A66 Northern Trans-Pennine Project
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8.3 Change Application – Environmental Statement Addendum Volume II (Rev 2) (Clean)

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8.3 CHANGE APPLICATION – ENVIRONMENTAL STATEMENT ADDENDUM VOLUME II

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Author:	A66 Northern Trans-Pennine Project Team, National Highways

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CONTENTS

1 DC-01

1.1 Introduction

1.1.1 This chapter assesses potential for DC-01 to introduce new or different likely significant effects upon the environment when compared to the findings of the original Development Consent Order (DCO) Environmental Statement (ES) (doc ref. 3.1 to 3.4, APP-043 to APP-233).

1.1.2 Only the environmental topics which were scoped in as requiring a full assessment are detailed within this document. For further information in regard to the rational as to why any environmental disciplines have been scoped out of requiring a full assessment, please refer to ES Addendum Volume 1. Topics scoped in for further assessment in this chapter are Noise and Vibration in the operational phase only.

1.1.3 Design change DC-01 is summarised in Section 1 and detailed in Section 3 of the Change Application (Document Reference 8.1, CR1-002). An updated Project description is provided in Environmental Statement Addendum Volume III: Updated Project Description.

2 Noise and Vibration – Operation

2.1 Introduction

2.1.1 The following chapter details the assessment undertaken in order to quantify whether or not DC-01 results in any new or different likely significant when compared to those reported within the ES within Chapter 12 Noise and Vibration (APP-055).

2.1.2 The assessment undertaken as part of this ES Addendum has followed the methodology set out in the Design Manual for Roads and Bridges (DMRB) LA111 and any other relevant guidance as noted in the ES. This ES addendum details the methodology followed, summarises the legislation and policy framework relevant to the Noise and Vibration assessment and describes the existing environment in the area surrounding the Project. It then considers the design, mitigation and residual effects of the Project, including taking account of relevant characteristics of the future baseline environment. Any key assumptions and limitations applicable to the assessment are also identified.

2.1.3 Where any of the sections of this addendum are unchanged compared to the ES, a cross reference has been provided and this document will highlight any changes or updates.

2.1.4 Any new or different likely significant effects upon construction Noise and Vibration receptors are identified in Section 2.10 of this chapter.

2.1.5 This chapter has been prepared by competent experts with relevant experience and expertise. The professional qualifications and experience of the technical lead are summarised in ES Chapter 12 Noise and Vibration.

2.2 Legislation and policy framework

2.2.1 The key legislation, national level policy, regional and local level policy; and other relevant policy and guidance applicable to the noise and vibration assessment is listed in Section 12.3 of the ES. No updates to any of the aforementioned documents has occurred since the production of the Environmental Statement. Therefore, all information detailed within Section 12.3 remains applicable to this assessment.

2.3 Assessment methodology

2.3.1 The methodology for the noise and vibration assessment follows the guidance set out within DMRB LA 111. The assessment methodology utilised for this addendum is the same as the original ES which is described in Section 12.4.

Scoping

2.3.2 Table 12-16: Summary of scoping opinion and response in the ES sets out the key points from the Planning Inspectorate Scoping Opinion relevant to the noise and vibration assessment. The full Scoping Opinion is provided in

Appendix 4.2 (APP-149) of the ES. There has been no further scoping opinion received since the submission of the ES.

Consultation

2.3.3 The design change has been presented to statutory consultees and other stakeholders. There are responses relevant to Noise and Vibration. These comments are detailed in the Change Application Consultation Report (Document Reference 8.2, CR1-007) and have been taken into account in this assessment.

2.4 Assumptions and limitations

2.4.1 The assumptions and limitations of the noise and vibration assessment described in Section 12.5 of the ES have not changed due to the design change.

2.5 Study area

2.5.1 The study area has been defined as described in Section 12.6 of the ES.

2.6 Baseline conditions

2.6.1 The baseline information for the M6 Junction 40 to Kemplay Bank scheme is described in paragraphs 12.7.9 and 12.7.11 of the ES.

2.6.2 The study area defined in the ES around the design change to the west of M6 Junction 40, includes the 600m study area around new roads and 50m study area around affected roads. This study area is predominantly rural and includes commercial and residential areas.

2.6.3 There is one Noise Important Area (NIA), NIA 10284, located in close proximity to design change DC-01. It is located to the west of the design change along the A66 as shown on Figure 12.1: Operational Noise Study Area (Sheet 1 of 12) (APP-112).

Future baseline

2.6.4 The future baseline for operation remains unchanged from that reported in paragraphs 12.7.30 to 12.7.32 of the ES.

2.7 Summary of DCO Design Likely Significant Effects

Introduction

2.7.1 The potential likely significant effects of noise and vibration were identified in paragraphs 12.10.34 to 12.10.52 of the ES for the area M6 Junction 40 to Kemplay Bank. The potential likely significant effects within the study area of the design change are summarised below.

Construction

2.7.2 Approximately 18 residential and non-residential receptors are predicted to experience construction noise levels above the Significant Observed Adverse Effect Level (SOAEL) west of M6 Junction 40. These receptors

are located within Skirsgill Business Park, Eamont Terrace and along the existing A66. The greatest potential for construction noise levels to exceed the SOAEL is during Phase 2: Road construction (details of construction phases are presented in paragraph 12.4.13 of the ES and in Appendix 12.2 Construction Assessment Assumptions (APP-212)). A construction significant effect is likely if sensitive receptors are exposed to construction noise levels exceeding SOAEL for ten or more days and/or nights in any 15 consecutive days/or nights or a total number of 40 or more days in any six consecutive months. The construction programme was not finalised at the time the ES was prepared so, as a worst-case, all these receptors were assessed as adverse likely significant effects.

2.7.3 The ES reported potential temporary vibration significant effects on human receptors, at any sensitive receptors located within 100m of the scheme during start-up and run-down of vibratory roller/compactor; within 70m during steady state operation of vibratory roller/compactor and within 50m of vibratory piling. Sensitive receptors located within 100m of construction works in Skirsgill Business Park and Skirsgill Business Park North were assessed to experience temporary construction vibration significant effects in the ES.

Operation

2.7.4 As noted in paragraph 12.10.41 of the ES, there is one dwelling currently exceeding the Significant Observed Adverse Effect Level (SOAEL), where an increase in noise would occur because of the scheme and will result in a minor impact at the east and north façade of the property (further details are presented in Appendix 12.4 Operational Assessment Results (APP-214)). In line with DMRB LA 111, where the predicted operational noise levels are above a SOAEL, a minor impact in the short-term is assessed as an adverse likely significant likely significant effect. This dwelling located to the west of Skirsgill Roundabout and west of Skirsgill Business Park. This receptor falls within the NIA reference 10284.

2.7.5 The ES identified that a 2-4m noise barrier installed for approximately 35m along the perimeter of the receptor on the roadside would be likely to eliminate the adverse likely significant effect. The barrier in the form of a fence (reference 52) with the characteristics described in Table 12-20 of the ES chapter is likely to be sustainable. As noted in commitment reference D-NV-02 of the Environmental Management Plan (Application Document 2.7 Environmental Management Plan (Rev 4)), the noise barrier provision would be subject to liaison with relevant stakeholders, including the resident(s) in question, since it benefits only one residential receptor and has other potential impacts. Should the barrier not be installed, then this receptor is likely to be eligible for noise insulation under Noise Insulation Regulations (NIR) 1975.

2.7.6 As noted in paragraph 12.10.50 of the ES, there is one non-residential receptor currently exceeding the SOAEL, which is predicted to be subject to a minor impact. In line with DMRB LA 111, where the predicted operational noise levels are above a SOAEL, a minor impact in the short-

term is likely to result in an adverse significant effect. This receptor is located to the north of Skirsgill Roundabout.

2.7.7 No other sensitive receptors were reported to experience a likely significant effect in the study area close to the design change.

2.8 Potential impacts

Construction

2.8.1 The design change, which reduces the operational design speed of the A66 from 70mph to 50mph, does not change the construction noise and vibration assessment presented in the ES.

Design and embedded mitigation

2.8.2 The design and embedded mitigation for the construction phase is the same as those reported in paragraphs 12.8.4 to 12.8.11 of the original ES.

Operation

2.8.3 It is anticipated that the introduction of DC-01 would remove a likely adverse significant effect which was reported in the ES, see Section 2.10 for the detailed assessment.

Design and embedded mitigation

2.8.4 The design and embedded mitigation for the operational phase is the same as those reported in paragraph 12.8.18 of the original ES.

Potential Impacts before essential mitigation and enhancement

2.8.5 DC-01 has the potential to remove the adverse likely significant effect associated with road traffic noise reported in the ES for one residential receptor. This is due to a reduction in traffic speed, which would result in a reduction in noise emission from the road.

2.9 Essential mitigation and enhancement measures

Construction

Essential mitigation

2.9.1 No essential mitigation measures are proposed in addition to those reported in paragraphs 12.9.1 to 12.9.5 of the ES.

Enhancement

2.9.2 Further detailed enhanced mitigation measures will be developed at the detailed design stage when detailed construction methods and programme are finalised.

Operation

Essential mitigation

2.9.3 With the design change DC-01, the residential receptor at Skirsgill Lodge is not predicted to experience an adverse likely significant effect. As such,

there is no longer a requirement to provide a barrier in the form of a reflective fence as noted in Table 12-20 and paragraph 12.10.42 of the ES.

Enhancement

2.9.4 In addition to the mitigation integrated within the Project design, further consideration will be given to developing enhancements during detailed design of the Project.

2.10 Assessment of likely significant effects

Construction

2.10.1 The design change, which reduces the operational design speed of the A66 from 70mph to 50mph, does not change the construction noise and vibration assessment presented in the ES.

Operation

2.10.2 The predicted operational noise levels at sensitive receptors where likely significant effects that are new or different to those reported in the ES are summarised in Table 1 and detailed results presented in Table 2. The operational likely significant effects reported in the ES are summarised in paragraphs 2.7.5 to 2.7.6 in this chapter.

2.10.3 The Skirsgill Lodge receptor is predicted to experience a minor adverse impact at the south façade as a result of the operation of the design change. The south façade of the receptor is predicted to be exposed to traffic noise levels between LOAEL and SOAEL. In line with DMRB LA 111, this noise impact is unlikely to result in an adverse significant effect. The north façade, which is exposed to noise levels above a SOAEL, is predicted to experience negligible impacts as a result of the design change. As such, the predicted impacts are assessed to not result in a likely significant effect.

Table 1: Summary of receptors with a change in significant effects

Receptor name	Likely significant effect identified in the ES	Likely significant effect with design change DC-03
Skirsgill Lodge, Redhills Lane, Redhills CA11 0DT	Significant adverse	Not significant

Table 2: Operational likely significant effects of DC-01.

Receptor Address	Type of Receptor	Noise level dB L_{Aeq}, free-field (day: $L_{Aeq, 16hr}$, night: $L_{Aeq, 8hr}$)													Any OTHER façade with highest noise level >SOAEL				
		Facade with greatest magnitude of noise change (GMC)								Change, short term (With scheme 2029 – Without scheme 2029)		Change, long term (With scheme 2044 – Without scheme 2029)		Facade	Different façade from GMC result				Facade
		Without Scheme 2029		Scheme and local roads 2029		Without scheme 2044		Scheme and local roads 2044							Scheme and local roads 2029		Scheme and local roads 2044		
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night		Day	Night	Day	Night	
Skirsgill Lodge, Redhills Lane, Redhills CA11 0DT	Residential	55.3	50.5	56.6	51.5	56.5	51.0	57.3	52.1	1.3	1.0	2.0	1.6	S	66.3	58.4	67.0	59.1	N

2.11 Monitoring

Construction

2.11.1 Monitoring methodologies described in paragraph 12.12.4 of the ES are considered appropriate and are not affected by the design change.

Operation

2.11.2 Monitoring measures described in paragraph 12.12.5 of the ES are considered sufficient and no additional monitoring measures are proposed as a result of the design change.

2.12 Glossary

2.12.1 See Application Glossary (APP-005).

1 DC-03

1.1 Introduction

1.1.1 This chapter assesses potential for design change DC-03 to introduce new or different likely significant effects upon the environment when compared to the findings of the original Development Consent Order (DCO) Environmental Statement (ES) (doc ref. 3.1 to 3.4, APP-043 to APP-233).

1.1.2 Only the environmental topics which were scoped in as requiring a full assessment are detailed within this document. For further information in regard to the rational as to why any environmental disciplines have been scoped out of requiring a full assessment please refer to ES Addendum Volume I. Topics that have been scoped in for further assessment within this chapter are Geology and Soils, Landscape and Visual, Material Assets and Waste, Noise and Vibration and Population and Human Health.

1.1.3 This design change is summarised in Section 1 and a detailed description is provided in Section 3 of the Change Application (Document Reference 8.1, CR1-002). An updated Project description is provided in Environmental Statement Addendum Volume III: Updated Project Description.

2 Geology and Soils

2.1 Introduction

2.1.1 The following chapter details the assessment undertaken in order to quantify whether or not DC-03 results in any new or different likely significant when compared to those reported within the ES Chapter 9, for Geology and Soils (APP-052).

2.1.2 The assessment undertaken as part of this ES Addendum has followed the methodology set out in the Design Manual for Roads and Bridges (DMRB)[1] and any other relevant guidance. It details the methodology followed, summarises the legislation and policy framework relevant to the ES Chapter 9 Geology and Soils assessment and describes the existing environment in the area surrounding the project. It then considers the design, mitigation and residual effects of the project, including taking account of relevant characteristics of the future baseline environment. Any key assumptions and limitations applicable to the assessment are also identified.

2.1.3 Any Geology and Soils effects predicted to be significant are identified in Section 2.7 and 2.10 of this chapter. Effects identified in the course of the assessment but not predicted to be significant are presented in Environmental Statement Appendix 9.1 Non-Significant Effects (APP-188).

2.1.4 This chapter of the ES has been undertaken by competent experts with relevant experience and expertise. The technical lead for the Geology and Soils assessment is as described in the ES Chapter 9 Geology and Soils (APP-052).

2.2 Legislation and policy framework

2.2.1 The key legislation, national level policy, regional and local level policy; and other relevant policy and guidance applicable to the noise and vibration assessment is listed in Section 9.3 of the ES Chapter 9. No updates to any of the aforementioned documents has occurred since the production of the Environmental Statement. Therefore all information detailed within Section 9.3 remains applicable to this assessment.

2.3 Assessment methodology

2.3.1 The methodology for the Geology and Soils assessment follows the guidance set out within DMRB LA 109[1] and considers the potential impacts on:

- Bedrock geology and superficial deposits, including geological designations and sensitive/ valuable non-designated features.
- Soil resources, including Agricultural Land Classification (ALC) and Best and most versatile (BMV) soils (BMV soils are ALC Grades 1, 2 and 3a).

1 Highways England (now National Highways) (2019) Design Manual for Roads and Bridges (DMRB) LA 109 - Geology and soils. Volume 11, Section 3, Part 11 & Part 6]

- Human health, surface water and groundwater arising from the project's interaction with contamination.

2.3.2 See ES Chapter 9 Geology and Soils (APP-052), Section 9.4 for the Contamination assessment methodology, Geological geodiversity assessment methodology and Soils assessment methodology.

Scoping

2.3.3 Table 9-8 of the Geology and Soils assessment within ES Chapter 9 (APP-052) sets out the key points from the Planning Inspectorate Scoping Opinion relevant to the Geology and Soils assessment and the design change. The full Scoping Opinion is provided in Appendix 4.2 (APP-149) of the ES. There has been no further scoping opinion received since the submission of the ES.

Consultation

2.3.4 The design change has been presented to statutory consultees and other stakeholders. There are no responses relevant to Geology and Soils. All responses are detailed in the Change Application Consultation Report (Document Reference 8.2, CR1-007).

