

A47/A11 Thickthorn Junction

Scheme Number: TR010037

Volume 9 **9.15 Environmental Statement Addendum**

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The A47/A11 Thickthorn Junction
Development Consent Order 202[x]

ENVIRONMENTAL STATEMENT ADDENDUM

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CONTENTS

1	INTRODUCTION.....	1
1.1	Purpose of this Document.....	1
2	Reduction of order limits.....	2
3	Design changes.....	2
3.2	Change to the horizontal alignment of the A11-A47 Link Road.....	2
3.3	Change in location to field accesses.....	3
4	Review of environmental statement.....	3
4.1	Introduction.....	3
4.2	Noise and vibration.....	4
4.3	Climate.....	12
5	Conclusion.....	14
	Appendix A: Predicted Construction Noise Levels.....	15

1 INTRODUCTION

1.1 Purpose of this Document

1.1.1 The purpose of the Environmental Statement (ES) Addendum is to introduce and collate the design changes which have occurred during the examination process and to clarify how, if at all, they change or alter the conclusions of the ES (**APP-038 – APP-050, REP3-006**). The ES Addendum will also set out the need for these design changes and how they affect the DCO and ES documents.

1.1.2 Table 1.1 summarises the design changes introduced during the examination and which ES chapters require amendments as a result of each design change. (✓) means change is required and (✗) means no change is required. The changes are detailed individually for each ES Chapter in this Addendum.

Table 1.1 ES Chapters affected by design changes

ES chapters	Design and Order Limit Changes		
	Realignment of A11-A47 Link Road	Relocation of field accesses	Amendment to order limits
Air quality	✗	✗	✗
Landscape	✗	✗	✗
Cultural heritage	✗	✗	✗
Biodiversity	✗	✗	✗
Geology & soils	✗	✗	✗
Material assets and waste	✗	✗	✗
Noise and vibration	✓	✗	✗
Population & human health	✗	✗	✗
Road drainage and the water environment	✗	✗	✗
Climate	✓	✗	✗
Cumulative effects assessment	✗	✗	✗

2 REDUCTION OF ORDER LIMITS

- 2.1.1 A property on Intwood Road adjacent to the Cantley Stream was included in the current Order Limits as initial flood modelling indicated an increased detriment in flood levels at the property that could require local mitigation measures. This is shown as Plot 7/12a on the Land Plans (**APP-006**).
- 2.1.2 Between the DCO application submission in March 2021 and the examination, additional survey information obtained and used to update the flood model, showed no increased detriment to flood levels at the property. No mitigation is subsequently required. The Applicant is proposing that Plot 7/12a can therefore be removed from the Order Limits. The updated Flood Risk Assessment was submitted to the Examining Authority at Deadline 3 (**REP3-008**).
- 2.1.3 The revised Order Limit is shown on Figure 1.1 (**APP-053**).

3 DESIGN CHANGES

- 3.1.1 There are two design changes detailed in this ES Addendum associated with the A11-A47 Link Road and the field accesses that form part of the Cantley Lane Link Road, north of the A11. These are detailed in the following sections.

3.2 Change to the horizontal alignment of the A11-A47 Link Road

- 3.2.1 ES Chapter 2 (The Proposed Scheme) (**APP-039**) Section 2.6 details the two proposed construction methods of the underpasses required to facilitate the A11-A47 Link Road. Both of the construction methods were assessed within the ES.
- 3.2.2 As a result of a detailed review into the method of construction undertaken by the Applicant, a reduction in the cross section of the Cantley Lane Underpass (S04) can be achieved by adjusting the horizontal alignment of the A11-A47 Link Road between the Wards Wood Underpass and the Cantley Lane Underpass to reduce the width of the offside verge required to accommodate forward visibility. The maximum deviation from the current alignment is 7m horizontally to the north.
- 3.2.3 The proposed amendment to the horizontal alignment will require a corresponding adjustment to the earthwork cut slopes required for the A11-A47 Link Road and the bunding provided north and south.
- 3.2.4 This design change is shown on the General Arrangement Plans, Rev.1 (**APP-005**) submitted at Deadline 4.
- 3.2.5 The Applicant considers this proposed change to be non-material, as the design changes remain within the limits of the land to be permanently acquired by the Applicant as shown on Sheet 6 of 7 of the Land Plans (**APP-006**). This design change also remains within the highway works limit of deviation as shown on Sheet 6 of 7 of the Works Plans (**APP-007**). There are no other changes to permanent or temporary land take as a result of this design change.

3.3 Change in location to field accesses

- 3.3.1 There are currently two field accesses proposed that permit access to the fields east and west of the Cantley Lane Link Road north of the A11. It is proposed to relocate these field access points based on a request from the landowner of plots 5/2b and 5/2c as shown on the Land Plans (**APP-006**) submitted at Deadline 4.
- 3.3.2 The western access point will be relocated 85m north, and the eastern access point will be relocated 50m south. The fencing and bunding adjacent to the field accesses also required some localised redesign. Both field access points are being constructed to provide access to land either side of the Cantley Lane Link Road which will be used temporarily as construction compounds and material storage as shown on the Works Plans (**APP-007**).
- 3.3.3 This design change is shown on the General Arrangement Plans (**APP-005**) submitted at Deadline 4.
- 3.3.4 The Applicant considers this proposed change to be non-material as the design change remains within the limits of the land to be permanently acquired by the Applicant. This design change also remains within the highway works limit of deviation as shown on Sheet 5 of 7 of the Land Plans (**APP-006**). There are no other changes to permanent or temporary land take as a result of this design change.

