout junction at the entry to and exit from North Terminal rather than the signalised intersection proposed in September’s consultation.
- Relocation of eastbound Airport Way traffic to the new signalised junction on the A23 London Road to remove the issue of merging traffic close to the start of the new flyover at South Terminal Roundabout.
- Modifications to Airport Way westbound and leading to Longbridge Roundabout arising from further design development and optioneering.

2.4.8 The choice of this layout, and in particular the arrangement for traffic travelling westbound between South Terminal Roundabout and North Terminal Roundabout required a further, secondary option assessment dealing with two specific highway design issues:

- The form of the merge layout where traffic from South Terminal join traffic on the westbound flyover, and whether the volume of traffic in each case was better served by three lanes on Airport Way or if this would create weaving issues affecting safety.
- The orientation of the lanes from Airport Way, either taking traffic onto the flyover towards the A23 London Road or leading into North Terminal Roundabout.

2.4.9 The secondary option assessment was mainly driven by the safety aspects of merging traffic, weaving between lanes, and diverging to separate routes. In summary, different combinations of two or three lanes on Airport Way were assessed, in addition to the link leading to North Terminal Roundabout filtering off to the left or right, with different lane arrangements at the diverge. The preferred solution, developed in consultation with National Highways, provides extra resilience and enhanced operation by adding a third lane westbound on Airport Way whilst significantly reducing the need for weaving between lanes.

2.4.10 During the design development of this option, all aspects of the highway mitigation were reviewed. In consultation with National Highways and local highway authorities it was concluded that widening of westbound A23 London Road heading towards Longbridge Roundabout would also be beneficial. These enhancements to the westbound links provide greater resilience and futureproofing of capacity over the DCO assessment period up to 2047. This has resulted in a simpler, more intuitive layout that provides for both non-airport traffic and airport traffic.

3 References

Department for Transport (2022) Transport analysis guidance (TAG).

4 Glossary

4.1 Glossary of Terms

Table 4.1.1: Glossary of Terms

Term	Description
DCO	Development Consent Order
ES	Environmental Statement
GAL	Gatwick Airport Limited
PEIR	Preliminary Environmental Information Report
RAG	Red, Amber, Green
SRN	Strategic Road Network
TAG	Transport Analysis Guidance