2.4 Assumptions and limitations

2.4.1 See ES Chapter 9 Geology and Soils (APP-052), Section 9.5 for the assumptions and limitations relevant to the assessment and the design change. New assumptions and limitations relevant to the design change, are:

2.4.2 The baseline data used for the ES Chapter 9 Geology and Soils (APP-052) is used in this assessment. The baseline data has not been updated.

2.4.3 Pollution incidents between 2021 to 2022 have been reviewed using publicly available open-source data. The pollution incidents recorded in the area have been reviewed and assessed against the design change for this assessment.

2.4.4 Soil surveys have not been completed outside the Order Limits. Where the design change falls outside the Order Limits, the Agricultural Land Classification has been assumed using the Natural England Provisional Agricultural land classification maps and nearby factual soil survey findings.

2.4.5 The design change includes changes to temporary and permanent land take use and these changes have been considered in this assessment. Soil losses have not been recalculated across the scheme, due to lack of updated available data at the time of writing. It is considered that the worse-case scenario has been assessed in the ES.

2.5 Study area

2.5.1 The study area for this specific design change (DC-03) is a 250m buffer beyond the Order Limits as defined in the ES Chapter 9 (APP-052) in the vicinity of Kemplay Bank roundabout.

2.6 Baseline conditions

2.6.1 Section 9.7 of ES Chapter 9 Geology and Soils (APP-052) sets out the Baseline Conditions relevant to the Geology and Soils assessment and the design change.

Future baseline

2.6.2 Section 9.7 of Environmental Statement Chapter 9 Geology and Soils (Document Reference 3.2, APP-052) sets out the future baseline relevant to the Geology and Soils assessment and the design change.

2.7 Summary of DCO Design Likely Significant Effects

Construction

2.7.1 Section 9.10.9 of the Environmental Statement Chapter 9 Geology and Soils (APP-052) sets out the construction related Assessment of Likely Significant Effects relevant to the Geology and Soils assessment. Key findings are summarised below.

Geology and geodiversity

2.7.2 There are no geological or geodiversity receptors in the vicinity of the design change.

Contamination

2.7.3 The risk assessment of potential temporary effects on human health, groundwater, surface water, buildings or ecological receptors during the construction phase, was carried out and is presented in Section 1.2 of ES Appendix 9.3: Geology and Soils Detailed Risk Assessment and Conceptual Site Models (APP-194).

2.7.4 The magnitude of impact at the design change location was assessed and embedded and mitigation measures applied. The significance of the effects is neutral to slight adverse effect, which is not considered significant.

Soils

2.7.5 A moderate magnitude of impact is predicted, for the topic of geology and soils, as a result of the construction phase of the scheme. Moderate impacts are anticipated on ALC Grade 2 and Grade 3 soils (BMV land), with between 1- 20 ha of land permanently lost in this scheme. The significance of the effect on BMV is moderate or large to large or very large and is considered significant.

Operation

2.7.6 Section 9.10.32 of the Environmental Statement Chapter 9 Geology and Soils (APP-052) sets out the operation related Assessment of Likely Significant Effects relevant to the Geology and Soils assessment and the design change. There are no likely significant effects predicted on the topic of geology and soils as a result of the operational phase of the Project.

2.8 Potential impacts

2.8.1 Based on the project design and associated construction activities, the design change has the potential to impact upon Geology and Soils during both construction and operation.

2.8.2 Potential impacts of the design change are described in this section prior to the implementation of the essential mitigation described in Section 2.9 below. The residual effects of the project, taking into account this essential mitigation, are then described in Section 2.10.

2.8.3 An assessment of all likely significant effects that could arise as a result of the construction and operation of the design change has been carried out. In accordance with the Infrastructure Planning EIA Regulations, which require the identification of significant effects, and to ensure this ES is proportionate.

Construction

Design and embedded mitigation

2.8.4 There are no geological or geodiversity receptors in the vicinity of design change DC-03 and therefore these are not considered further.

2.8.5 The design change reduces the temporary land take but increases the permanent land take at this location. This is an additional permanent loss of an estimated at 0.22ha of ALC grade 2 soils. The increase in loss of permanent soils, does not change the significance of effect, which is already assessed as significant, as presented in Section 9.10.31 of Environmental Statement Chapter 9 Geology and Soils (APP-052).

2.8.6 The design change rotates the orientation of the round-about. There are potentially contaminated sites-Penrith Hospital (CL02-09) and Penrith Fire and Ambulance Station (CL02-10) located in the vicinity of the design change. The design change has been assessed against the methodology as presented in the ES appendix. The risk assessment impact score and proximity zones of these potentially contaminated sites have remained the same as a result of the design change. The detailed methodology of this is given in ES Appendix 9.3 Geology and Soils Detailed Risk Assessment and Conceptual Site Model (APP-194).

2.8.7 Human health receptors in the vicinity have a very high sensitivity. The impact during construction, with embedded and mitigation measures applied for human health receptors within the study area, has been assessed. The magnitude of impact is negligible. The significance of the effects is slight adverse effect, which is not considered significant. There is no change to the significance of the effects as those presented in Section 9.10 of Environmental Statement Chapter 9 Geology and Soils (APP-052).

2.8.8 No new design and embedded mitigation have been proposed in relation to design change DC-03. Key aspects of the design and embedded mitigation, directly applicable to the geology and soils are presented in Section 8.8 of the Geology and Soils chapter (APP-052) and within the

EMP (Application Document 2.7 Environmental Management Plan (Rev 4)).

Potential Impacts before essential mitigation and enhancement

2.8.9 The Environmental Statement Chapter 9 Geology and Soils (APP-052) assessment assumed a worst-case construction impact regarding the loss of soils, which was assessed as a moderate to major impact, which is considered significant. The design change does not change Order Limits, the additional permanent land take of ALC Grade 2 soils and reduced temporary land take does not change the level of significance for this scheme, which is significant. The approximate permanent and temporary land take for this scheme in Environmental Statement Chapter 9 Geology and Soils (APP-052) assumed a worst-case construction impact for the design change.

Operation

Design and embedded mitigation

2.8.10 No new design and embedded mitigation have been proposed in relation to the design change. Key aspects of the design and embedded mitigation, directly applicable to the geology and soils are presented in Section 8.8 of the Geology and Soils chapter (APP-052) and within the EMP (Application Document 2.7 Environmental Management Plan (Rev 4)).

Potential Impacts

2.8.11 The operation of the design change would not introduce any new impacts in addition to those identified in the Environmental Statement Chapter 9 Geology and Soils (APP-052).Likely significant effects on receptors are not expected to arise during the operational phase. The impacts to geology and soils are likely to occur during the construction phase when excavation and earthworks take place.

2.8.12 The design of the Project includes measures that would contain and control any releases of contaminants along the highway and its associated infrastructure during the operational period, as set out in section 9.9 of the Geology and Soils chapter (APP-052). These include measures in the drainage design to prevent and minimise the risk of discharging pollutants into the Principal and Secondary aquifers via drainage pathways.

2.9 Essential mitigation and enhancement measures

Construction

Essential mitigation

2.9.1 There are no new essential mitigation measures to be applied in relation to the design change.

Enhancement

2.9.2 There are no new enhancement measures to be applied in relation to the design change.

Operation

Essential mitigation

2.9.3 There are no new essential mitigation measures to be applied in relation to the design change.

Enhancement

2.9.4 There are no new enhancement measures to be applied in relation to the design change.

2.10 Assessment of likely significant effects

2.10.1 There are no new likely significant effects identified for Geology and Soils as a result of the design change. Likely effects not predicted to be significant are presented in Environmental Statement Appendix 9.1 Non-Significant Effects (APP-188).

2.11 Monitoring

Construction

2.11.1 No new construction monitoring is proposed in relation to the design change. The existing measures proposed are presented in the laid out in section 9.11 of the Environmental Statement Chapter 9 Geology and Soils (APP-052) and within the EMP (Application Document 2.7 Environmental Management Plan (Rev 4)).

Operation

2.11.2 No new operational monitoring is proposed in relation to the design change. The existing measures proposed are presented in the laid out in section 9.11 of the Environmental Statement Chapter 9 Geology and Soils (APP-052) and within the EMP(Application Document 2.7 Environmental Management Plan (Rev 4)).

3 Landscape and Visual

3.1 Introduction

3.1.1 The following chapter details the assessment undertaken in order to quantify whether or not DC-03 results in any new or different likely significant effects when compared to those reported within the ES Chapter 10 Landscape and Visual (APP-053).

3.1.2 This assessment undertaken as part of this ES Addendum follows the methodology set out in the Design Manual for Roads and Bridges (DMRB) LA 107 Landscape and Visual Effects and any other relevant guidance. It details the methodology followed, summarises the legislation and policy framework relevant to the Landscape and Visual assessment and describes the existing environment in the area surrounding the project. It then considers the design, mitigation and residual effects of the project, including taking account of relevant characteristics of the future baseline environment. Any key assumptions and limitations applicable to the assessment are also identified.

3.1.3 Where any sections are unchanged a cross reference back to the original ES has been provided and this document will only highlight any changes or updates.

3.1.4 Any new or different likely significant effects during construction upon Landscape or Visual receptors are identified in Section 3.9 of this chapter.

3.1.5 This chapter of the ES has been undertaken by competent experts with relevant experience and expertise. The professional qualifications and experience of the technical lead are summarised in ES Chapter 10 Landscape and Visual (APP-053).

3.2 Legislation and policy framework

Legislation

3.2.1 Please refer to ES Chapter 10 Landscape and Visual (APP-053), (section 10.3 Legislation and policy framework, para 10.3.1) for key legislation that is applicable to the assessment.

3.3 Assessment methodology

3.3.1 The methodology for the landscape and visual assessment follows the guidance set out within DMRB LA107 Landscape and visual effects and LA104 Environmental assessment and monitoring.

3.3.2 The assessment methodology is set out in Document ES Chapter 10 Landscape and Visual (APP-053) section 10. 4 Assessment Methodology.

Scoping

3.3.3 Summary of Scoping Opinion and Response Appendix 10.1 Landscape and Visual Policy and Consultation Tables (APP-197) sets out the points from the Planning Inspectorate Scoping Opinion relevant to the landscape

and visual assessment. The full Scoping Opinion is provided in ES Appendix 4.2: EIA Scoping Opinion (APP-149).

3.3.4 There are no changes to the scope from the ES as noted above.

Consultation

3.3.5 The design change has been presented to statutory consultees and other stakeholders. There are some responses relevant to Landscape and Visual. All responses are detailed in the Change Application Consultation Report (Document Reference 8.2, CR1-007) and considered in the assessment where applicable.

3.4 Assumptions and limitations

3.4.1 The assumptions and limitations are set out in ES Chapter 10 Landscape and Visual (APP-053) Section 10. 5 Assumptions and limitations.

3.4.2 Study area

3.4.3 The study area is set out in ES Chapter 10 Landscape and Visual (APP-053) Section 10.6 Study area.

3.5 Baseline conditions

3.5.1 The design changes are located in the Landscape Character Areas (LCA) Urban Area and adjacent to LCA Intermediate Farmland. It is these landscape character types that could be affected by the design changes. The selected viewpoints (VP) that could be affected by the design changes are VP2.2 and VP2.5. The baseline conditions for both landscape and visual receptors are set out in ES Chapter 10 Landscape and Visual (APP-053) (section 10.7 Baseline conditions, para 10.7.44 – 10.7.108).

3.6 Summary of DCO Design Likely Significant Effects

Construction

Construction Landscape effects

3.6.1 There are no significant effects anticipated for construction for landscape receptors within the M6 Junction 40 to Kemplay Bank scheme.

3.6.2 The full assessment for construction landscape effects is set out in ES Appendix 10.5 Schedule of Landscape Effects (APP-201), para 10.5.2 Table 1.

Construction Visual effects

3.6.3 There are predicted significant effects in the construction phase at the location of this design change, however these are not expected to continue into operation. These are situated at VP2.2 from Wetheriggs Country Park, Clifford Road, Penrith looking east and VP2.5 View from Penrith Hospital Footpath looking south east.

3.6.4 The full assessment for construction visual effects is set out in ES Appendix 10.6 Schedule of Visual Effects (APP-202), para 10.6.2 Table 1.

Operation

Operation Landscape effects Year 1

3.6.5 There are no significant effects anticipated in operation for landscape receptors within schemes 1 and 2.

3.6.6 The full assessment for operational landscape effects is set out in ES Appendix 10.5 Schedule of Landscape Effects (APP-201), para 10.5.3 Table 2.

Operation Visual effects Year 1

3.6.7 There are no significant effects anticipated in operation for visual receptors at the location of this design change.

3.6.8 The full assessment in operation for visual effects is set out in ES Appendix 10.6 Schedule of Visual Effects (APP-202), para 10.6.3 Table 2

Operation Landscape Year 15

3.6.9 There are no significant effects anticipated in operation for landscape receptors within schemes 1 and 2.

3.6.10 The full assessment for operational landscape effects is set out in ES Appendix 10.5 Schedule of Landscape Effects (APP-201), para 10.5.4 Table 3.

Operation Visual Year 15

3.6.11 There are no significant effects anticipated in operation for visual receptors at the location of this design change.

3.6.12 The full assessment in operation for visual effects is set out in ES Appendix 10.6 Schedule of Visual Effects (APP-202), para 10.6.4 Table 3.

3.7 Potential impacts

3.7.1 Based on the design, a detailed description of which is provided in Section 3 of the Change Application (Document Reference 8.1, CR1-002) and Environmental Statement Addendum Volume III: Updated Project Description, and associated construction activities, the design change has the potential to impact upon landscape and visual receptors, compared to the DCO design, during both construction and operation.

3.7.2 Potential impacts of design change DC-03 are described in this section, prior to the implementation of the essential mitigation described below. The residual effects of the Project, taking into account this essential mitigation, are then described.

Construction

Design and embedded mitigation

3.7.3 A specific principle applies in Application Document 5.11 Project Design Principles (Rev 4) para 4.1 Table 4-2, principle 0102.04, this states, “Minimise impacts on mature tree canopy cover at Wetheriggs Country Park to maintain setting and landscape experience as far as reasonably practicable. Opportunities should be explored for the enhancement of

Wetheriggs Country. Park (CH10000) through woodland management and sensitive replanting" is pertinent to this design change.

3.7.4 The landscape mitigation for the project seeks to offset impacts on landscape character and visual impact. There are no proposed changes to the embedded and essential mitigation and enhancement measures described in section 10.9 of Document 3.2 Environmental Statement Chapter 10 Landscape and Visual (APP-053) which are also indicated on Environmental Mitigation Maps (Figure 2.8.1) (APP-041).

3.7.5 No new design and embedded mitigation measures have been proposed in relation to the design change or to address the principles in Application Document 5.11 Project Design Principles (Rev 4) in Table 4-2: M6 Junction 40 to Kemplay Bank Scheme Specific Design Principles.

Potential Impacts before essential mitigation and enhancement

3.7.6 Wetheriggs Country Park provides wooded enclosure between Clifford Road and the A66 between the M6 Junction 40 and Kemplay Bank Roundabout.

3.7.7 Between Wetheriggs and Pategill districts there is an area of institutional, industrial, retail and municipal buildings including Penrith Hospital immediately to the north of Kemplay Bank roundabout. Viewpoint 2.5, illustrated on ES Figure 10.8: Viewpoint Photosheets (Application Document 3.3) is representative of views from the hospital boundary. There is a substantial buffer of open space, parkland and formal parks including Wetheriggs Country Park between the A66 and residential areas. Views in the direction of the scheme from the edge of Penrith comprise of formal and informal parkland, sports pitches, institutional, industrial and retail buildings. Belts of trees and woodland on the north side of the existing A66 restrict views of infrastructure and traffic. The DCO design retained and enhanced tree cover to Wetheriggs Country Park to enhance the landscape and provide additional visual screening to users of the recreational park as week as nearby residents. The re-alignment of the roundabout reduces the mitigating effect of the retention of existing vegetation.

Construction Landscape effects

3.7.8 The design change from the DCO design would require the removal of some medium sized broad leaved trees on the west bound approach to Kemplay Bank roundabout as well as a dense group of maturing broad leaved trees lining a path from Wetheriggs Lane to Kemplay Bank.