4 REVIEW OF ENVIRONMENTAL STATEMENT

4.1 Introduction

- 4.1.1 The following sections summarise the outcomes of a review of the proposed design changes and removal of plot 7/12a from the order limits against the existing environmental assessment detailed within the ES (**APP-038 – APP-050, REP3-006**).
- 4.1.2 There are no changes to the following ES chapters or their conclusions as a result of the design changes or the reduction to the Order Limits.
- Air quality (**APP-042**)
 - Cultural Heritage (**APP-043**)
 - Landscape (**APP-044**)
 - Biodiversity (**APP-045**)
 - Geology & Soils (**APP-046**)
 - Material assets and waste (**APP-047**)
 - Population & human health (**APP-049**)
 - Road drainage and the water environment (**APP-050**)
 - Cumulative effects assessment (**APP-052**)
- 4.1.3 Sections 4.2 and 4.3 provide an update to the assessments of ES Chapter 11 Noise and Vibration (**APP-048**) and ES Chapter 14 Climate (**REP3-006**).

4.2 Noise and vibration

Introduction and Scope of Assessment

4.2.1 The potential effects due to noise and vibration from the construction and operation of the Proposed Scheme were assessed and reported within ES Chapter 11: Noise and Vibration (**APP-048**, submitted at Deadline 4), along with the accompanying Figures 11.1 – 11.8 (**APP-071**) and Appendices (**APP-109**) and in Appendix A of this Addendum submitted at Deadline 4.

4.2.2 The conclusions of ES Chapter 11 (**APP-048**) were as follows:

- The assessment of construction noise identified the potential for significant effects during particular work phases and at specific receptors. For this reason, suitable means of minimising the potential for significant adverse effects were presented and incorporated into the Environmental Management Plan (**APP-128**). These mitigation measures include temporary acoustic barriers (**APP-048** Table 11-12), further construction noise assessment for key construction activities, and construction noise monitoring in some locations. Potentially significant residual construction noise effects were identified at receptor R10 during the culvert structure works. For this reason, construction noise monitoring at R10 with real-time alerts was specified in the Environmental Management Plan (**APP-128**), so as to alert the Principal Contractor when noise from culvert works approaches the SOAEL at R10. No significant residual construction noise effects were expected where these mitigation measures are implemented effectively.
- An assessment of construction vibration identified the potential for significant effects at receptors R9, R10 and R11 (within 30 m of some works phases). For this reason, suitable means of minimising the potential for significant adverse effects were presented and incorporated into the Environmental Management Plan (**APP-128**). These mitigation measures included prior warning of residents, pre-condition building surveys, restrictions on the timings of the works, vibration monitoring at the closest properties to these works, as well as the need for the Principal Contractor to carry out further detailed assessments of construction vibration prior to the works commencing. No significant residual construction vibration effects were expected these mitigation measures are implemented effectively.
- An assessment of traffic noise changes during the construction period concluded that, provided that vehicle movements and routes were restricted as per the Traffic Management Plan (**APP-129**), potential significant effects are unlikely.
- An assessment of operational noise concluded that no significant adverse or significant beneficial noise effects were expected due to changes in road traffic noise that would occur due to the Proposed Scheme. This applied at all receptors within the study area and the NIAs.

4.2.3 The proposed design changes described in Section 3 of this ES Addendum have the potential to affect the above assessment conclusions and the scope of the mitigation measures within the Environmental Management Plan (**APP-128**). In particular, the minor changes in scheme alignment and associated earthworks have the potential to affect the assessment of operational noise and the assessment of construction noise. The assessment of these aspects has been updated to account for the amended design of the Proposed Scheme

- 4.2.4 The proximity of works likely to generate high levels of vibration to the nearest vibration-sensitive receptors is not affected by the design changes (works within 30 m of R9, R10 and R11 remain unaffected by the design changes). For this reason, further assessment of construction vibration is scoped out of this addendum.
- 4.2.5 The quantity and routing of construction traffic is also not affected by the design changes. For this reason, further assessment of road traffic noise changes during construction is scoped out of this addendum.

Construction Noise

Assessment method and assumptions

- 4.2.6 The updated assessment of construction noise has been carried out following the assessment method presented in Section 11.4 of ES Chapter 11 (**APP-048**), with the application of the assumptions presented within Section 11.5 of the same document and within ES Appendix 11.5 (**APP-109**), with the following exceptions:
- The location of noise sources representing the construction works associated with the proposed A11 to A47 slip road have been relocated to reflect the design changes.
 - The location of noise sources representing the earthworks and landscaping to the north and south of the proposed A11 to A47 slip road have been relocated to reflect the design changes.
- 4.2.7 The proposed methods of construction and construction programme previously described within ES Chapter 2 (**APP-039**) are assumed to be unaffected by the design changes described in Section 3 of this ES addendum. For this reason, the construction programme and plant assumptions presented within ES Appendix 11-5 (**APP-109** Tables 11-5.1, 11-5.5 and 11-5.6) are unaffected by the design changes. These assumptions have been applied to the assessment of construction noise due to the amended Proposed Scheme.
- 4.2.8 Construction noise levels have been predicted at receptor buildings within each representative receptor location (i.e. R1, R2, etc.). These representative receptor locations were defined in ES Appendix 11-5 (**APP-109**) and are shown in ES Figure 11-1 (**APP-071**). The highest construction noise level at any receptor façade within each representative receptor location is then presented. Where the construction noise effects vary within the same representative receptor location, the potentially significantly affected property addresses are presented.
- 4.2.9 The significance of construction noise at each representative receptor has then been determined using the same approach as within ES Chapter 11 (**APP-048**) and in accordance with the Design Manual for Roads and Bridges (DMRB) LA111: *Noise and Vibration*. The lowest observed adverse effect level (LOAEL) and significant observed adverse effect level (SOAEL) values that apply to construction noise remain the same as presented within ES Appendix 11-5 (**APP-109** Tables 11-5.2, 11-5.3 and 11-5.4). These were defined based on the existing level of ambient noise during relevant periods of day, evening and night.