3.7.9 The removal of vegetation could have aneffect on some landscape receptors. The loss of vegetation is just within LAC Rolling Fringe which has a high sensitivity. There would be no change to the ES assessment that the high sensitivity and minor magnitude of impact concludes a slight and not significant landscape effect. Similarly the design change would not alter the ES assessment for LCA Intermediate Farmland. This LCA has medium sensitivity and the change creates a minor magnitude of impact giving a slight and not significant landscape effect. The majority of the changes lie within LCA Urban which is defined at this point as having low

sensitivity. The design change would have a moderate adverse magnitude of impact during construction giving a slight and not significant landscape effect. This is because the design change is located close to the existing road corridor, on the periphery of the LCA.

Construction Visual effects

3.7.10 The removal of the trees discussed above would open up views for residents of Clifford Road towards the south. As well as, increasing the presence of infrastructure in the landscape, by reducing softening effect for users of the recreational park in Wetheriggs Country Park. This is likely to cause significant effects for recreational users of Wetheriggs Country Park and reduce the layering visual screening offered by the DCO application. During construction this would allow views of the construction equipment and processes.

3.7.11 VP 2.2 Wetheriggs Country Park, Clifford road, Penrith, looking south-east, looking East is representative of recreational users from Wetheriggs Country Park. Viewpoint 2.2 is identified as highly sensitive. During construction the magnitude of impact would be moderate leading to a moderate and therefore significant effect. The effect is moderate as there would be some visual mitigation from existing vegetation retained at the school boundary.

3.7.12 VP 2.5 Penrith Hospital Footpath, looking south-east, is identified as having low sensitivity. It is representative of road users. The design changes would be visible from this viewpoint and would include the removal of vegetation and a change in the height of the road. As such there would be a major magnitude of change resulting in a moderate and therefore significant effect. The effect remains moderate due to the proximity of the changes to this receptor.

Operation

Design and embedded mitigation

3.7.13 No new design and embedded mitigation has been proposed in relation to the design change or to address the principles in Application Document 5.11 Project Design Principles (Rev 4) in Table 4-2: M6 Junction 40 to Kemplay Bank Scheme Specific Design Principles.

Potential Impacts Operation Landscape effects

3.7.14 Due to the construction works being peripheral to the landscape character areas and already affected by the existing road corridor, the design changes would not introduce any new or different significant landscape effects in years 1 or 15 to those reported in document 3.4 Environmental Statement Appendix 10.5 Schedule of Landscape Effects (APP-201).

Potential Impacts Operation Visual effects

3.7.15 The design change would cause a minor change to the view from VP2.2 Wetheriggs Country Park, Clifford road, Penrith, looking south-east, where the change in road height and the vegetation removal would be perceptible. The design change would produce visual effects similar to

those produced by the DCO design and therefore would not change the assessment in document 3.2 Environmental Statement Chapter 10 Landscape and Visual (APP-053) which notes a minor magnitude of impact on a highly sensitive receptor giving a slight and therefore not significant visual effect. The effect is slight and not moderate due to the retained vegetation in the park and at the boundary of the school playing fields that gives a degree of screening.

3.7.16 From VP 2.5, Penrith Hospital Footpath, looking south-east, the design change would alter the operational assessment in 3.4 Environmental Statement Appendix 10.6 Schedule of Visual Effects (APP-202). The extent of the works removes existing planting and limits the scope for replacement. The road level also rises, making it more visible and therefore is predicted to have a major magnitude of impact. Combined with the low sensitivity this gives a moderate and therefore significant effect at year 1 and year 15.

3.8 Essential mitigation and enhancement measures

Construction

Essential mitigation

3.8.1 No change from essential mitigation in ES Chapter 10 Landscape and Visual (APP-053) has been proposed.

Enhancement

3.8.2 No new enhancement measures have been proposed for this design change.

Operation

Essential mitigation

3.8.3 No change from essential mitigation in ES Chapter 10 Landscape and Visual (APP-053) has been proposed.

Enhancement

3.8.4 No new enhancement measures have been proposed for this design change.

3.9 Assessment of likely significant effects

3.9.1 This section identifies the new or different likely landscape and visual effects of the project incorporating the design change DC-03 that are predicted to be significant.

3.9.2 There are no new or different significant landscape effects due to this design change.

3.9.3 There are no new or different significant visual effects during the construction phase due to this design change.

3.9.4 There is a new significant visual effect during operation at year 1 and year 15 due to this change for VP 2.5 (Table 3-2 Summary of significant effects (operation year 15)).

3.9.5 No additional mitigation is proposed to be secured at this stage from that included within the ES Chapter 10 (APP-053). The likely significant effect reported above is based on the absolute worst case scenario (i.e. the use of the full extent of the limits of deviation) and is subject to the final detailed design, which may result in the effect being reduced. Opportunities for mitigation at this location will be explored during detailed design and any measures considered to be feasible and proportionate will form part of the suite of measures included in the next draft of the first iteration EMP (particularly as part of the detailed landscaping scheme required under commitment ref. D-LV-02, amongst other measures) that must be consulted on and approved by the Secretary of State.

Table 3-1 Summary of significant effects (Construction)

Receptor	Attribute	Receptor sensitivity	Potential impact before essential mitigation	Essential mitigation/enhancement	Impact magnitude	Residual effect
Viewpoint 2.2 Wetheriggs Country Park, Clifford road, Penrith, looking south-east	Visual	High	Moderate	None proposed	Moderate	Moderate
Viewpoint 2.5 Penrith Hospital Footpath, looking south-east	Visual	Low	Major	None proposed	Major	Moderate

Table 3-2 Summary of significant effects (operation year 15)

Receptor	Attribute	Receptor sensitivity	Potential Impact before essential mitigation	Essential mitigation/ enhancement	Impact magnitude	Residual effect
Viewpoint 2.5 Penrith Hospital Footpath, looking south-east	Visual	Low	Major	None proposed	Major	Moderate

3.10 Monitoring

Construction

3.10.1 No new monitoring has been proposed for the design change. The existing measures in 2.7 Environmental Management Plan Annes B1 Outline Landscape and Ecological Management Plan (Rev 2) (REP3-003) would apply.

Operation

3.10.2 No new monitoring has been proposed for the design change. The existing measures in 2.7 Environmental Management Plan Annes B1 Outline Landscape and Ecological Management Plan (Rev 2) (REP3-003) would apply.

4 Material Assets and Waste

4.1 Introduction

4.1.1 The following chapter details the assessment undertaken in order to quantify whether or not DC-03 results in any new or different likely significant when compared to those reported within the ES Chapter 11, for Material Assets and Waste (APP-054).

4.1.2 The assessment undertaken as part of this ES Addendum has followed the methodology set out in the Design Manual for Roads and Bridges (DMRB) LA110 and any other relevant guidance. DMRB LA 110 and other relevant guidance is summarised in section 11.3 of ES Chapter 11 for Material Assets and Waste (APP-054). It details the methodology followed, summarises the legislation and policy framework relevant to the Material Assets and Waste assessment and describes the existing environment in the area surrounding the project and the M6 Junction to Kemplay Bank Scheme (where the design change DC-03 is located). It then considers the design, mitigation and residual effects of the project and the M6 Junction to Kemplay Bank Scheme, including taking account of relevant characteristics of the future baseline environment. Any key assumptions and limitations applicable to the assessment are also identified.

4.1.3 Where any of the aforementioned sections are unchanged from ES Chapter 11 (APP-054) a cross reference back to the original ES Chapter has been provided. This ES addendum highlights any changes or updates from the ES Chapter 11, including, in particular, any new or different likely significant effects upon construction and operation Material Assets and Waste receptors are identified in Section 2.10 of this chapter.

4.1.4 This chapter has been prepared by competent experts with relevant experience and expertise. The professional qualifications and experience of the technical lead are summarised in ES Chapter 11 Material Assets and Waste (APP-054).

4.2 Legislation and policy framework

4.2.1 The key legislation, national, regional and local policy; and other relevant policy and guidance applicable to the material assets and waste assessment is listed in Section 11.2 of ES Chapter 11. No updates to any of the aforementioned documents has occurred since the production of ES Chapter 11. Therefore all information detailed within Section 11.2 of ES Chapter 11 (APP-054) remains applicable to this assessment.

4.3 Assessment methodology

4.3.1 The methodology for the material assets and waste assessment follows the guidance set out within DMRB LA 110. The assessment methodology utilised for this addendum is the same as within ES Chapter 11, where it is detailed in Section 11.3.

Scoping

4.3.2 Table 11.4 of the Material Assets and Waste assessment within ES Chapter 11 (APP-054) sets out the key points from the Planning Inspectorate Scoping Opinion relevant to the Material Assets and Waste assessment and design change DC-03. The full Scoping Opinion is provided in Appendix 4.1 (APP-148) of the ES. There has been no further scoping opinion received since the submission of the ES.

Consultation

4.3.3 The design change has been presented to statutory consultees and other stakeholders. These comments are detailed in the Change Application Consultation Report (Document Reference 8.2, CR1-007), however no specific comments in relation to Material Assets and Waste have been received.

4.4 Assumptions and limitations

4.4.1 Section 11.4 of ES Chapter 11 (APP-054) sets out the assumptions and limitations relevant to the assessment and the design change.

4.5 Study area

4.5.1 Section 11.5 of ES Chapter 11 (APP-054) sets out the study areas relevant to the assessment and the design change.

4.5.2 Study area 1 is the area within the Order Limits, as within these areas construction materials will be consumed. For the purpose of this material assets and waste assessment, Study area 1 now incorporates the change to the Order Limits for the design change. Study area 2 remains unchanged and is the area where the main construction materials will be sourced and construction waste will be treated or disposed of, and comprises waste infrastructure in the North East, the North West and Yorkshire and The Humber.

4.6 Baseline conditions

4.6.1 Section 11.6 of the Material Assets and Waste assessment (Document Reference 3.2, APP-054) sets out the Baseline Conditions relevant to the Material Assets and Waste assessment and the design change.

4.6.2 The baseline conditions relating to mineral safeguarding sites for the M6 Junction 40 to Kemplay Bank are identified in Table 11.7 of the ES assessment (Document Reference 3.2, APP-054) using information provided by Cumbria County Council during consultation.

Future baseline

4.6.3 Section 11.6.28 of the Material Assets and Waste assessment (Document Reference 3.2, APP-054) sets out the future baseline relevant to the Material Assets and Waste assessment and the design change.

4.7 Summary of DCO Design Likely Significant Effects

Construction

4.7.1 Section 11.9 of the ES Chapter 11 (APP-054) sets out the construction related Assessment of Likely Significant Effects relevant to the Material Assets and Waste assessment and the design change.

4.7.2 The potential sterilisation to mineral safeguarding sites for the M6 Junction 40 to Kemplay Bank Scheme are assessed in Table 11.31 of the ES Chapter 11 assessment APP-054) using information provided by Cumbria County Council during consultation.

4.7.3 There are no Likely Significant Effects for Construction for the M6 J40 to Kemplay Bank Scheme.

Operation

4.7.4 Section 11.9.34 of the Material Assets and Waste assessment (Document Reference 3.2, APP-054) sets out the operation related Assessment of Likely Significant Effects relevant to the Material Assets and Waste assessment and the design change.

4.7.5 There are no Likely Significant Effects for operation for the M6 J40 to Kemplay Bank Scheme.

4.8 Potential impacts

4.8.1 Based on the project design and associated construction activities, design change DC-03 has the potential to impact Material Assets and Waste during both construction and operation. However the design change is unlikely to alter the conclusions of the likely significant effects assessments reported in Section 11.7 of the ES Chapter 11 (APP-054) during construction and operation.

4.8.2 The potential construction and operation impacts on material assets included in the assessment, as identified in DMRB LA 110, are:

- The sterilisation of mineral safeguarding sites and/or peat resources.
- The consumption of virgin materials.

4.8.3 The potential construction and operation impacts on waste included in the assessment, as identified in DMRB LA 110, are:

- The reduction in regional landfill capacity.
- The reduction in national landfill capacity.

Construction

Design and embedded mitigation

4.8.4 Sections 11.7.2 and 11.8.2 of the ES Chapter 11 (APP-054) set out the construction Embedded Design Mitigation relevant to the Material Assets and Waste assessment and the design change.

4.8.5 For the purpose of this material assets and waste assessment for the design change, the Design and embedded mitigation for construction remain unchanged as the changes are not of a size that alters the ES and the Environmental Management Plan (EMP).

Potential Impacts before essential mitigation and enhancement

4.8.6 Section 11.7 of the ES Chapter 11 (APP-054) sets out the construction Potential Impacts relevant to the Material Assets and Waste assessment and the design change.

4.8.7 For the purpose of this material assets and waste assessment for the design change, the Potential Impacts before essential mitigation and enhancement for construction remain unchanged as the design changes are not of a size that alters the ES and the EMP.

Operation

Design and embedded mitigation

4.8.8 Section 11.7.10 of the Material Assets and Waste assessment (Document Reference 3.2, APP-054) sets out the operation Embedded Design Mitigation relevant to the Material Assets and Waste assessment and the design change.

4.8.9 For the purpose of this material assets and waste assessment for the design change, the Design and embedded mitigation for Operation remain unchanged as the design changes are not of a size that alters the ES and the EMP.

Potential Impacts

4.8.10 Section 11.7.11 of the ES Chapter 11 (APP-054) sets out the operation Potential Impacts relevant to the Material Assets and Waste assessment and the design change.

4.8.11 For the purpose of this material assets and waste assessment for the design change, the Potential Impacts for operation remain unchanged as the design changes are not of a size that alters the ES and the EMP.

4.9 Essential mitigation and enhancement measures

Construction

Essential mitigation

4.9.1 Section 11.8.45 of the ES Chapter 11 (APP-054) sets out the construction Essential Mitigation relevant to the Material Assets and Waste assessment and the design change.

Enhancement

4.9.2 Section 11.8.66 of the ES Chapter 11 (APP-054) sets out the construction Essential Enhancement relevant to the Material Assets and Waste assessment and the design change.

Operation

Essential mitigation

4.9.3 Section 11.8.67 of the ES Chapter 11 (APP-054) sets out the operation Essential Mitigation relevant to the Material Assets and Waste assessment and the design change.

Enhancement

4.9.4 Section 11.8.67 of the Material Assets and Waste assessment (Document Reference 3.2, APP-054) sets out the operation Essential Enhancement relevant to the Material Assets and Waste assessment and the design change.

4.10 Assessment of likely significant effects

4.10.1 This section identifies the likely Material Assets and Waste effects of the project that are predicted to be significant.

4.10.2 There are no new Likely Significant Effects for Construction for the DC-03 or M6 J40 to Kemplay Bank Scheme.

Mineral Safeguarding Sites

4.10.3 The design change DC-03 will rotate the Kemplay Bank roundabout by 90 degrees and raise the mainline through the underpass structure. It reduces the amount of material which is required to be excavated and taken off site and reduces the length of retaining structures required on the approach to the underpass. The design change is located close to a Mineral Consultation Area (MCA) for sand and gravel which could potentially be sterilised. However there are no new Likely Significant Effects for the sterilisation of mineral safeguarding sites for DC-03 or the M6 Junction 40 to Kemplay Bank Scheme as the design change would:

- Require a minor change to the Order Limits when compared to the Scheme as whole
- Take land close to the existing A66
- Be located close to the urban fringes of Penrith that is unlikely to be suitable for mineral development

4.10.4 The potential sterilisation to mineral safeguarding sites for the M6 Junction 40 to Kemplay Bank Scheme are assessed in Table 11.31 of the ES Chapter 11 (APP-054) using information provided by Cumbria County Council during consultation. A minor adverse impact was identified for the M6 Junction 40 to Kemplay Bank Scheme for the sterilisation of mineral safeguarding sites. The design change DC-03 does not give cause to alter this assessment. Therefore this minor adverse impact would also be applied for the design change and would not represent a Likely Significant Effect.

4.10.5 Section 11.9.5 of the material assets and waste assessment (APP-054) sets out the sensitivity of mineral safeguarding sites. Each mineral safeguarding site and allocation was considered to have a value (sensitivity) of Medium.

Therefore the minor adverse impact for the design change would remain unchanged and would not represent a likely significant effect.

4.10.6 There are no new Likely Significant Effects for Operation for the DC-03 or M6 J40 to Kemplay Bank Scheme.

4.11 Monitoring

Construction

4.11.1 Section 11.10.1 of the ES Chapter 11 (APP-054) sets out the construction Monitoring relevant to the assessment and the design change.

Operation

4.11.2 Section 11.10.4 of the ES Chapter 11 (APP-054) sets out the operation Monitoring relevant to the assessment and the design change.

5 Noise and Vibration

5.1 Introduction

5.1.1 The following chapter details the assessment undertaken in order to quantify whether or not DC-03 results in any new or different likely significant when compared to those reported within the ES Chapter 12 (APP-055).

5.1.2 The assessment undertaken as part of this ES Addendum has followed the methodology set out in the Design Manual for Roads and Bridges (DMRB) LA111 and any other relevant guidance. It details the methodology followed, summarises the legislation and policy framework relevant to the Noise and Vibration assessment and describes the existing environment in the area surrounding the project. It then considers the design, mitigation and residual effects of the project, including taking account of relevant characteristics of the future baseline environment. Any key assumptions and limitations applicable to the assessment are also identified.

5.1.3 Where any of the sections of this addendum are unchanged compared to the ES, a cross reference has been provided and this document will highlight any changes or updates.

5.1.4 Any new or different likely significant effects upon construction Noise and Vibration receptors are identified in Section 2.10 of this chapter.

5.1.5 This chapter has been prepared by competent experts with relevant experience and expertise. The professional qualifications and experience of the technical lead are summarised in ES Chapter 12 (APP-055).

5.2 Legislation and policy framework

5.2.1 The key legislation, national level policy, regional and local level policy; and other relevant policy and guidance applicable to the noise and vibration assessment is listed in Section 12.3 of the ES. No updates to any of the aforementioned documents has occurred since the production of the Environmental Statement. Therefore, all information detailed within Section 12.3 remains applicable to this assessment.

5.3 Assessment methodology

5.3.1 The methodology for the noise and vibration assessment follows the guidance set out within DMRB LA 111. The assessment methodology utilised for this addendum is the same as the original ES which is described in Section 12.4.

Scoping

5.3.2 Table 12-16: Summary of scoping opinion and response in the ES sets out the key points from the Planning Inspectorate Scoping Opinion relevant to the noise and vibration assessment. The full Scoping Opinion is provided in Appendix 4.1 (APP-148) of the ES. There has been no further scoping opinion received since the submission of the ES.

Consultation

5.3.3 The design change has been presented to statutory consultees and other stakeholders. There are responses relevant to Noise and Vibration. These comments are detailed in the Change Application Consultation Report (Document Reference 8.2, CR1-007) and have been taken into account in this assessment.

5.4 Assumptions and limitations

5.4.1 The assumptions and limitations of the noise and vibration assessment described in Section 12.5 of the ES Chapter 12 (APP-055) have not changed due to the design change.

5.5 Study area

5.5.1 The study area has been defined as described in Section 12.6 of the ES.

5.6 Baseline conditions

5.6.1 The baseline information for the M6 Junction 40 to Kemplay Bank scheme is described in paragraphs 12.7.9 and 12.7.11 of the ES Chapter 12 (APP-055).

5.6.2 The 600m study area around the design change at the Kemplay Bank Roundabout is predominantly rural and includes commercial and residential areas.

5.6.3 There is one Noise Important Area (NIA), NIA 10285, located within the study area of DC-03. It is located to the south of the design change along the A6 as shown on Figure 12.1: Operational Noise Study Area (Sheet 1 of 12) (Application Document 3.3).

Future baseline

5.6.4 The future baseline for operation remains unchanged from that reported in paragraphs 12.7.30 to 12.7.32 of the ES.

5.7 Summary of DCO Design Likely Significant Effects

Introduction

5.7.1 The potential likely significant effects of noise and vibration were identified in paragraphs 12.10.34 to 12.10.52 of the ES Chapter 12 (APP-055) for the area M6 Junction 40 to Kemplay Bank. The potential likely significant effects within the study area of the design change are summarised below.

Construction

5.7.2 Approximately 70 residential and non-residential receptors are predicted to experience construction noise levels above the Significant Observed Adverse Effect Level (SOAEL). These receptors are located on Clifford Road, Pategill Park, Carleton Hall Road, Carleton Hall Walk, the Green, Bridge Lane, at Toll Bar Cottage and Birbeck Medical Practice. The greatest potential for construction noise levels to exceed the SOAEL is during Phase 2: Road construction (details of construction phases are

presented in paragraph 12.4.13 of the ES and in Appendix 12.2 Construction Assessment Assumptions (APP-212)). A construction significant effect is likely if sensitive receptors are exposed to construction noise levels exceeding SOAEL for ten or more days and/or nights in any 15 consecutive days/or nights or a total number of 40 or more days in any six consecutive months. The construction programme was not finalised at the time the ES was prepared so, as a worst-case, all these receptors were assessed as adverse likely significant effects.

5.7.3 The ES reported potential temporary vibration significant effects on human receptors, at any sensitive receptors located within 100m of the scheme, during start-up and run-down of vibratory roller/compactor; within70m during steady state operation of vibratory roller/compactor and within 50m of vibratory piling. Sensitive receptors located on The Green, Bridge Lane, Toll Bar Cottage and Birbeck Medical Practice are within approximately 100m of the design change. These receptors were assessed as temporary construction vibration significant effects in the ES.

Operation

5.7.4 There is one residential property where traffic noise levels currently exceed the SOAEL and a noise reduction greater than 1dB would occur with the scheme, and which would therefore experience a significant beneficial effect. This dwelling is located to the south of Kemplay Bank Roundabout.

5.7.5 There are three non-residential properties that would be subject to noise levels between the Lowest Observed Adverse Effect Level (LOAEL) and SOAEL, where noise reductions would occur greater than 3dB in the short-term because of the scheme. These receptors are predicted to experience a moderate beneficial impact and will therefore experience beneficial likely significant effects. These receptors are located to the east of Kemplay Bank Roundabout and its use is offices i.e. commercial.

5.7.6 The ES reported, no residential or non-residential receptors predicted to experience adverse likely significant effect.

5.8 Potential impacts

5.8.1 The design change DC-03 has the potential to affect noise and vibration impacts during construction and operation as presented in this section.

Construction

5.8.2 It is anticipated that the construction activities associated with the design would not result in any new or different impacts to those reported in Section 12.8 of the ES.

5.8.3 The Birbeck Medical Practice is located close to the design change, approximately 40m north of the roundabout. It is noted that at this receptor a temporary construction noise and vibration effect has been already identified in the ES. As the roundabout is to be moved closer to the receptor, then construction activities with the potential to generate appreciable vibration (as noted in paragraph 12.10.20 of the ES), have the potential to result in vibration impacts. However, with the implementation of

the EMP and NVMP, which would include use of best practicable means of working and continuous engagement with stakeholders, these vibration impacts would be mitigated.

Design and embedded mitigation

5.8.4 The design and embedded mitigation for the construction phase is the same as those reported in paragraphs 12.8.4 to 12.8.11 of the original ES.

Operation

5.8.5 The proposed design change has the potential to change the noise impacts reported in the ES since the roundabout and the altered section of the A686 are moving slightly closer to sensitive receptors located to the north. Furthermore, the change in vertical alignment may also result in a change in noise emissions from the dualling which is the dominant source in the area. However, as noted in Section 5.10 below, the operation of the Project with the design change would not result in any significant effects that are new or different to those reported in the ES.

Design and embedded mitigation

5.8.6 The design and embedded mitigation for the operational phase is the same as those reported in paragraph 12.8.18 of the original ES.

5.9 Essential mitigation and enhancement measures

Construction

Essential mitigation

5.9.1 No essential mitigation measures are proposed in addition to those reported in paragraphs 12.9.1 to 12.9.5 of the ES.

Enhancement

5.9.2 No additional enhanced mitigation measures are proposed in addition to those reported in paragraphs 12.9.11 to 12.9.12 of the ES.

Operation

Essential mitigation

5.9.3 No essential mitigation measures are proposed in addition to those described in paragraphs 12.9.6 to 12.9.10 of the ES.

Enhancement

5.9.4 In addition to the mitigation integrated within the Project design, further consideration will be given to developing enhancements during detailed design of the Project.

5.10 Assessment of likely significant effects

5.10.1 This section identifies the new or different likely significant effects of noise and vibration to those reported in the ES.

Construction

5.10.2 It is anticipated that the construction method, programme and construction boundary would not be considerably altered to the extent of causing likely significant effects that are new or different significant to those reported in the ES.

Operation

5.10.3 The results of noise modelling suggest that the operational noise levels at sensitive receptors would not be significantly altered by the design change. The design would therefore not result in likely significant effects that are new or of different significance to those reported in the ES.

5.11 Monitoring

Construction

5.11.1 Monitoring methodologies described in paragraph 12.12.4 of the ES are considered appropriate and are not affected by the design change. Continuous engagement with the Birbeck Medical Practice will be carried out to achieve a better understanding of any vibration sensitivities, as the facility is located close to the realigned slip roads. Use of construction vibratory equipment should be monitored and programmed in such way to minimise the potential risk from construction induced vibration at the receptor. This is secured with commitment reference D-NV-01 of the EMP, where it is noted that no part of the Project can start until a NVMP is developed in detail and has been subject to stakeholder consultation.

Operation

5.11.2 Monitoring measures described in paragraph 12.12.5 of the ES are considered sufficient and no additional monitoring measures are proposed as a result of the design change.

6 Population and Human Health

6.1 Introduction

6.1.1 The following chapter details the assessment undertaken in order to quantify whether or not design change DC-03 results in any new or different likely significant when compared to those reported within the ES Chapter 13 for Population and Human Health (APP-056).

6.1.2 The assessment undertaken as part of this ES Addendum has followed the methodology set out in the Design Manual for Roads and Bridges (DMRB) LA112 and any other relevant guidance is summarised in section 13.4 of ES Chapter 13 for Population and Human Health (APP-056). It details the methodology followed, summarises the legislation and policy framework relevant to the Population and Health assessment and describes the existing environment in the area surrounding the project and the M6 Junction 40 to Kemplay Bank scheme where the design change is located. It then considers the design, mitigation and residual effects of the project, and the M6 Junction 40 to Kemplay Bank scheme, including taking account of relevant characteristics of the future baseline environment. Any key assumptions and limitations applicable to the assessment are also identified.

6.1.3 Where any of the sections of this addendum are unchanged compared to the ES, a cross reference has been provided and this document will highlight any changes or updates.

6.1.4 Any new or different likely significant effects upon Population and Human Health receptors are identified in Section 6.10 of this chapter.

6.1.5 This chapter has been prepared by competent experts with relevant experience and expertise. The professional qualifications and experience of the technical lead are summarised in ES Chapter 13 Population and Human Health (APP-056).

6.2 Legislation and policy framework

Legislation

6.2.1 The key legislation, national, regional and local policy; and other relevant policy and guidance applicable to the noise and vibration assessment is listed in Section 13.3 of ES Chapter 13. No updates to any of the aforementioned documents has occurred since the production of ES Chapter 13 (APP-056). Therefore all information detailed within Section 13.3 of ES Chapter 13 (APP-056) remains applicable to this assessment.

6.3 Assessment methodology

6.3.1 The methodology for the Population and Health assessment follows the guidance set out within DMRB LA112. The methodology for the Population and Health assessment for the design change remains the same as outlined in Section 13.4 in ES Chapter 13 (APP-056).

Scoping

6.3.2 Table 13-4: Summary of scoping opinion and response in ES Chapter 13 (APP-056) sets out the key points from the Planning Inspectorate Scoping Opinion relevant to the noise and vibration assessment. The full Scoping Opinion is provided in Appendix 4.1 (APP-148) of the ES. There has been no further scoping opinion received since the submission of the ES.

Consultation

6.3.3 The design change has been presented to statutory consultees and other stakeholders. There are responses relevant to Population and Human Health. These comments are detailed in the Change Application Consultation Report (Document Reference 8.2, CR1-007) and have been taken into account in this assessment.

6.4 Assumptions and limitations

6.4.1 The assumptions and limitations of the population and human health assessment described in Section 13.5 of Chapter 13 of the ES are not anticipated to be changed due to the design change.

6.4.2 For the purposes of the assessment it is assumed that no replacement recreational space to offset the loss of the sports pitch has been provided. Consultation is ongoing via the SOCG's however a mitigation or compensation proposal is yet to be agreed. As such in order to assess the reasonable worst case scenario this assessment has assumed no replacement provision.

6.5 Study area

6.5.1 The study area has been defined as described in Section 13.6 of ES Chapter 13 (APP-056).

6.6 Baseline conditions

6.6.1 A full assessment of baseline conditions is outlined in Section 13.7 within ES Chapter 13 (APP-56). There are no further changes to baseline conditions within the study area being considered. The design change is located within the M6 Junction 40 to Kemplay Bank section of the scheme. A detailed assessment for receptors located within the study area for the design change is outlined within Section 13.7 of ES Chapter 13 (APP-056).

Future baseline

6.6.2 A detailed analysis of the future baseline has been outlined within Section 13.7 within Chapter 13 of the ES.

6.6.3 The future baseline has been set as 2044. It is acknowledged that populations will increase locally, particularly given the numerous housing related planning applications. However, it is not predicted that any growth would occur in such a way that development will be outside of the existing conurbation. It is also noted that agricultural, businesses and community facilities may open and close, and the level of usage of community resources including PRoWs may change.

6.6.4 It is not possible to predict any changes to the population and human health baseline with any degree of accuracy. As such, potential changes to population and human health receptors in the future would not be noticeable.

6.6.5 The in-combination climate change assessment has used a future climate baseline that is based on representative concentration pathway 8.5 (RCP 8.5) of the UK climate change 2018 projections (UKCP18).

6.7 Summary of DCO Design Likely Significant Effects

Construction

6.7.1 The following significant effects have been identified within direct vicinity of design change DC-03 during construction, as reported in the ES:

- Permanent very large adverse effects have been identified at Happy Hooves Riding Centre due to permanent and temporary land take.
- Temporary very large adverse effects have been identified at Land Adjacent to Skirsgill Depot employment land allocation due to temporary land take.
- Temporary moderate adverse effects have been identified at Ullswater Community College Playing Field and Skirsgill Park.

6.7.2 Section 13.10 of Chapter 13 of the ES (APP-056) outlines the likely significant effects in the M6 Junction 40 to Kemplay Bank section of the scheme.

Operation

6.7.3 As reported in Section 13.10 of Chapter 13 (APP-056) the following receptors, which are located within the vicinity of design change DC-03, were assessed as having a moderate beneficial and significant effects during operation:

- Wetheriggs Country Park
- Birbeck Medical Group
- Penrith Community Hospital
- Ullswater Community College
- NHS Teaching Hospital
- NHS Primary Care Trust

6.8 Potential impacts

6.8.1 Based on the project design and associated construction activities, the project has the potential to impact upon Population and Health during both construction and operation.

6.8.2 Potential impacts of the project are described in this section prior to the implementation of the essential mitigation described below. The residual effects of the project, taking into account this essential mitigation, are then described in Section 6.10.

Construction

Design and embedded mitigation

6.8.3 Where access to private properties and businesses is affected, temporary alternative access will be provided and agreement will be sought with the landowner and/or tenant(s) as necessary, via the CTMP.