4.2.10 Construction noise has the potential to result in a significant effect where the construction noise SOAEL is exceeded (i.e. a moderate or major impact occurs) for 10 or more days or nights in any 15 consecutive days or nights; or for a total number of days exceeding 40 in any six consecutive months. These duration thresholds are defined within DMRB LA 111 and referred to in ES Chapter 11 (**APP-048**) and ES Appendix 11-5 (**APP-109**).

Potential impacts of the amended Proposed Scheme

4.2.11 The effects of the amended Proposed Scheme have been evaluated through construction noise level predictions as described above to account for the design changes.

4.2.12 The predicted construction noise levels for each construction stage are presented in Appendix A of this addendum within Table A.1. Details of the construction stages during which a moderate or major magnitude of impact could occur are presented in Table 4-1 below.

Table 4-1: Moderate and major magnitude of noise impacts during construction

Construction stage	Activity	Representative receptor	Predicted construction noise level (dB L _{Aeq,T} façade)	SOAEL (dB L _{Aeq,T} façade)	Magnitude of impact
1. Site set up	Set Site	R6	67	65	Moderate
		R10	66	65	Moderate
2. Utilities	Allowance for utility works	R6	70	65	Major
		R10	74	65	Major
		R11	73	65	Major
		R12	73	65	Major
4. Structures: Ward's Wood Underpass (Box Push Night-time Works Only)	(Box push construction) Site preparation, construct north and south headwall, box construction, box slide and underpass completion.	R8	62	58	Moderate
		R9	56	55	Moderate
		R12	57	55	Moderate
5. Structures: S04 Cantley Lane underpass (box push night-time works only)	(Box push construction) Site preparation, construct north and south headwall, box construction, box slide and underpass completion.	R6	61	56	Moderate
		R11	62	56	Major
		R12	61	55	Moderate
10. Structures: S45 Cantley Lane Footbridge	North abutment, south abutment and bridge completion	R6	70	65	Major
		R11	68	65	Moderate
11. Structures: S46- Cantley Lane South culvert	Excavate, install culvert units, construct eastern and western headwall, backfill culvert units, construct carriageway over and complete finishing works	R10	79	65	Major

Construction stage	Activity	Representative receptor	Predicted construction noise level (dB L _{Aeq,T} façade)	SOAEL (dB L _{Aeq,T} façade)	Magnitude of impact
12. Structures: S47- Cantley Stream diversion culvert	Excavate, install culvert units, construct eastern and western headwall, backfill culvert units, construct carriageway over and complete finishing works	R10	79	65	Major
13. Highway Works: A11 to A47 Link Road (West of A11) (night)	Topsoil excavation, drainage installation, carriageway construction, edge of carriageway detail, surfacing (night-time)	R12	56	55	Moderate
16. Highway Works: A11 to A47 Link Road (East of A11) – box push and top-down methods	Topsoil excavation, drainage installation, carriageway construction, edge of carriageway detail, surfacing	R11	69	65	Moderate
		R12	67	65	Moderate
17. Highway Works: A11 - A47 Connector Road (North of A47) (night-time works only)	Topsoil excavation and fill, top of batter ditch, top of batter drainage, drainage installation, carriageway construction, edge of carriageway detail, surfacing, A47 tie in.	R4	57	55	Moderate
		R6	65	56	Major
		R11	58	56	Moderate
		R12	56	55	Moderate
20. Highway Works: B1172 junction with new link Road	Drainage, construct carriageway, install kerblines, surfacing works	R9	62	60 (evenings & weekends)	Moderate (evenings & weekends)
23. Highway Works: Cantley Lane improvements	Topsoil strip, ditch, fill, new underground drainage storage, drainage, carriageway construction and gullies, NFD, finishing and landscaping, kerb, footway construction.	R10	69	65	Moderate

4.2.13 Table 4-1 shows that some receptors which are close to certain construction stages would potentially experience a temporary moderate or major magnitude of impact without mitigation. These construction noise impacts have the potential to result in significant noise effects if this occurs for 10 or more days or nights in any 15 consecutive days or nights; or for a total number of days exceeding 40 in any six consecutive months. A precautionary worst-case approach has been adopted, considering that the assessed construction activities have the potential to exceed the above durations. In reality, this may not happen for all stages of work.

4.2.14 The following section presents specific noise mitigation measures and best practice techniques that are expected to reduce the magnitude of the impacts occurring due to construction noise.

Design, mitigation and enhancement measures

- 4.2.15 Construction works will take place mainly during the daytime. Construction works outside of the normal construction hours of 07:00-19:00 on weekdays and 07:00-19:00 on Saturdays shall be minimised as far as practicable, as detailed in the Environmental Management Plan (**APP-128**).
- 4.2.16 Where it is determined that there is a risk of significant effect, or works outside of the normal construction hours are unavoidable (for example certain tie-in works, national grid diversion works), the Principal Contractor will need to undertake further detailed assessments of noise and vibration due to construction, implement best practicable means, consult with the environmental health department at the local authority, and agree appropriate methods of mitigation and monitoring that account for the location of works, hours of work and expected duration. This could form part of a Section 61 prior consent application under the Control of Pollution Act 1974, or a less formal route may be possible pending discussions with the Local Authority.
- 4.2.17 Table 4-2 presents the construction stages for which construction noise is likely to result in significant effects without mitigation. Mitigation measures in the form of temporary noise barriers or site hoarding shall be provided to mitigate construction noise effects at the receptors presented in Table 4-2. This is necessary where construction activity in the vicinity of the receptor is expected to exceed 10 days or nights in any 15 consecutive days or nights; or for a total number of days exceeding 40 in any six consecutive months.
- 4.2.18 The precise locations and heights of the temporary barriers is to be determined by the Principal Contractor and confirmed to the local authority as part of the further detailed construction noise assessments.

Table 4-2: Construction stages and receptors for which temporary noise barriers are required as specific construction noise mitigation measures

Receptor Reference	Receptor Address	Construction stage
R4	North Side Farm, 8 Meadow Farm Drive, Cringleford NR4 6TR	17 (night-time only)
R6	Cringleford residential extension development	1 (during all construction hours) 2 (during all construction hours) 5 (night-time push box method only) 10 (during all construction hours) 17 (night-time only)
R8	Travelodge, Thickethorn Services	4 (night-time push box method only)
R9	Thickethorn Cottages only	4 (night-time push box method only)
		20 (evening and night-time only)
R10	Bridge Cottages, Meadow Farm Cottages, and 128 Cantley Lane NR4 6TF	1 (during all construction hours) 2 (during all construction hours) 11 (during all construction hours) 12 (during all construction hours) 23 (during all construction hours)

Receptor Reference	Receptor Address	Construction stage
R11	102, 104, 106, 108 Cantley Lane, NR4 6TD	2 (during all construction hours) 5 (night-time push box method only) 10 (during all construction hours) 16 (all construction hours push box method only) 17 (night-time)
R12	110, 112, 114, 116, 118, 120, 122, 124 Cantley Lane, NR4 6TD	2 (during all construction hours) 4 (night-time push box method only) 5 (night-time push box method only) 13 (night-time only) 16 (all construction hours push box method only) 17 (night-time)

4.2.19 In addition to the temporary noise barriers, where there is still potential for moderate adverse impacts, the Principal Contractor shall carry out noise monitoring during the relevant construction stages and at the relevant receptors. This is discussed further below.

4.2.20 In addition to the above mitigation measures, the best practice noise and vibration mitigation techniques described within ES Chapter 11 (**APP-048**) section 11.9.8 shall also be employed.

Assessment of likely significant effects

4.2.21 With the mitigation measures described above, the potential for significant effects due to construction noise is reduced. The magnitude of the construction noise impact with effective temporary noise barriers is presented in Table 4-3.

Table 4-3: Construction noise impacts with mitigation

Receptor Reference	Receptor Address	Construction Stage	Magnitude of impact (mitigated)
R4	North Side Farm, 8 Meadow Farm Drive, Cringleford NR4 6TR	17 (night-time only)	Negligible
R6	Cringleford residential extension development	1 (during all construction hours) 2 (during all construction hours) 5 (night-time push box method only) 10 (during all construction hours) 17 (night-time only)	Minor (for stages 2, 5, 17 and 17) Negligible (for stage 1)
R8	Travelodge, Thickthorn Services	4 (night-time push box method only)	Negligible
R9	Thickthorn Cottages only	4 (night-time push box method only)	Negligible
R10	Bridge Cottages, Meadow Farm Cottages, and 128 Cantley Lane NR4 6TF	1 (during all construction hours) 2 (during all construction hours) 11 (during all construction hours) 12 (during all construction hours) 23 (during all construction hours)	Moderate (for stages 11 and 12) Minor (for stages 1, 2 and 23)

Receptor Reference	Receptor Address	Construction Stage	Magnitude of impact (mitigated)
R11	102, 104, 106, 108 Cantley Lane, NR4 6TD	2 (during all construction hours) 5 (night-time push box method only) 10 (during all construction hours) 16 (all construction hours push box method only) 17 (night-time)	Minor (for stage 2) Negligible (for stages 5, 10, 16 and 17)
R12	110, 112, 114, 116, 118, 120, 122, 124 Cantley Lane, NR4 6TD	2 (during all construction hours) 4 (night-time push box method only) 5 (night-time push box method only) 13 (night-time only) 16 (all construction hours push box method only) 17 (night-time)	Minor (for stage 2) Negligible (for stages 4, 5, 13, 16 and 17)

4.2.22 Table 4-3 demonstrates that with effective temporary noise barriers, construction is not expected to result in any significant effects with the exception of receptor R10 during the culvert works (work stages 11 and 12). This is the same conclusion as presented within ES Chapter 11 (**APP-048**). It is noted that there are some changes in the receptors and works stages for which temporary barriers shall be provided. Therefore, the Environmental Management Plan (**APP-128**) has been updated and submitted at Deadline 4 to secure this necessary construction noise mitigation.

4.2.23 The residual moderate adverse impact could result in significant effects where the culvert works take place for 10 or more days or nights in any 15 consecutive days or nights, or for a total number of days exceeding 40 in any 6 consecutive months. For this reason, the potential for significant residual construction noise effects during the culvert works will need to be considered in detail by the Principal Contractor. A further detailed assessment of construction noise from the culvert works shall be undertaken, on the basis of confirmed plant types and durations, where these works are expected to exceed the durations above. Construction noise monitoring with real-time alerts shall be employed at R10 where the risk of significant effects cannot be eliminated. These alerts would notify the Principal Contractor when noise from works approaches the defined SOAEL levels, at which time methods of work can be altered. Where these measures are implemented effectively, construction noise is not predicted to result in significant adverse residual effects.

4.2.24 Given the above, the conclusions of ES Chapter 11 (**APP-048**) with regard to construction noise due to the Proposed Scheme are unaffected by the design changes. No significant residual construction noise effects are expected due to the amended Proposed Scheme provided that the mitigation measures identified above are implemented effectively.