6.8.4 Land required for construction compounds would be used temporarily before being returned to its original use and condition as per before the works (unless required for mitigation such as alternative habitat creation, in which case it will be prepared and planted accordingly after the construction works are complete). Consultation with the landowners will be required to ensure that the land returned is of the same condition as its current use to prevent any potential sterilisation of land parcels. The EMP will also ensure impacts of dust and noise on crops and livestock are minimised.

6.8.5 Access arrangements would be maintained during construction to all identified commercial property and businesses, and any disruption would be minimised as much as possible as part of the CTMP. Through scheme design, appropriate access would continue to be provided. Where concerns have been raised by landowners and tenants about the scheme and its potential effects on business viability, landowner engagement has helped inform design with appropriate mitigation measures agreed and incorporated as part of the scheme.

6.8.6 Prior to the commencement of the construction phase the sports pitch located at Ullswater College will be assessed to ensure that that it falls outside of the scheme Order Limits, inclusive of all run off areas and spectators standoff zones. The details of the assessment will be agreed with Sports England through ongoing consultation as part of the Statements of Common Ground as the detailed design progresses. It is assumed for the purpose of this assessment that an agreement will be reached and the provision of the sports pitch will continue throughout construction and operation.

6.8.7 National Highways will commission a construction phase ball strike risk assessment from Labosport, prior to the finalisation of the detailed design in order to understand the potential risk of ball strikes on the carriageway and inform what measures are to be implemented if required to retain balls on the playing field and prevent them landing in the highway. These measures will be secured through the next draft of the first iteration EMP.

Potential Impacts before essential mitigation and enhancement

6.8.8 The design change seeks to build an underpass at Kemplay Bank, which passes below a roundabout at ground level. The proposed design change will also look to raise the mainline through the underpass. The design change would change the Limits of Deviation for the Kemplay Bank element of the scheme. The design change will affect the amount of land that will permanently need to be required to the north side of the roundabout.

The design change will now require 1100m^2 of new permanent land take and some further temporary land take of the land located to the south of the sports pitch at Ullswater College.

6.8.9 It should be noted that the change in land take is within the Order Limits that were assessed for the ES. The additional areas of land take will not prevent the sports pitch from being utilised during construction or operation following the implementation of the mitigation measures outlined above. As such there is no change to and no new impacts or effects upon the receptor beyond those reported within Chapter 13 of the ES (APP-056).

6.8.10 New permanent land take of 1100m^2 will be required from Penrith Community Hospital as well as further temporary land take. Following consultation with the hospital it has been established that the area of land to be acquired is not utilised in any operational capacity. The design change would therefore not inhibit the Penrith Community Hospital operational functions. As such there is no change to and no new impacts or effects upon the receptor beyond those reported within Chapter 13 of the ES (APP-056).

Operation

Design and embedded mitigation

6.8.11 National Highways will commission an operational phase ball strike risk assessment from Labosport, prior to the finalisation of the detailed design in order to understand the potential risk of ball strikes on the carriageway and inform what measures are to be implemented if required to retain balls on the playing field and prevent them landing in the highway. These measures will be secured through the EMP.

Potential Impacts

6.8.12 No further potential operational impacts have been identified as a result of the design change.

6.9 Essential mitigation and enhancement measures

Construction

Essential mitigation

6.9.1 No specific essential mitigation measures have been identified beyond those listed in Section 13.9 of Chapter 13 of the ES.

Enhancement

6.9.2 No specific enhancement measures have been identified beyond those listed in Section 13.9 of Chapter 13 of the ES.

Operation

Essential mitigation

6.9.3 No specific essential mitigation measures have been identified beyond those listed in Section 13.9 of Chapter 13 of the ES.

Enhancement

6.9.4 No specific enhancement measures have been identified beyond those listed in Section 13.9 of Chapter 13 of the ES.

6.10 Assessment of likely significant effects

6.10.1 No further likely significant effects have been identified during construction or operation beyond those identified within Chapter 13 of the ES.

6.11 Monitoring

6.11.1 Beyond the recommendations for monitoring made in other relevant assessments and supporting documents, there are no proposals for monitoring arising from this chapter.

1 DC-04

1.1 Introduction

1.1.1 This chapter assesses potential for design change DC-04 to introduce new or different likely significant effects upon the environment when compared to the findings of the original Development Consent Order (DCO) Environmental Statement (ES) (doc ref. 3.1 to 3.4, APP-043 to APP-233).

1.1.2 Only the environmental topics which were scoped in as requiring a full assessment are detailed within this document. For further information in regard to the rational as to why any environmental disciplines have been scoped out of requiring a full assessment please refer to ES Addendum Volume I. Topics scoped in for further assessment include Biodiversity, Material Assets and Waste and Road Drainage and the Water Environment.

1.1.1 Design change DC-04 is summarised in Section 1 and detailed in Section 3 of the Change Application (Document Reference 8.1, CR1-002). An updated Project description is provided in Environmental Statement Addendum Volume III: Updated Project Description.

2 Biodiversity

2.1 Introduction

2.1.1 The following chapter details the assessment undertaken in order to quantify whether or not design change DC-04 results in any new or different likely significant when compared to those reported within the ES Chapter 6, for Biodiversity (APP-045).

2.1.2 The assessment undertaken as part of this ES Addendum has followed the methodology set out in the Design Manual for Roads and Bridges (DMRB) [1] and any other relevant guidance. It details the methodology followed, summarises the legislation and policy framework relevant to the ES Chapter 6 Biodiversity Geology and Soils assessment and describes the existing environment in the area surrounding the Project. It then considers the design, mitigation and residual effects of the Project, including taking account of relevant characteristics of the future baseline environment. Any key assumptions and limitations applicable to the assessment are also identified.

2.1.3 Where any of the sections of this addendum are unchanged compared to the ES, a cross reference has been provided and this document will highlight any changes or updates.

2.1.4 Any new or different likely significant effects upon Geology and Soils are identified in Section 2.10 of this chapter.

2.1.5 This addendum of the ES has been undertaken by competent experts with relevant experience and expertise as set out in ES Chapter 6 (APP-045).

2.2 Legislation and policy framework

Legislation

2.2.1 There have been no changes in the legislation and policy framework since the submission of the Environmental Statement Chapter 6 Biodiversity (Section 6.3) (APP-049).

2.3 Assessment methodology

2.3.1 The methodology for the biodiversity assessment remains the same as during the production of the Environmental Statement Chapter 6 Biodiversity and follows the guidance set out within DMRB LA 104, DMRB LA 108, DMRB LD 118 and the CIEEM Guidance for Ecological Impact Assessment.

Scoping

2.3.2 There is no change to the scope of the assessment for the design change. Refer to Environmental Statement Chapter 6 Biodiversity Section 6.4 (APP-049).

Consultation

2.3.3 The design change has been presented to statutory consultees and other stakeholders. There are responses relevant to Biodiversity. These comments

[1] Highways England (2020) Design Manual for Roads and Bridges LA 108 Biodiversity, Revision 1.

are detailed in Change Application Consultation Report (Document Reference 8.2, CR1-007) and have been taken into account in this assessment.

2.4 Assumptions and limitations

2.4.1 Limitations specific to baseline surveys are stated within the individual technical reports which were appended to the ES (Appendix 6.2: Designated Sites to Appendix 6.22: White-Clawed Crayfish (Application Document 3.4).

2.4.2 Mitigation measures are described in Section 6.9 of ES Chapter 6 Biodiversity (APP-049). Updated environmental mitigation design has not been provided for the purposes of this assessment. However, it has been confirmed that all mitigation measures in the location of DC-04 will be retained as part of the design change. This would include barn owl obstacle planting, badger fencing, badger crossing and otter crossing.

2.4.3 The final environmental design may alter slightly during the detailed design process prior to construction. However, the impact assessment has taken account of the worst-case scenarios and mitigation measures are included within the Project design accordingly and within the Limits of Deviation (Application Document 5.11 Project Design Principles (Rev 4)).

2.4.4 For the purposes of this assessment, the assumption remains from ES Chapter 6 Biodiversity (APP-049), that all habitat within the indicative site clearance boundary (ES Figure 2.2: Indicative Site Clearance Boundary (APP-062)will be lost as a result of construction.

2.5 Study area

2.5.1 The study area for this assessment remains the same as in ES Chapter 6 Biodiversity (APP-049) (Section 6.6.). The study area was defined in accordance with DMRB LA 108, DMRB LD 118 and CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland. In accordance with this guidance, the study area covers the Project in its entirety including construction compounds, areas for landscaping and habitat creation, and extends beyond the Order Limits, where necessary, to encompass all the areas potentially within the Zone of Influence for impacts from the Project.

2.5.2 In establishing the ZoI, potential impact pathways during construction and operational phases were considered in relation to water quality, and noise and vibration, which could have direct or indirect effects on ecological features.

2.5.3 The ZoI differs for each ecological feature as follows (see ES Figure 6.19: Indicative Zone of Influence for Ecological Features (APP-087)):

- 2km radius from the Order Limits for international sites of nature conservation importance (or 30km for SACs where bats are noted as one of the qualifying interests)
- 2km radius from the Order Limits for nationally designated sites for nature conservation importance.
- 1km radius from the Order Limits for regionally important and local non-statutory designated sites

- 1km radius from the Order Limits for Section 41 Habitats of Principal Importance (HoPI), Ancient Woodland Inventory (AWI) sites and veteran trees
- 500m radius from the Order Limits for breeding birds, wintering birds and barn owl (Tyto alba)
- 500m length (250m upstream and downstream) of all new and existing watercourse crossing points within the Order Limits for aquatic receptors
- 250m radius from the Order Limits for habitats, otter, badger, red squirrel, other terrestrial mammals and amphibians.
- 100m radius from the Order Limits for bat roosts (structures), bat crossing points, water vole (Arvicola amphibius), reptiles and terrestrial invertebrates
- 50m radius from the Order Limits for hedgerows
- Within the Order Limits for bat roosts (trees)
- The maximum ZoI for internationally, nationally and locally designated sites including ancient woodland and veteran trees relating to potential air quality impacts is established at 200m from the Affected Road Network (ARN) (see ES Figure 5.1: Air Quality Study Area (APP-065)). Further details are provided within ES Chapter 5: Air Quality (APP-048).

2.6 Baseline conditions

2.6.1 There are no changes in the baseline conditions for this assessment that are described in ES Chapter 6 Biodiversity (APP-049).

2.6.2 The location of DC-04 is approximately 140m to the south of River Eden Special Area for Conservation (SAC), the boundary of which is consistent with the River Eden and Tributaries Site of Special Scientific Interest (SSSI). DC-04 is predominantly located within improved grassland and poor semi-improved grassland.

2.6.3 The design change affects three crossings of tributaries of the River Eden SSSI/SAC: Light Water, Unnamed Tributary of River Eamont 3.3 and Unnamed Tributary of River Eamont 3.5. As described in ES Chapter 6 Biodiversity (APP-049) (Section 6.10.169) Light Water is assessed as being of National importance (high value) as it conforms to habitat 3260: Watercourses of plain to montane levels with the *Ranunculion fluitantis and Callitricho-Batrachion* vegetation, and supports salmon (eDNA records), a qualifying species of the River Eden SAC/SSSI.

2.6.4 Unnamed Tributary of River Eamont 3.3 is minor tributary, considered to be of limited value for fish of conservation value due to the lack of flow and stagnant nature. The affected section of Unnamed Tributary of River Eamont 3.5 is an ephemeral ditch (dry during survey) with no connectivity with the River Eamont (due to steep bedrock ravine and associated waterfall); for theses reason the area of affected watercourse is considered unsuitable for fish.

2.6.5 As described in ES Chapter 6 Biodiversity (APP-049) (Section 6.10.170) Unnamed Tributary of River Eamont 3.3 and Unnamed Tributary of River Eamont 3.5 were assessed as being of Local importance (low value).

Future baseline

2.6.6 There is no change in the consideration of future baseline in relation to the year of construction and year of opening/operation, to that reported in ES Chapter 6 Biodiversity Section 6.7 (APP-049).

2.7 Summary of DCO Design Likely Significant Effects

Construction

2.7.1 Section 6.10 of ES Chapter 6 Biodiversity (APP-049) sets out the construction related Assessment of Likely Significant Effects relevant to the biodiversity assessment and the design change.

2.7.2 There were no Likely Significant Effects for construction for the Penrith to Temple Sowerby Scheme.

Operation

2.7.3 Section 6.10 of ES Chapter 6 Biodiversity (APP-049) sets out the operation related Assessment of Likely Significant Effects relevant to the biodiversity assessment and the design change.

2.7.4 There were no Likely Significant Effects for operation for the Penrith to Temple Sowerby Scheme.

2.8 Potential impacts

2.8.1 Based on the Project design and associated construction activities, the Project including design change DC-04 has the potential to impact upon biodiversity during both construction and operation.

Construction

Design and embedded mitigation

2.8.2 Section 6.8.4 to 6.8.21 of ES Chapter 6 Biodiversity (APP-049) sets out the construction embedded design mitigation relevant to the biodiversity assessment and the design change.

2.8.3 There is no change to any of the construction design and embedded mitigation measures proposed in the ES (Chapter 6 Biodiversity (APP-049) and the EMP (Application Document 2.7 Environmental Management Plan (Rev 4)).

Potential Impacts before essential mitigation and enhancement

2.8.4 Section 6.8.22 to 6.8.47 of ES Chapter 6 Biodiversity (APP-049) presents potential construction impacts that would be applicable to that of design change DC-04 during construction.

2.8.5 The design change would result in a change to the Indicative Site Clearance Boundary in two locations. This will result in additional permanent land take (habitat loss) within two arable fields.

2.8.6 For Light Water, the only design change is that the location of Light Water Maintenance Lane Culvert has been moved within the Order Limits. Assuming a worst-case scenario, it has been assumed that the Light Water Maintenance Lane Culvert shall be located a short distance (approximately

50m) downstream of the A66 carriageway. The longitudinal length (10m) of the culvert and all other dimensions are unchanged from the design presented at DCO.

2.8.7 In addition, minor culverts on Unnamed Tributary of River Eamont 3.3 and Unnamed Tributary of River Eamont 3.5 (the affected section of which is described as an ephemeral ditch with no connectivity with the River Eamont and unsuitable for fish), will also be moved locally within the Order Limits. The design and dimensions of the culvert will otherwise remain unchanged from that presented at DCO.

Operation

Design and embedded mitigation

2.8.8 Section 6.8.48 to 6.8.49 of ES Chapter 6 Biodiversity (APP-049) sets out the operation embedded design mitigation relevant to the biodiversity assessment and the design change.

2.8.9 There is no change to any of the operation design and embedded mitigation measures proposed in the ES (Chapter 6 Biodiversity (APP-049) and the EMP (Application Document 2.7 Environmental Management Plan (Rev 4)); the design change will incorporate the embedded design mitigation as set out in the ES and EMP.

Potential Impacts

2.8.10 Section 6.8.40 to 6.8.46 of ES Chapter 6 Biodiversity (APP-049) presents potential impacts that would be applicable to that of design change DC-04 during operation. The design changes involves a minor change in location of three culverts; the design of these structures (and therefore the way these they will function during operation) remains unchanged from that presented at DCO application.

2.9 Essential mitigation and enhancement measures

Construction

Essential mitigation

2.9.1 There is no change to any of the essential mitigation measures proposed in the ES (Chapter 6 Biodiversity (APP-049)). Updates to the habitat mitigation as a result of this design change will require to be in line with ES Chapter 6 Biodiversity (APP-049) and the EMP (Application Document 2.7 Environmental Management Plan (Rev 4)) requirements in relation to the habitat loss to mitigation ratios to be provided. Therefore, there will be no change in the habitat loss to mitigation ratios as reported in ES Chapter 6 Biodiversity.

2.9.2 Mitigation requirements for habitat losses are described within Table 6-20 and 6-21 (ES Chapter 6 Biodiversity (APP-049)) which detail the requirements to ensure the provision of required replacement habitat mitigates for that which is anticipated to be lost. The tables secure the mitigation requirements for replacement habitats and inform the quantum of habitat mitigation that would be required. Both the mitigation measures outlined in ES Chapter 6 Biodiversity (APP-049) and the EMP (Application

Document 2.7 Environmental Management Plan (Rev 4)) secures the measures to ensure that replanting of lost habitats is achieved and that where not replaced directly, the type and quality of the habitats replaced is greater than that lost.