Monitoring

4.2.25 The requirements for the monitoring of construction noise and vibration are unaffected by the design changes and are as stated within ES Chapter 11 (**APP-128**).

Operational Noise

Assessment method and assumptions

- 4.2.26 The updated assessment of operational noise has been carried out following the assessment method presented in Section 11.4 of ES Chapter 11 (**APP-048**), with the application of the assumptions presented within Section 11.5 of the same document, with the following exceptions:
- Road alignments for the Do Something scenario within the road traffic noise model have been updated to account for the amended Proposed Scheme.
 - The topography (ground profile) for the Do Something scenario within the road traffic noise model has been updated to account for the amended Proposed Scheme.
- 4.2.27 The transport consultant has confirmed that the proposed amendments will not affect the traffic data used with the road traffic model. This therefore remains the same as used in the assessment presented in ES Chapter 11 (**APP-048**) and the operational noise study area is therefore also unaffected.
- 4.2.28 For consistency with the assessment presented within ES Chapter 11 (**APP-048**), operational noise effects are evaluated at the least beneficially affected façade of any receptor (i.e. the façade experiencing the smallest decrease or the largest increase in road traffic noise).
- 4.2.29 Road traffic noise levels have been predicted at all dwellings and non-residential sensitive receptors within the operational study area. The short-term noise change has been used to evaluate the potential for significant operational noise effects due to amended Proposed Scheme.
- 4.2.30 The significance of changes in road traffic noise due to the Proposed Scheme has been determined using the same approach as within ES Chapter 11 (**APP-048**) and in accordance with the Design Manual for Roads and Bridges (DMRB) LA111: *Noise and Vibration*. The lowest observed adverse effect level (LOAEL) and significant observed adverse effect level (SOAEL) values that apply to operational road traffic noise remain the same as presented within ES Chapter 11 (**APP-048** Table 11-2).

Potential impacts of the amended Proposed Scheme

- 4.2.31 The effects of the amended Proposed Scheme have been evaluated through road traffic noise level predictions for the amended Do Something scenario.
- 4.2.32 In addition, road traffic noise levels predicted for the Do Something scenario (amended Proposed Scheme) have been compared to those predicted for the previous Do Something scenario (the previously Proposed Scheme).
- 4.2.33 The outcome of the updated assessment of operational effects due to road traffic noise are summarised as follows:
- The greatest adverse change in road traffic noise on scheme opening reported in ES Chapter 11 was minor adverse (+1.2 dB $L_{A10,18hr}$).
 - The greatest adverse change in road traffic noise on scheme opening with the amended Proposed Scheme is unaffected and minor adverse (+1.2 dB $L_{A10,18hr}$).

- The smallest beneficial change in road traffic noise on scheme opening reported in ES Chapter 11 was minor beneficial (-2.2 dB $L_{A10,18hr}$).
- The smallest beneficial change in road traffic noise on scheme opening with the amended Proposed Scheme is unaffected and minor beneficial (-2.2 dB $L_{A10,18hr}$).
- When comparing the Proposed Scheme to the amended Proposed Scheme, the greatest difference in road traffic noise in the Do Something Opening Year scenario is a difference of 0.1 dB $L_{A10,18hr}$ – a negligible difference in operational road traffic noise due to the design changes.

Design, mitigation and enhancement measures

- 4.2.34 The assessment concludes that mitigation is not necessary to avoid significant adverse traffic noise effects due to the operation of the amended Proposed Scheme.

Assessment of likely significant effects

- 4.2.35 Given the above, the conclusions of ES Chapter 11 (**APP-048**) with regard to operational noise due to the Proposed Scheme are unaffected by the design changes.
- 4.2.36 No significant adverse or significant beneficial noise effects are expected due to changes in road traffic noise that would occur due to the amended Proposed Scheme. This applies at all receptors within the study area and the NIAs.

4.3 Climate

- 4.3.1 As part of the development of the methodology for constructing the Cantley Lane Underpass (Structure S04 shown on the General Arrangement Plans (**APP-048**) submitted at Deadline 4), an opportunity was identified to amend the horizontal alignment of the A11-A47 Link Road on the western approach to Structure S04, in order to reduce the span of the structure. This change gives rise to benefits associated with scope reduction on Structure S04, principally concrete volumes, reinforcement tonnages and temporary works elements. The change requires the horizontal alignment of the A11-A47 Link Road to be moved up to 7m northwards, which can be accommodated with the works areas as shown on the Works Plans (**APP-007**).
- 4.3.2 An assessment of the Alignment Changes carried out on the approach to Structure S04 was made to estimate the potential carbon saving. Assumptions based on the previous carbon assessment of A47/A11 Thickthorn Junction, described in ES Chapter 14 (**REP3-006**), were used (e.g. concrete or steel types, falsework type and specifications, earthworks, transport mode and distances). All items provided in the Bill of Quantities were entered in the Highways England Carbon Tool (v2.3) to estimate their carbon emissions. Savings from the underpass reduction and road reinstatement are estimated to be 942 tCO₂e. A breakdown of the results is shown in Table 4-4.

Table 4-4: Carbon Savings from underpass span reduction and road reinstatement – Highways England Carbon Tool Output

Category	Item	Type	Quantity	Unit	Total Carbon emissions for this item (tCo2e)
Bulk materials	Ready mix concrete	General	1166.2	m ³	322
	Asphalt	General asphalt	124.8	tonnes	8
	Fill, aggregate and sand	General mixture	324.1	tonnes	6
Road pavement, Civils, structures & retaining walls	Bitumen / surface treatment	Bitumen emulsion	0.5	tonnes	0
	Steelwork	General steel	377.8	tonnes	590
	Formwork / shuttering	Plywood	2.4	m ³	1
Fuel, energy and water	Site offices, site vehicles and plant energy	Diesel	4677.7	litres	15
Total					942

4.3.3 In addition to savings from the reduction in span and road reinstatement, efficiencies to temporary works have been considered which result in a reduction of 263 tCO₂e.

Table 4-5: Carbon Savings from temporary works – Highways England Carbon Tool Output

Category	Item	Type	Quantity	Unit	Total Carbon emissions for this item (tCo2e)
Bulk materials	Ready mix concrete	General C25/30	321.5	m ³	101
Civils, structures & retaining walls	Steelwork	General steel	85.5	tonnes	134
Fuel, energy and water	Site offices, site vehicles and plant energy	Diesel	8793.8	litres	23
Total					263

4.3.4 A further carbon estimate for the whole project will be completed during detailed design (secured via Requirement 3 of the dDCO) which will take account of these reduction opportunities and others identified through value engineering.

5 CONCLUSION

- 5.1.1 The review of the noise and vibration and climate assessments as a result of the design changes and Order Limit reduction as detailed in Section 3 of this ES Addendum, conclude no new or different likely significant effects to the A47/A11 Thickthorn Junction environmental impact assessment.

APPENDIX A: Predicted Construction Noise Levels

Table A.1: Predicted construction noise levels and magnitude of impact at sensitive receptors (unmitigated)

Phase	Receptor Reference	Predicted construction noise $L_{Aeq,T}$ levels (dB), façade levels	Magnitude of impact without mitigation (impact during the weekend and evening in brackets when different)
1. Site set up	R1	60	Negligible
	R2	53	Negligible
	R3	52	Negligible
	R4	60	Negligible (Minor)
	R5	54	Negligible
	R6	67	Moderate
	R7	55	Negligible
	R8	60	Negligible
	R9	56	Negligible
	R10	66	Moderate
	R11	62	Minor
	R12	60	Negligible (Minor)
2. Utilities	R1	54	Negligible
	R2	50	Negligible
	R3	48	Negligible
	R4	60	Negligible (Minor)
	R5	50	Negligible
	R6	70	Major
	R7	53	Negligible
	R8	62	Minor (Negligible)
	R9	57	Negligible
	R10	74	Major
	R11	73	Major
	R12	73	Major
3. Structures – Cantley Lane Underpass modifications	R1	42	Negligible
	R2	37	Negligible
	R3	45	Negligible
	R4	55	Negligible

Phase	Receptor Reference	Predicted construction noise $L_{Aeq,T}$ levels (dB), façade levels	Magnitude of impact without mitigation (impact during the weekend and evening in brackets when different)
	R5	39	Negligible
	R6	64	Minor
	R7	48	Negligible
	R8	46	Negligible
	R9	44	Negligible
	R10	49	Negligible
	R11	58	Negligible
	R12	55	Negligible
4. Structures- Ward's Wood Underpass – box push and top-down methods	R1	55	Negligible
	R2	50	Negligible
	R3	45	Negligible
	R4	43	Negligible
	R5	45	Negligible
	R6	53	Negligible
	R7	51	Negligible
	R8	62	Minor (Negligible)
	R9	56	Negligible
	R10	55	Negligible
	R11	55	Negligible
	R12	57	Negligible
4. Structures- Ward's Wood Underpass (night) – box push only	R1	55	Negligible
	R2	50	Negligible
	R3	45	Negligible
	R4	43	Negligible
	R5	45	Negligible
	R6	53	Minor
	R7	51	Negligible
	R8	62	Moderate
	R9	56	Moderate
	R10	55	Minor
	R11	55	Minor

Phase	Receptor Reference	Predicted construction noise L _{Aeq,T} levels (dB), façade levels	Magnitude of impact without mitigation (impact during the weekend and evening in brackets when different)
	R12	57	Moderate
5. Structures- S04 Cantley Lane underpass – box push and top-down methods	R1	46	Negligible
	R2	41	Negligible
	R3	49	Negligible
	R4	46	Negligible
	R5	41	Negligible
	R6	61	Minor
	R7	53	Negligible
	R8	51	Negligible
	R9	48	Negligible
	R10	52	Negligible
	R11	62	Negligible (Minor)
	R12	61	Negligible (Minor)
5. Structures- S04 Cantley Lane underpass (night) – box push only	R1	46	Negligible
	R2	41	Negligible
	R3	49	Negligible
	R4	46	Negligible
	R5	41	Negligible
	R6	61	Major
	R7	53	Negligible
	R8	51	Negligible
	R9	48	Negligible
	R10	52	Negligible
	R11	62	Major
	R12	61	Major
6. Structures- Cantley Lane Footbridge (Removal)	R1	37	Negligible
	R2	31	Negligible
	R3	38	Negligible
	R4	42	Negligible
	R5	35	Negligible
	R6	63	Minor

Phase	Receptor Reference	Predicted construction noise $L_{Aeq,T}$ levels (dB), façade levels	Magnitude of impact without mitigation (impact during the weekend and evening in brackets when different)
	R7	42	Negligible
	R8	40	Negligible
	R9	39	Negligible
	R10	44	Negligible
	R11	52	Negligible
	R12	50	Negligible
7. Structures- S18 Drainage attenuation tank – box push and top-down methods	R1	47	Negligible
	R2	41	Negligible
	R3	33	Negligible
	R4	32	Negligible
	R5	35	Negligible
	R6	40	Negligible
	R7	39	Negligible
	R8	49	Negligible
	R9	44	Negligible
	R10	44	Negligible
	R11	43	Negligible
	R12	44	Negligible
8. Structures- S41 Cantley Wood Overbridge	R1	57	Negligible
	R2	48	Negligible
	R3	38	Negligible
	R4	37	Negligible
	R5	44	Negligible
	R6	45	Negligible
	R7	43	Negligible
	R8	50	Negligible
	R9	47	Negligible
	R10	50	Negligible
	R11	49	Negligible
	R12	48	Negligible
	R1	57	Negligible