Enhancement

2.9.3 There is no change to any of the enhancement measures proposed in the ES (Chapter 6 Biodiversity (APP-049).

Operation

Essential mitigation

2.9.4 There is no change to any of the essential mitigation measures proposed in the ES (Chapter 6 Biodiversity (APP-049).

Enhancement

2.9.5 There is no change to any of the enhancement measures proposed in the ES (Chapter 6 Biodiversity (APP-049).

2.10 Assessment of likely significant effects

2.10.1 This section identifies any changes in likely biodiversity effects of the Project that are predicted to be significant.

2.10.2 There would be no new or different significant effects for construction or operation for this design change to those reported in ES Chapter 6 Biodiversity (APP-049).

2.11 Monitoring

2.11.1 Section 6.11 of ES Chapter 6 Biodiversity sets out the monitoring required for both construction and operation relevant to the biodiversity assessment and design change. The EMP (Application Document 2.7 Environmental Management Plan (Rev 4)) and LEMP (Annex B1 of the EMP (Application Document 2.7) provide full details of all required monitoring and should be read in conjunction with the ES.

2.11.2 There are no changes to any of the monitoring proposed in ES Chapter 6 Biodiversity (APP-049).

2.12 Glossary

2.12.1 See Application Glossary (APP-005).

3 Material Assets and Waste

3.1 Introduction

3.1.1 The following chapter details the assessment undertaken in order to quantify whether or not design change DC-04 results in any new or different likely significant when compared to those reported within the ES Chapter 11, for Material Assets and Waste (APP-054).

3.1.2 The assessment undertaken as part of this ES Addendum has followed the methodology set out in the Design Manual for Roads and Bridges (DMRB) LA110 and any other relevant guidance. DMRB LA 110 and other relevant guidance is summarised in section 11.3 of ES Chapter 11 for Material Assets and Waste (APP-054). It details the methodology followed, summarises the legislation and policy framework relevant to the Material Assets and Waste assessment and describes the existing environment in the area surrounding the Project and the Penrith to Temple scheme (where the design change DC-04 is located). It then considers the design, mitigation and residual effects of the Project and the Penrith to Temple Sowerby scheme incorporating the change, including taking account of relevant characteristics of the future baseline environment. Any key assumptions and limitations applicable to the assessment are also identified.

3.1.3 Where any of the aforementioned sections are unchanged a cross reference back to the original ES has been provided and this document will highlight any changes or updates.

3.1.4 Any new or different likely significant effects during construction upon Material Assets and Waste receptors are identified in Section 3.10 of this chapter.

3.1.5 This chapter has been prepared by competent experts with relevant experience and expertise. The professional qualifications and experience of the technical lead are summarised in ES Chapter 11 Material Assets and Waste (APP-054).

3.2 Legislation and policy framework

3.2.1 The key legislation, national, regional and local policy; and other relevant policy and guidance applicable to the material assets and waste assessment is listed in Section 11.2 of ES Chapter 11. No updates to any of the aforementioned documents has occurred since the production of ES Chapter 11. Therefore all information detailed within Section 11.2 of the ES Chapter 11 (APP-054) remains applicable to this assessment.

3.3 Assessment methodology

3.3.1 The methodology for the material assets and waste assessment follows the guidance set out within DMRB LA 110. The assessment methodology utilised for this addendum is the same as within ES Chapter 11, where it is detailed in Section 11.3.

Scoping

3.3.2 Table 11.4 of the Material Assets and Waste assessment within ES Chapter 11 (APP-054) sets out the key points from the Planning Inspectorate Scoping Opinion relevant to the Material Assets and Waste assessment and the design change. The full Scoping Opinion is provided in Appendix 4.1 (APP-149) of the ES. There has been no further scoping opinion received since the submission of the ES.

Consultation

3.3.3 The design change has been presented to statutory consultees and other stakeholders. These comments are detailed in the Change Application Consultation Report (Document Reference 8.2, CR1-007), however no specific comments in relation to Material Assets and Waste have been received.

3.3.4 Since the submission of the ES, consultation with the relevant local planning authorities is ongoing, throughout the DCO examination, as part of the Statements of Common Ground and Principal Areas of Disagreement documents.

3.4 Assumptions and limitations

3.4.1 Section 11.4 of ES Chapter 11 (APP-054) sets out the assumptions and limitations relevant to the assessment and the design change.

3.5 Study area

3.5.1 Section 11.5 of ES Chapter 11 (APP-054) sets out the study areas relevant to the assessment and the design change.

3.5.2 Study area 1 is the area within the Order Limits, as within these areas construction materials will be consumed. For the purpose of this material assets and waste assessment, Study area 1 now incorporates the change to the Order Limits for the design change. Study area 2 remains unchanged and is the area where the main construction materials will be sourced and construction waste will be treated or disposed of, and comprises waste infrastructure in the North East, the North West and Yorkshire and The Humber.

3.6 Baseline conditions

3.6.1 Section 11.6 of the Material Assets and Waste assessment (Document Reference 3.2, APP-054) sets out the Baseline Conditions relevant to the Material Assets and Waste assessment and the design change.

3.6.2 The baseline conditions relating to mineral safeguarding sites for the Penrith to Temple Sowerby scheme are identified in Table 11.7 of the ES assessment (Document Reference 3.2, APP-054) using information provided by Cumbria County Council during consultation.

Future baseline

3.6.3 Section 11.6.28 of the Material Assets and Waste assessment (Document Reference 3.2, APP-054) sets out the Future baseline relevant to the Material Assets and Waste assessment and the design change.

3.7 Summary of DCO Design Likely Significant Effects

Construction

3.7.1 Section 11.9 of the Material Assets and Waste assessment (Document Reference 3.2, APP-054) sets out the construction related Assessment of Likely Significant Effects relevant to the Material Assets and Waste assessment and the design change.

3.7.2 The potential sterilisation to mineral safeguarding sites for the Penrith to Temple Sowerby scheme are assessed in Table 11.32 of the ES assessment (Document Reference 3.2, APP-054) using information provided by Cumbria County Council during consultation.

3.7.3 There are no Likely Significant Effects for construction for the Penrith to Temple Sowerby scheme.

Operation

3.7.4 Section 11.9.34 of the Material Assets and Waste assessment (Document Reference 3.2, APP-054) sets out the operation related Assessment of Likely Significant Effects relevant to the Material Assets and Waste assessment and the design change.

3.7.5 There are no Likely Significant Effects for operation for the Penrith to Temple Sowerby scheme.

3.8 Potential impacts

3.8.1 Based on the Project design and associated construction activities design change DC-04 has the potential to impact material assets and waste during both construction and operation. However the design change is unlikely to alter the conclusions of the likely significant effects assessment reported in Section 11.7 of the ES Chapter 11 (APP-054) during construction and operation.

3.8.2 The potential construction and operation impacts on material assets included in the assessment, as identified in DMRB LA 110, are:

- The sterilisation of mineral safeguarding sites and/or peat resources
- The consumption of virgin materials.

3.8.3 The potential construction and operation impacts on waste included in the assessment, as identified in DMRB LA 110, are:

- The reduction in regional landfill capacity
- The reduction in national landfill capacity.

Construction

Design and embedded mitigation

3.8.4 Sections 11.7.2 and 11.8.2 of the Material Assets and Waste assessment (Document Reference 3.2, APP-054) set out the construction Embedded Design Mitigation relevant to the Material Assets and Waste assessment and the design change.

3.8.5 For the purpose of this material assets and waste assessment for the design change, the Design and embedded mitigation for construction remain unchanged as the design changes are not of a size that alters the ES and the Environmental Management Plan (EMP).

Potential Impacts before essential mitigation and enhancement

3.8.6 Section 11.7 of the Material Assets and Waste assessment (Document Reference 3.2, APP-054) sets out the construction Potential Impacts relevant to the Material Assets and Waste assessment and the design change.

3.8.7 For the purpose of this material assets and waste assessment for the design change, the Potential Impacts before essential mitigation and enhancement for construction remain unchanged as the design changes are not of a size that alters the ES and the EMP.

Operation

Design and embedded mitigation

3.8.8 Section 11.7.10 of the Material Assets and Waste assessment (Document Reference 3.2, APP-054) sets out the operation Embedded Design Mitigation relevant to the Material Assets and Waste assessment and the design change.

3.8.9 For the purpose of this material assets and waste assessment for the design change, the Design and embedded mitigation for Operation remain unchanged as the design changes are not of a size that alters the ES and the EMP.

Potential Impacts

3.8.10 Section 11.7.11 of the Material Assets and Waste assessment (Document Reference 3.2, APP-054) sets out the operation Potential Impacts relevant to the Material Assets and Waste assessment and the design change.

3.8.11 For the purpose of this material assets and waste assessment for the design change, the Potential Impacts for operation remain unchanged as the design changes are not of a size that alters the ES and the EMP.

3.9 Essential mitigation and enhancement measures

Construction

Essential mitigation

3.9.1 Section 11.8.45 of the Material Assets and Waste assessment (Document Reference 3.2, APP-054) sets out the construction Essential Mitigation relevant to the Material Assets and Waste assessment and the design change.

Enhancement

3.9.2 Section 11.8.66 of the Material Assets and Waste assessment (Document Reference 3.2, APP-054) sets out the construction Essential Enhancement relevant to the Material Assets and Waste assessment and the change.

Operation

3.10 Assessment of likely significant effects

3.10.1 This section identifies whether or not there are any new or different likely significant effects upon material assets and waste as a result of design change DC-04.

Mineral Safeguarding Sites

3.10.2 The design change will separate shared public rights of way and private access track provision on the Penrith to Temple Sowerby scheme. The design change is located close to a Mineral Consultation Area (MCA) for sand and gravel. However there are no new Likely Significant Effects for the sterilisation of mineral safeguarding sites for DC-04 or the Penrith to Temple Sowerby scheme as the design change would:

- Require only a minor change to the Order Limits when compared to the scheme as whole
- Take land close to the existing A66, which land that is unlikely to be suitable for mineral development.

3.10.3 The potential sterilisation to mineral safeguarding sites for the Penrith to Temple Sowerby scheme are assessed in Table 11.32 of the ES assessment (Document Reference 3.2, APP-054) using information provided by Cumbria County Council during consultation. A minor adverse impact was identified for the Penrith to Temple Sowerby scheme for the sterilisation of mineral safeguarding sites. The design change DC-04 does not give cause to alter this assessment. Therefore this minor adverse impact would also be applied for the design change and would not represent a Likely Significant Effect.

3.10.4 Section 11.9.5 of the material assets and waste assessment (APP-054) sets out the sensitivity of mineral safeguarding sites. Each mineral safeguarding site and allocation was considered to have a value (sensitivity) of Medium. Therefore the minor adverse for the design change would remain unchanged and would not represent a likely significant effect.

3.10.5 Therefore, there are no new or different likely significant effects anticipated during construction or operation as a result of DC-04.

3.11 Monitoring

Construction

3.11.1 Section 11.10.1 of the Material Assets and Waste assessment (Document Reference 3.2, APP-054) sets out the construction Monitoring relevant to the assessment and the design change.

Operation

3.11.2 Section 11.10.4 of the Material Assets and Waste assessment (Document Reference 3.2, APP-054) sets out the operation Monitoring relevant to the assessment and the design change.

3.12 Glossary

3.12.1 See Application Glossary (APP-005).

4 Road Drainage and the Water Environment

4.1 Introduction

4.1.1 The following chapter details the assessment undertaken in order to quantify whether or not design change DC-04 results in any new or different likely significant when compared to those reported within the ES within Chapter 14 Road Drainage and the Water Environment (APP-057).

4.1.2 The assessment undertaken as part of this ES Addendum has followed the methodology set out in the Design Manual for Roads and Bridges (DMRB) LA104 and LA 113 and any other relevant guidance as noted in the ES. This ES addendum details the methodology followed, summarises the legislation and policy framework relevant to the Road Drainage and the Water Environment assessment and describes the existing environment in the area surrounding the Project. It then considers the design, mitigation and residual effects of the Project, including taking account of relevant characteristics of the future baseline environment. Any key assumptions and limitations applicable to the assessment are also identified.

4.1.3 Where any of the sections of this addendum are unchanged compared to the ES, a cross reference has been provided and this document will highlight any changes or updates.

4.1.4 Any new or different likely significant effects upon construction Road Drainage and the Water Environment receptors are identified in Section 4.10 of this chapter.

4.1.5 This chapter has been prepared by competent experts with relevant experience and expertise. The professional qualifications and experience of the technical lead are summarised in ES Chapter 14 (APP-057).

4.2 Legislation and policy framework

Legislation

4.2.1 There have been no changes in the legislation and policy framework since the submission of the Environmental Statement (ES) Chapter 14 Road Drainage and the Water Environment (APP-057).

4.3 Assessment methodology

4.3.1 The methodology for the road drainage and water environment assessment follows the guidance set out within DMRB LA 104 (Highways England, 2020a1 and DMRB LA 113 (Highways England, 2020b)[2].

Scoping

4.3.2 There is no change from the ES Scoping Opinion provided in Appendix 4.2 (APP-149).

4.3.3 Where assessment has been undertaken in accordance with the Scoping Opinion, the wording of each point raised with a response and reference to the relevant ES section is provided. Where further discussion and/or an alternative approach has been agreed with the relevant stakeholders and the Planning Inspectorate, an explanation is provided.

Consultation

4.3.4 The design change has been presented to statutory consultees and other stakeholders. There are responses relevant to Road Drainage and the Water. These comments are detailed in the Change Application Consultation Report (Document Reference 8.2, CR1-007) and have been taken into account in this assessment where necessary.

4.4 Assumptions and limitations

4.4.1 There are no changes to the assumptions and limitations presented in ES Chapter 14 Road Drainage and the Water Environment (APP-057).

4.4.2 Further hydromorphology and flood risk surveys to support the assessment of DC-04 have not been completed due to the design changes being within DCO survey areas, and therefore this addendum and its supporting assessments are reliant upon the DCO survey information. The survey information presented in ES Appendix 14.2: Flood Risk Assessment and Outline Drainage Strategy (APP-221) and ES Appendix 14.4 Hydromorphology Assessment (APP-223) is considered to remain valid as there is no anticipated change to the baseline conditions.

4.4.3 The watercourse crossing of Unnamed Tributary of River Eamont 3.3 and Unnamed Tributary of River Eamont 3.5 are modelled and assessed within ES Appendix 14.2: Flood Risk Assessment and Outline Drainage Strategy (APP-221). The hydraulic modelling undertaken to inform the assessment ES Appendix 14.2: Flood Risk Assessment and Outline Drainage Strategy (APP-221) presents no increase in flood depth or extent at these crossings. Due to the magnitude of design change DC-04 (which includes the minor change in location of the watercourse crossings of Unnamed Tributary of River Eamont 3.3 and Unnamed Tributary of River Eamont 3.5 further away from the A66 main alignment) it is considered that the hydraulic modelling results presented in Appendix 14.2: Flood Risk Assessment and Outline Drainage Strategy (APP-221) remain representative. Therefore, these minor changes have not been assessed in this addendum.

4.4.4 As required further hydraulic modelling will inform the detailed design as secured within the EMP (Application Document 2.7 Environmental Management Plan (Rev 4)), REAC table reference D-RDWE-02.

4.4.5 The assessments represent a ‘reasonable worst-case’ and are based on conservative inputs derived from available field or desk study data and published research literature relevant to the study area.

4.5 Study area

4.5.1 There are no changes to the study area presented in ES Chapter 14 Road Drainage and the Water Environment (APP-057).

4.6 Baseline conditions

4.6.1 There are no changes to the baseline that is presented in ES Chapter 14 Road Drainage and the Water Environment (APP-057).

4.6.2 Design change DC-04 is located in the Penrith to Temple Sowerby scheme.

Future baseline

4.6.3 There are no changes to the future baseline that is presented in ES Chapter 14 Road Drainage and the Water Environment (APP-057).

4.7 Summary of DCO Design Likely Significant Effects

Construction

4.7.1 ES Chapter 14 Road Drainage and the Water Environment (APP-057) reported that with suitable mitigation no residual likely significant effects on road drainage and the water environment receptors during construction of the scheme are expected.

Operation

4.7.2 ES Chapter 14 Road Drainage and the Water Environment (APP-057) reported that with suitable mitigation no residual likely significant effects on road drainage and the water environment receptors during operation of the scheme are expected.

4.8 Potential impacts

4.8.1 Potential impacts of the design change are described in this section prior to the implementation of the essential mitigation described in Section 4.8. The residual effects of the Project, taking into account this essential mitigation, are then described in Section 4.9.

Construction

Design and embedded mitigation

4.8.2 The Environmental Management Plan (EMP) secures the 'maximum' extent of mitigation required but also, where appropriate, includes mechanisms (eg by way of further surveys or modelling) to establish, pre-construction and during detailed design, whether the identified mitigation can be refined such that a lesser extent is required to achieve the outcome reported in this assessment. The fundamental point is that the mitigation identified in this addendum and supporting appendices is secured by the EMP, where required, to achieve the outcome reported in this assessment.

4.8.3 The mitigation measures stipulated within the impact assessment are secured by the Project Design Principles (Application Document 5.11 Project Design Principles (Rev 4)) and the EMP (Application Document 2.7 Environmental Management Plan (Rev 4)), which are certified documents under DCO.

Potential impacts before essential mitigation and enhancement

4.8.4 The design change does not introduce infrastructure with the potential to create new impacts therefore, there are no changes to the potential impacts that are presented in ES Chapter 14 Road Drainage and the Water Environment (APP-057)

4.8.5 Section 14.8.25 to Section 14.8.47 and Section 14.8.58 to Section 14.8.60 of ES Chapter 14 Road Drainage and the Water Environment (APP-057) presents potential impacts representative of design change DC-04 during construction. Therefore, the potential impacts that may arise as a result of

design change DC-04 have been assessed within ES Chapter 14 Road Drainage and the Water Environment (APP-057).

Operation

Design and embedded mitigation

4.8.6 Design and embedded mitigation considered for the operational phase of the proposed road scheme in this road drainage and water environment assessment addendum is the same as stated in ES Chapter 14 Road Drainage and the Water Environment (APP-057).

Potential Impacts

4.8.7 The design change does not introduce infrastructure with the potential to create new impacts therefore, there are no changes to the potential impacts that are presented in ES Chapter 14 Road Drainage and the Water Environment (APP-057)

4.8.8 Section 14.8.86 to Section 14.8.98 and Section 14.8.102 to Section 14.8.104 of ES Chapter 14 Road Drainage and the Water Environment (APP-057) presents potential impacts representative of design change DC-04. Therefore, the potential impacts that may arise as a result of design change DC-04 have been assessed within ES Chapter 14 Road Drainage and the Water Environment (APP-057).

4.9 Essential mitigation and enhancement measures

Construction

Essential mitigation

4.9.1 Design change DC-04 does not require essential mitigation measures additional to those presented in Section 14.9.2 to Section 15.9.3 of ES Chapter 14 Road Drainage and the Water Environment (Document Reference APP-057) and secured in the EMP (Application Document 2.7 Environmental Management Plan (Rev 4)) and PDP (Application Document 5.11 Project Design Principles (Rev 4)).

Enhancement

4.9.2 There are no changes to the enhancement measures that are presented in ES Chapter 14 Road Drainage and the Water Environment (Document Reference APP-057).

Operation

Essential mitigation

4.9.3 Essential mitigation measures presented in Section 14.9.4 to Section 14.9.18 of ES Chapter 14 Road Drainage and the Water Environment (Document Reference APP-057) remain secured.

4.9.4 ES Addendum Volume II Appendix 1: WFD Compliance Assessment Addendum outlines additional mitigation as a result of design change DC-04. In addition to the WFD mitigation outlined in Section 14.9.17 of ES Chapter 14 Road Drainage and the Water Environment (APP-057), an additional one meter of mitigation is required to compensate for the minor lengthening of the Lightwater maintenance culvert associated with design change DC-04.The additional meter of WFD mitigation for Eamont (Lower)

(GB102076070990) will be secured in a future draft of the first iteration EMP submit to be submitted during the examination.

4.9.5 ES Addendum Appendix 2: Hydromorphology Assessment Addendum outlines an additional mitigation requirement as a result of proposed design change DC-24 for where feasible during detailed design, culvert structures will be tied in to the existing bed and bank elevations/profiles upstream and downstream of the culvert and culvert embedment is to be designed to be in line with CIRIA guidance (C786). The requirement for these culvert design mitigations will be secured in a future draft of the first iteration EMP to be submitted during the examination.

4.9.6 Further hydraulic modelling, as secured by D-RDWE-02 of the EMP (Application Document 2.7 Environmental Management Plan (Rev 4)), may result in additional floodplain volume needing to be incorporated within the Order Limits and/or refinement to culvert design. This is considered appropriate to mitigate the minor impact on flood depths as a result of design change DC-04, as reported in ES Addendum Volume II Appendix 3: FRA Addendum.

Enhancement

4.9.7 There are no changes to the enhancement measures that are presented in ES Chapter 14 Road Drainage and the Water Environment (APP-057).

4.10 Assessment of likely significant effects

4.10.1 ES Addendum Volume II Appendix 1: WFD Compliance Assessment Addendum assesses the potential impacts of design change DC-04 on the Project maintaining WFD compliance. The ES Addendum Volume II Appendix 2: Hydromorphology Assessment Addendum assesses the potential impacts of the design change DC-04 on hydromorphological features. The ES Addendum Volume II Appendix 3: Flood Risk Assessment and Drainage Strategy Addendum assesses the potential impacts of change DC-04 on flood risk to third party land.

4.10.2 Design change DC-04 is not anticipated to impact any new receptors, or to cause greater impact to those receptors already identified as being impacted in ES Chapter 14 Road Drainage and the Water Environment (APP-057), following the implementation of mitigation secured in the EMP (Application Document 2.7 Environmental Management Plan (Rev 4)).

4.10.3 There are no new likely significant effects for construction or operation for design change DC-04 for the Penrith to Temple Sowerby scheme.

4.11 Monitoring

Construction

4.11.1 There are no changes to monitoring that are presented in ES Chapter 14 Road Drainage and the Water Environment (APP-057).

Operation

4.11.2 There are no changes to monitoring that are presented in ES Chapter 14 Road Drainage and the Water Environment (APP-057).

4.12 Glossary

4.12.1 See Application Glossary (APP-005).

1 DC-05

1.1 Introduction

1.1.1 This chapter assesses potential for design change DC-05 to introduce new or different likely significant effects upon the environment when compared to the findings of the original Development Consent Order (DCO) Environmental Statement (ES) (doc ref. 3.1 to 3.4, APP-043 to APP-233).

1.1.2 Only the environmental topics which were scoped in as requiring a full assessment are detailed within this document. For further information in regard to the rational as to why any environmental disciplines have been scoped out of requiring a full assessment please refer to ES Addendum Volume I. Topics scoped in for further assessment within this chapter is Cultural Heritage only.

1.1.3 Design change DC-05 is summarised in Section 1 and detailed in Section 3 of the Change Application (Document Reference 8.1, CR1-002). An updated Project description is provided in Environmental Statement Addendum Volume III: Updated Project Description.

2 Cultural Heritage

2.1 Introduction

2.1.1 The following chapter details the assessment undertaken in order to quantify whether or not DC-05 results in any new or different likely significant when compared to those reported within the ES within Chapter 8 Cultural Heritage (APP-051).

2.1.2 The assessment undertaken as part of this ES Addendum has followed the methodology set out in the Design Manual for Roads and Bridges (DMRB) LA106 and any other relevant guidance as noted in the ES. This ES addendum details the methodology followed, summarises the legislation and policy framework relevant to the Cultural Heritage assessment and describes the existing environment in the area surrounding the project. It then considers the design, mitigation and residual effects of the project, including taking account of relevant characteristics of the future baseline environment. Any key assumptions and limitations applicable to the assessment are also identified.

2.1.3 Where any of the sections of this addendum are unchanged compared to the ES, a cross reference has been provided and this document will highlight any changes or updates.

2.1.4 Any new or different likely significant effects upon construction Cultural Heritage receptors are identified in Section 2.7 of this chapter.

2.1.5 This chapter of the ES Addendum has been undertaken by competent experts with relevant experience and expertise. The professional qualifications and experience of the technical lead are summarised in ES Chapter 8 (APP-051).

2.2 Legislation and policy framework

2.2.1 The key legislation, national level policy, regional and local level policy; and other relevant policy and guidance applicable to the cultural heritage assessment is listed in Section 8.4 of the ES Chapter 8 Cultural Heritage (APP-051). There have been no changes in the legislation and policy framework since the submission of the ES.

2.3 Assessment methodology

2.3.1 The methodology for the Cultural Heritage assessment follows the guidance set out within DMRB LA 106 Cultural Heritage Assessment (Highways England, 2020)[1] and the Chartered Institute for Archaeologists (CIfA) Standard and guidance for historic environment desk-based assessment (CifA, 2020)[2] (for full details see 3.2 Environmental Statement Chapter 8 Cultural Heritage (APP-051) section 8.4).

[1] Highways England (2020) Design Manual for Roads and Bridges LA 106 Cultural Heritage Assessment
[2] CIfA (2020) Standard and guidance for historic environment desk-based assessment

Scoping

2.3.2 ES Chapter 8 Cultural Heritage (APP-051), Table 8-7 sets out the key points from the Planning Inspectorate Scoping Opinion relevant to the Cultural Heritage assessment. The full Scoping Opinion is provided in ES Appendix 4.2 (APP-149).

2.3.3 Where assessment has been undertaken in accordance with the Scoping Opinion, the wording of each point raised with a response and reference to the relevant ES section is provided. Where further discussion and/or an alternative approach has been agreed with the relevant stakeholders and the Planning Inspectorate, an explanation is provided.

Consultation

2.3.4 The design change has been presented to statutory consultees and other stakeholders. Responses relevant to the Cultural Heritage topic have been received from Historic England and the English Heritage Trust. These comments are detailed in the Change Application Consultation Report (Document Reference 8.2, CR1-007) and have been taken into account in this assessment.

2.4 Assumptions and limitations

2.4.1 No new assumptions or limitations apply to this assessment so those detailed in ES Chapter 8 Cultural Heritage (APP-051) are unchanged. This assessment relies on one of the assumptions made within the ES, which is that it is assumed that any Cultural Heritage resources within the Order Limits will be affected by the construction of the Project.

2.5 Study area

2.5.1 The study area considered for the Cultural Heritage assessment in the ES was 1 km from the Order Limits for designated heritage resources and 300m from the Order Limits for non-designated heritage resources.

2.5.2 A 2 km study area was used to identify designated heritage resources located within the 2 m Digital Surface Model (DSM) Zone of Visual Influence (ZVI) and Historic Landscape Character Areas (HLCA).

2.5.3 No change has been made to the study area considered for this assessment.

2.6 Baseline conditions

2.6.1 The baseline conditions relevant to the locale of design change DC-05 can be found in the Penrith to Temple Sowerby section of ES Chapter 8 Cultural Heritage (APP-051), paragraphs 8.6.68-8.6.101. Specific elements relevant to the design change locale are described here.

2.6.2 A number of heritage resources of an unknown date have been identified within the study area. Although it is not possible to confirm a period for these resources without further detailed archaeological investigation, it is possible to ascribe possible periods based on the interpretation of the available evidence. For example, ring ditches (03-0050) identified during AP/LiDAR

survey are thought to be Prehistoric in origin, due to the presence of Peterborough Ware and other Prehistoric findspots in the vicinity. Additional cropmarks were also identified in amongst an area of Early Medieval finds and field systems (03-0126).

2.6.3 Archaeological evaluation undertaken by Wessex Archaeology in 2021-2022 uncovered undated features within the study area, including ditches which are likely to be field boundaries (03-0203) and peat deposits (03-0212). The archaeological trenching undertaken in 2021-2022 also revealed a paleochannel associated with the Light Water (03-0200). Another paleochannel, potentially dating to the Palaeolithic period was detected through AP/LiDAR survey (03-00129).

2.6.4 Brougham Enclosure (03-0051) is a non-designated Neolithic enclosure visible as a cropmark in the form of an irregular sub-rectangular feature, with what appears to be two ditches leading away from it on its northern side. There are also other undated cropmarks within the field.

2.6.5 Archaeological trenching undertaken in 2021 recovered a Neolithic stone axe head from the surface of a roughly cobbled track within the north-eastern edge of the vicus of Brougham Roman fort (03-0004), which may have been re-used purposefully as a good luck charm as there are numerous examples of similar Neolithic polished stone axes being found within foundation deposits or in other building contexts.

2.6.6 There are multiple Scheduled sites dating to the Romano-British period within the study area: a Marching Camp, 410 m northeast of Brougham Fort (03-0001); Brougham fort, civil settlement and castle (02-0002); and a settlement situated 540 m northeast of Brougham Castle (03-0004).

2.6.7 The marching camp 410 m northeast of Brougham fort (03-0001) is known from cropmarks. The gate and tituli in the centre of the southeast side and surrounding ditches are clearly visible in aerial photographs. The marching camp may be presumed to predate the establishment of the permanent fort at Brougham and may therefore date to the initial advance into north-west England under Petillius Cerealis (Bidwell, 2009)[3].

2.6.8 Brougham Romano-British fort (02-0002) was constructed on the south bank of the River Eamont near its confluence with the River Lowther and covers an area of 1.4 hectares. It was situated at the junction of main north-south and east-west roads, which intersected and crossed the River Eamont close to the site of the fort. The fort may have been established under the governorship of Julius Agricola AD78-84 and continued in use until the end of the fourth century. Altars found locally around the fort were dedicated to Belatucadrus, a local deity, and record the presence of a part mounted cohort (the Cohors III Bracaraugustanorum), a unit originally formed in Portugal in the first century AD. An altar was also dedicated to Mars by a soldier of the Stratonician cavalry, originally formed in Asia Minor, stationed at Brougham fort in the third century AD.

[3] Bidwell, P. and Hodgson, N.. (2009) The Roman Army in Northern England

2.6.9 A substantial settlement developed to the east and north of the fort which thrived into the third century. The settlement 540 m northeast of Brougham Castle (03-0004) was discovered using aerial photography. It is situated on a river terrace on the south bank of the River Eamont. The settlement forms part of the vicus of Brougham fort. Evidence of the vicus was identified during archaeological evaluation in 2021 including three stone surfaces, interpreted as a flagged floor and rough trackway; multiple dark earth deposits; and a number of ditches. Geophysical survey has also recorded anomalies outside the Scheduled boundary of the vicus, particularly south of the A66 carriageway.

2.6.10 Burials associated with the fort and vicus (03-0072) have been found from the immediate vicinity of the fort to an area at least as far as 600 m to the east. In AD1966 and AD1967, the part of the cemetery located on the low hill east of the fort was threatened by improvements to the A66. The resulting excavation was the largest to be undertaken on a Romano-British cemetery site in the north of England with close to 300 funerary related deposits being identified. The full extent of the cemetery is not known although its eastern extent probably lay at or close to the limit of the AD1966-7 excavations. Archaeological trenching in 2021 identified further evidence relating to the cemetery, including inhumation and cremation burials alongside multiple pits interpreted as votive or ritual deposits.

2.6.11 Brougham Castle (02-0002) is one of three great Norman castles constructed along the strategic route through the Pennines known as Stainmore Pass - Bowes and Brough being the others. Brougham Castle was built between AD1203 and AD1214 by Robert de Vieuxpont. A three-storey keep with a large forebuilding to the east were built together with another structure, possibly a hall, also to the east. The castle was enclosed within a defensive earthwork topped by a timber palisade and was probably entered from the Roman fort to the south, which may have provided a ready-made outer bailey.