Phase	Receptor Reference	Predicted construction noise L _{Aeq,T} levels (dB), façade levels	Magnitude of impact without mitigation (impact during the weekend and evening in brackets when different)
8. Structures- S41 Cantley Wood Overbridge (night)	R2	48	Negligible
	R3	38	Negligible
	R4	37	Negligible
	R5	44	Negligible
	R6	45	Negligible
	R7	43	Negligible
	R8	50	Negligible
	R9	47	Negligible
	R10	50	Negligible
	R11	49	Negligible
	R12	48	Negligible
	9. Structures- S42- Cantley Road Link Road Overbridge	R1	56
R2		47	Negligible
R3		37	Negligible
R4		36	Negligible
R5		43	Negligible
R6		44	Negligible
R7		42	Negligible
R8		49	Negligible
R9		46	Negligible
R10		49	Negligible
R11		48	Negligible
R12		47	Negligible
10. Structures- S45 Cantley Lane Footbridge	R1	43	Negligible
	R2	37	Negligible
	R3	43	Negligible
	R4	46	Negligible
	R5	41	Negligible
	R6	70	Major
	R7	47	Negligible
	R8	46	Negligible

Phase	Receptor Reference	Predicted construction noise $L_{Aeq,T}$ levels (dB), façade levels	Magnitude of impact without mitigation (impact during the weekend and evening in brackets when different)
	R9	45	Negligible
	R10	51	Negligible
	R11	68	Moderate
	R12	60	Negligible (Minor)
11. Structures- S46- Cantley Lane South Culvert	R1	49	Negligible
	R2	41	Negligible
	R3	38	Negligible
	R4	39	Negligible
	R5	46	Negligible
	R6	47	Negligible
	R7	41	Negligible
	R8	44	Negligible
	R9	43	Negligible
	R10	79	Major
	R11	49	Negligible
	R12	50	Negligible
12. Structures- S47- Cantley Stream Diversion Culvert	R1	50	Negligible
	R2	42	Negligible
	R3	38	Negligible
	R4	39	Negligible
	R5	47	Negligible
	R6	46	Negligible
	R7	41	Negligible
	R8	44	Negligible
	R9	43	Negligible
	R10	79	Major
	R11	49	Negligible
	R12	49	Negligible
13. Highway Works- A11 to A47 Link Road (West of A11)	R1	47	Negligible
	R2	43	Negligible
	R3	44	Negligible

Phase	Receptor Reference	Predicted construction noise $L_{Aeq,T}$ levels (dB), façade levels	Magnitude of impact without mitigation (impact during the weekend and evening in brackets when different)
	R4	41	Negligible
	R5	39	Negligible
	R6	54	Negligible
	R7	49	Negligible
	R8	57	Negligible
	R9	50	Negligible
	R10	50	Negligible
	R11	56	Negligible
	R12	56	Negligible
13. Highway Works- A11 to A47 Link Road (West of A11) (night)	R1	47	Negligible
	R2	43	Negligible
	R3	44	Negligible
	R4	41	Negligible
	R5	39	Negligible
	R6	54	Minor
	R7	49	Negligible
	R8	57	Minor
	R9	50	Negligible
	R10	50	Negligible
	R11	56	Minor
	R12	56	Moderate
14. Highway Works- Cantley Lane Drainage Basin	R1	53	Negligible
	R2	51	Negligible
	R3	38	Negligible
	R4	37	Negligible
	R5	44	Negligible
	R6	45	Negligible
	R7	43	Negligible
	R8	50	Negligible
	R9	47	Negligible
	R10	50	Negligible

Phase	Receptor Reference	Predicted construction noise $L_{Aeq,T}$ levels (dB), façade levels	Magnitude of impact without mitigation (impact during the weekend and evening in brackets when different)
	R11	48	Negligible
	R12	46	Negligible
15. Highways Works- A47 NB Drainage Basin	R1	42	Negligible
	R2	36	Negligible
	R3	39	Negligible
	R4	49	Negligible
	R5	40	Negligible
	R6	60	Minor (Negligible)
	R7	45	Negligible
	R8	44	Negligible
	R9	44	Negligible
	R10	51	Negligible
	R11	54	Negligible
	R12	53	Negligible
16. Highway Works- A11 to A47 Link Road (East of A11) – box push and top-down methods	R1	53	Negligible
	R2	50	Negligible
	R3	51	Negligible
	R4	48	Negligible
	R5	46	Negligible
	R6	61	Minor
	R7	56	Negligible
	R8	62	Minor (Negligible)
	R9	57	Negligible (Minor)
	R10	58	Negligible (Minor)
	R11	69	Moderate
	R12	67	Moderate
17. Highway Works- A11 to A47 Link Road (North of A47) – box push and top-down methods	R1	44	Negligible
	R2	38	Negligible
	R3	46	Negligible
	R4	57	Negligible
	R5	41	Negligible

Phase	Receptor Reference	Predicted construction noise $L_{Aeq,T}$ levels (dB), façade levels	Magnitude of impact without mitigation (impact during the weekend and evening in brackets when different)
	R6	65	Minor
	R7	50	Negligible
	R8	47	Negligible
	R9	44	Negligible
	R10	51	Negligible
	R11	58	Negligible
	R12	56	Negligible
17. Highway Works- A11 to A47 Link Road (North of A47) (night) – box push and top-down methods	R1	44	Negligible
	R2	38	Negligible
	R3	46	Negligible
	R4	57	Moderate
	R5	41	Negligible
	R6	65	Major
	R7	50	Negligible
	R8	47	Negligible
	R9	44	Negligible
	R10	51	Negligible
	R11	58	Moderate
	R12	56	Moderate
18. Highway Works- Cantley Lane South to B1172 (East of A11) (CH325- CH000)	R1	54	Negligible
	R2	49	Negligible
	R3	39	Negligible
	R4	38	Negligible
	R5	43	Negligible
	R6	46	Negligible
	R7	45	Negligible
	R8	54	Negligible
	R9	50	Negligible
	R10	50	Negligible
	R11	48	Negligible
	R12	49	Negligible

Phase	Receptor Reference	Predicted construction noise $L_{Aeq,T}$ levels (dB), façade levels	Magnitude of impact without mitigation (impact during the weekend and evening in brackets when different)
19. Highway Works- Works to Cantley stream culvert access	R1	56	Negligible
	R2	45	Negligible
	R3	37	Negligible
	R4	38	Negligible
	R5	48	Negligible
	R6	45	Negligible
	R7	41	Negligible
	R8	46	Negligible
	R9	43	Negligible
	R10	61	Negligible (Minor)
	R11	49	Negligible
	R12	48	Negligible
20. Highway Works- B1172 junction with new link Road	R1	48	Negligible
	R2	57	Negligible (Minor)
	R3	42	Negligible
	R4	40	Negligible
	R5	41	Negligible
	R6	49	Negligible
	R7	48	Negligible
	R8	63	Minor (Negligible)
	R9	62	Negligible (Moderate)
	R10	48	Negligible
	R11	48	Negligible
	R12	50	Negligible
21. Highway Works- Cantley Lane South to B1172 (west of A11) CH950- CH425) – box push and top-down methods	R1	48	Negligible
	R2	51	Negligible
	R3	39	Negligible
	R4	37	Negligible
	R5	40	Negligible
	R6	46	Negligible
	R7	45	Negligible

Phase	Receptor Reference	Predicted construction noise L _{Aeq,T} levels (dB), façade levels	Magnitude of impact without mitigation (impact during the weekend and evening in brackets when different)
	R8	56	Negligible
	R9	55	Negligible
	R10	47	Negligible
	R11	46	Negligible
	R12	48	Negligible
22. Highway Works- carriageway across S41 & S42 – box push and top-down methods	R1	56	Negligible
	R2	48	Negligible
	R3	38	Negligible
	R4	37	Negligible
	R5	43	Negligible
	R6	45	Negligible
	R7	43	Negligible
	R8	50	Negligible
	R9	47	Negligible
	R10	50	Negligible
	R11	48	Negligible
	R12	47	Negligible
23. Highway Works- Cantley Lane Improvements	R1	63	Negligible
	R2	46	Negligible
	R3	36	Negligible
	R4	38	Negligible
	R5	47	Negligible
	R6	46	Negligible
	R7	42	Negligible
	R8	48	Negligible
	R9	44	Negligible
	R10	69	Moderate
	R11	50	Negligible
	R12	49	Negligible
24. Highway Works- Thickthorn Roundabout Gyratory works	R1	44	Negligible
	R2	43	Negligible

Phase	Receptor Reference	Predicted construction noise L _{Aeq,T} levels (dB), façade levels	Magnitude of impact without mitigation (impact during the weekend and evening in brackets when different)
	R3	45	Negligible
	R4	39	Negligible
	R5	38	Negligible
	R6	57	Negligible
	R7	54	Negligible
	R8	57	Negligible
	R9	50	Negligible
	R10	46	Negligible
	R11	51	Negligible
	R12	51	Negligible

Table A.1: Predicted construction noise levels and magnitude of impact at sensitive receptors (mitigated, initial significant phases only)

Phase	Receptor Reference	Predicted construction noise $L_{Aeq,T}$ levels (dB), façade levels	Magnitude of impact without mitigation (impact during the weekend and evening in brackets when different)
1. Site set-up	R6	57	Negligible
	R10	56	Negligible
2. Utilities	R6	60	Minor
	R10	64	Minor
	R11	63	Minor
	R12	63	Minor (Negligible)
4. Structures- Ward's Wood Underpass (night) – box push only	R8	52	Negligible
	R9	46	Negligible
	R12	47	Negligible
5. Structures- S04 Cantley Lane underpass (night) – box push only	R6	51	Negligible
	R11	52	Negligible
	R12	51	Minor
10. Structures- S45 Cantley Lane Footbridge	R6	60	Negligible
	R11	58	Minor (Negligible)
11. Structures- S46- Cantley Lane South Culvert	R10	69	Moderate
12. Structures- S47- Cantley Stream Diversion Culvert	R10	69	Moderate
13. Highway Works- A11 to A47 Link Road (West of A11) (night)	R12	46	Negligible
16. Highway Works- A11 to A47 Link Road (East of A11) – box push and top-down methods	R11	59	Negligible
	R12	57	Negligible
17. Highway Works- A11 to A47 Link Road (North of A47) (night) – box push and top-down methods	R4	47	Negligible
	R6	55	Negligible
	R11	48	Negligible
	R12	46	Minor
20. Highway Works- B1172 junction with new link Road	R9	52	Negligible (Minor)
23. Highway Works- Cantley Lane Improvements	R10	59	Negligible