2.6.12 By virtue of marriage Robert Clifford (AD1274-1314) succeeded to Vieuxpont's Westmorland lands in the last decade of the thirteenth century. As an ally of Edward I Clifford became involved in Scottish affairs and made Brougham his principal seat due to its proximity to the border. Clifford made the keep the core of his castle by adding a storey and building a stone curtain wall as well as inner and outer gatehouses. These gatehouses provided the main access from the east and superseded the earlier entrance from the Roman fort to the south. After Robert Clifford's death at Bannockburn the Scots were in the ascendance in northern England for several decades. It fell to Robert's grandson, Roger Clifford (AD1333-1389), to restore Brougham Castle back to an effective border defence. As Warden of the Marches, Roger embarked on a building programme that saw the addition of ranges of buildings along the east and south curtains that included a great hall, kitchen and chapel. He also constructed a covered way from the hall porch to the ground floor of the keep. Excavations within the south-east corner of the castle's bailey took place in AD1987.

The excavation revealed that a large free-standing Medieval stone structure was constructed here sometime after about AD1300.

2.6.13 A park is mentioned near Brougham from the thirteenth century. Though the full extent of Whinfell Park (03-0089) is unknown, the northern boundary of the park lay along the Roman Road (00-0001). The deer park is mentioned in AD1258 as the property of Robert de Veteripont.

2.6.14 The Countess Pillar (03-0006) is a Scheduled Monument 300 m west of Lightwater Bridge. It is very well-preserved and represents a unique commemorative marker erected by Lady Anne Clifford. The two constituent elements of the monument provide group value with the alms table (03-0007) being mentioned in the inscription on the pillar. The group is of undoubted historical importance and the monument provides insight into the importance of the nobility in the earlier Post Medieval period and their role in establishing landmarks and commemorative monuments. The monument includes the remains of a stone pillar of seventeenth century date, situated alongside the A66 east of Penrith. The pillar stands to a height of 4.2 m and has an octagonal shaft with a chamfered base and moulded capping, above which is a square block with a cornice, pyramidal capping and finial. On the north face of the square block are two carved and painted shields of arms, on the south face is a brass tablet with an inscription and the remaining faces hold sundials. Located approximately 3 m east of the pillar is a low sandstone block. The pillar was erected in AD1656 to commemorate the last parting of Lady Anne Clifford and her mother. The stone block, known as the Dolestone, is an alms table upon which the Lady Anne Clifford laid an annual offering to the poor in memory of her mother. The manner and timing of the annuity are detailed on the inscription on the pillar.

2.6.15 There are multiple non-designated heritage resources of Post Medieval date within the 300 m study area, including Brougham mill (03-0091); Brougham rifle range (03-0090); farmsteads and residences; industrial buildings and structures such as the site of a former smithy (03-0146); roads, milestones and guideposts.

Future baseline

2.6.16 There are no changes to the future baseline, relevant to the design change, which have been identified since the submission of the ES (Chapter 8 Cultural Heritage, APP-051).

2.7 Summary of DCO Design Likely Significant Effects

Construction

2.7.1 Two heritage resources within the locale of the design change will be subject to moderate adverse effects during the construction period. However, these effects will be limited to the construction phase and are therefore temporary.

2.7.2 The Scheduled Monument and Grade II* listed Countess Pillar (03- 0006) and the associated Grade II* listed Alms Table (03-0007) are both located within the Order Limits but will not be removed or physically affected by the DCO Design. Temporary construction activities will occur within the setting of

the resource, including moving plant, lighting and noise. There is also a possibility of restricted access during the construction phase. These will be temporary minor adverse impacts to the settings of the Countess Pillar and Alms Table resulting in a moderate adverse effect on these high value assets. The addition of a new accommodation overbridge to the west of the Pillar will alter the baseline setting, however the impacts will be negligible, and permanent construction impacts of the road itself are likely to be very similar to baseline as described in ES Appendix 8.10: Impact Assessment Table (APP-187).

2.7.3 Four resources will also be subject to large and moderate adverse effects resulting from the construction of the DCO Design. These effects are the result of the loss of physical evidence arising from the construction of the DCO Design and will be permanent.

2.7.4 The Scheduled Monument of Brougham Roman fort (Brocavum) and civil settlement and Brougham Castle (02-0002) lies partially within the Order Limits. Although temporary construction activities will occur within the setting of the Scheduled Monument, including moving plant, lighting and noise, these are mainly screened from the upstanding sections of Brougham Castle and will not have a significant effect on the significance of the monument. However, the northern part of the easternmost Scheduled area is located within the Order Limits. The DCO Design at this location will include the creation of a hardstanding cycle path with associated verges and earthworks along the route, and areas of environmental mitigation consisting of species rich grassland and marsh and wet grassland. Any below ground works will result in the loss of associated physical evidence in the area within the Order Limits and a moderate adverse impact to the Scheduled Monument resulting in a large adverse effect, resulting in a moderate adverse effect following essential mitigation. Operational impacts are anticipated to be comparable to the baseline and will not result in a significant effect.

2.7.5 There will be a moderate adverse physical impact upon the Brougham Vicus Roman settlement site (03-0004) where the southern extent of the Scheduled area falls inside the Order Limits. The LIDAR assessment undertaken for the ES also indicates that the site may have a more substantial footprint than presently recorded which may extend further into the Order Limits on both the north and south side of the existing A66. Geophysical surveys undertaken in this area also suggest a high level of likely archaeological survival which was confirmed by trenching. Archaeological remains associated with the Brougham Vicus Roman settlement must be treated as undesignated resources of schedulable quality and importance. Where the Scheduled area is located within the Order Limits, works will include the extension of the carriageway from single lane carriageway to dual carriageway in both directions closely following the existing road alignment, the creation of a priority left-in/left out junction, a new accommodation overbridge to provide local farm access and associated access route and non-motorised users route. Although some of the works will be within previously disturbed areas, any works requiring below ground impacts in previously undisturbed areas will result in the removal of any

archaeological remains to formation levels. As the site is of high value, this will result in a large adverse effect, resulting in a moderate adverse effect following essential mitigation.

2.7.6 The Cumbria HER records the ring ditches at Brougham (03-0050) as being visible on aerial photographs and associated with a site where prehistoric pottery has been recovered although the site was not identified in the 2020 AP/LiDAR survey and the grid reference given for the site places it under the existing A66. This site falls within the Order Limits in an area where works will include the widening of the carriageway from single lane carriageway to dual carriageway in both directions. Any groundworks in this area will adversely impact upon any archaeological remains associated with the ring ditches which may survive. These are of medium value, receiving a major adverse impact and a large adverse effect, resulting in a moderate adverse effect following essential mitigation.

2.7.7 An area of peat deposits likely associated with nearby palaeochannels (03-212) was identified during archaeological evaluation in 2021. The peat deposits are located within the Order Limits where works will include the construction of a balancing pond, a new access route, WCHR route and areas of environmental mitigation, including the creation of woodland and species rich grassland. Groundworks will remove archaeological or geoarchaeological remains associated with these medium value features to formation levels, which will result in major adverse impacts and a large adverse effect, becoming a moderate adverse effect following essential mitigation.

Operation

2.7.8 A new amenity parking area and footway access for the Scheduled Monument and Grade II* listed Countess Pillar (03-0006) and the associated Grade II* listed Alms Table (03-0007) will enable better access to the site. This will be a minor beneficial impact on these high value assets, resulting in a moderate beneficial effect.

2.8 Potential impacts

2.8.1 Based on the project design and associated construction activities, the design change has the potential to impact upon Cultural Heritage during construction.

2.8.2 Potential impacts of the project are described in this section prior to the implementation of the essential mitigation described in Section 2.9 below. The residual effects of the Project, taking into account this essential mitigation, are then described in Section 2.10.

Construction

Design and embedded mitigation

2.8.3 No new design and embedded mitigation has been proposed in relation to the design change. Details of the design and mitigation relating to cultural

heritage within the DCO design can be found in ES Chapter 8 Cultural Heritage (APP-051).

Potential Impacts before essential mitigation and enhancement

2.8.4 The ES Chapter 8 Cultural Heritage (APP-051) identified four likely significant effects within the locale of the design change, relating to the permanent loss of archaeological remains within the Order Limits, including to two Scheduled Monuments.

2.8.5 There will be no change to the impact assessed within the ES on the ring ditches at Brougham (03-0050) and the area of peat deposits (03-212). The ES assessment assumed a worst-case construction impact of complete removal of heritage resources within the Order Limits. The design change does not alter this assessment.

2.8.6 Although no change to the Order Limits is proposed in association with this design change, there will be a change in the arrangement of works required within the Brougham Roman fort (Brocavum) and civil settlement and Brougham Castle (02-0002) and the Brougham Vicus Roman settlement site (03-0004) Scheduled Monuments. The ES assessment was based on the assumption that any heritage resources within the Order Limits will potentially be harmed. There will be no change to this assessment as a result of the design change. However, given the significance and sensitivity of the two Scheduled Monuments, the full details of the change are assessed here.

2.8.7 The elements of the design change which relate to the two Scheduled Monuments arise from the opportunity to reduce the land required for the project following alteration of a private means of access track, shared with a cycle track, which had been constrained within the DCO design by the location of a high-pressure gas main. An overbridge is proposed across the A66 at this location, which will not be altered from the DCO design.

2.8.8 The access track and cycle way will connect to the overbridge through the Brougham Vicus Roman settlement site Scheduled Monument (03-0004). In a design change from the DCO design the track will take a straighter course to the north of that originally proposed, while still remaining within the Order Limits. Although the track is in a slightly different location, there will be no change to the scale of the works proposed within the Scheduled area. There will, therefore, be no change to the significant effect assessed within ES Chapter 8 Cultural Heritage (APP-051).

2.8.9 On the southern side of the A66, the access track and cycle way will follow a slightly altered course. The change in levels will mean that the approach to the overbridge will need to curve more to the south, resulting in a greater engineering footprint within the Brougham Roman fort (Brocavum) and civil settlement and Brougham Castle (02-0002) Scheduled Monument, although the work will still take place within the order Limits. However, the altered arrangement will also relocate the access track to connect to the B6262 at a more northerly point, potentially removing the need for construction along the edge of the Scheduled Monument as was proposed in the DCO design. However, this area will remain within the Order Limits so the worst-case

assessment conducted for the purposes of the ES assessment, that there will be an impact on buried remains, remains unaltered. As a result, there will be an increase in the engineering footprint of the track on the northern edge of the monument, and a corresponding reduction to the footprint along its western edge. There will be no change, therefore, to the significant effect assessed within ES Chapter 8 Cultural Heritage (APP-051).

Operation

Design and embedded mitigation

2.8.10 Details of the design and mitigation relating to cultural heritage within the DCO design can be found in ES Chapter 8 Cultural Heritage (APP-051). No new design and embedded mitigation has been proposed in relation to the design change.

Potential Impacts

2.8.11 The operation of the project will not introduce any new impacts than those assessed within the ES Chapter 8 Cultural Heritage (APP-051).

2.9 Essential mitigation and enhancement measures

Construction

Essential mitigation

2.9.1 No change to the essential mitigation proposed in the ES Chapter 8 Cultural Heritage (APP-051) is proposed.

Enhancement

2.9.2 No new enhancement measures are proposed in relation to the design change.

Operation

Essential mitigation

2.9.3 No change to the essential mitigation proposed in the ES Chapter 8 Cultural Heritage (APP-051) is proposed.

Enhancement

2.9.4 No new enhancement measures are proposed in relation to the design change.

2.10 Assessment of likely significant effects

2.10.1 No likely significant effects have been identified in relation to the design change.

2.11 Monitoring

Construction

2.11.1 No new monitoring is proposed in relation to the design change. The existing measures proposed are laid out in the EMP (Application Document 2.7 Environmental Management Plan (Rev 4)).

Operation

2.11.2 There is no requirement to monitor Cultural Heritage resources during the operational phase.

2.12 References

2.12.1 Bidwell, P. and Hodgson, N. (2009) The Roman Army in Northern England. South Shields, Arbeia Society.

2.13 Glossary and Abbreviations

2.13.1 See Application Glossary (APP-005).

1 DC-08

1.1 Introduction

1.1.1 This chapter assesses potential for design change DC-08 to introduce new or different likely significant effects upon the environment when compared to the findings of the original Development Consent Order (DCO) Environmental Statement (ES) (doc ref. 3.1 to 3.4, APP-043 to APP-233).

1.1.2 Only the environmental topics which were scoped in as requiring a full assessment are detailed within this document. For further information in regard to the rational as to why any environmental disciplines have been scoped out of requiring a full assessment, please refer to ES Addendum Volume I. Topics scoped in for further assessment in this chapter is Noise and Vibration in the operational phase only.

1.1.3 DC-08 is summarised in Section 1 and a detailed in Section 3 of the Change Application (Document Reference 8.1, CR1-002). An updated Project description is provided in Environmental Statement Addendum Volume III: Updated Project Description.

2 Noise and Vibration – Operation

2.1 Introduction

2.1.1 The following chapter details the assessment undertaken in order to quantify whether or not DC-08 results in any new or different likely significant when compared to those reported within the ES within Chapter 12 Noise and Vibration (APP-055).

2.1.2 The assessment undertaken as part of this ES Addendum has followed the methodology set out in the Design Manual for Roads and Bridges (DMRB) LA111 and any other relevant guidance as noted in the ES. This ES addendum details the methodology followed, summarises the legislation and policy framework relevant to the Noise and Vibration assessment and describes the existing environment in the area surrounding the Project. It then considers the design, mitigation and residual effects of the Project, including taking account of relevant characteristics of the future baseline environment. Any key assumptions and limitations applicable to the assessment are also identified.

2.1.3 Where any of the sections of this addendum are unchanged compared to the ES, a cross reference has been provided and this document will highlight any changes or updates.

2.1.4 Any new or different likely significant effects upon construction Noise and Vibration receptors are identified in Section 2.10 of this chapter.

2.1.5 This chapter has been prepared by competent experts with relevant experience and expertise. The professional qualifications and experience of the technical lead are summarised in ES Chapter 12 Noise and Vibration.

2.2 Legislation and policy framework

2.2.1 The key legislation, national level policy, regional and local level policy; and other relevant policy and guidance applicable to the noise and vibration assessment is listed in Section 12.3 of the ES. No updates to any of the aforementioned documents has occurred since the production of the Environmental Statement. Therefore, all information detailed within Section 12.3 remains applicable to this assessment.

2.3 Assessment methodology

2.3.1 The methodology for the noise and vibration assessment follows the guidance set out within DMRB LA 111. The assessment methodology utilised for this addendum is the same as the original ES which is described in Section 12.4.

Scoping

2.3.2 Table 12-16: Summary of scoping opinion and response in the ES sets out the key points from the Planning Inspectorate Scoping Opinion relevant to the noise and vibration assessment. The full Scoping Opinion is provided in

Appendix 4.2 (APP-149) of the ES. There has been no further scoping opinion received since the submission of the ES.

Consultation

2.3.3 The design change has been presented to statutory consultees and other stakeholders. Responses relevant to Noise and Vibration have been received, these comments are detailed in the Change Application Consultation Report (Document Reference 8.2, CR1-007) and have been taken into account in this assessment.

2.4 Assumptions and limitations

2.4.1 The assumptions and limitations of the noise and vibration assessment described in Section 12.5 of the ES have not changed due to the design change.

2.5 Study area

2.5.1 The study area has been defined as described in Section 12.6 of the ES.

2.6 Baseline conditions

2.6.1 The baseline information for the Penrith to Temple Sowerby scheme is described in paragraphs 12.7.12 and 12.7.14 of the ES.

2.6.2 The 600m study area around the design change at the Centre Parcs junction is predominantly rural and includes commercial and residential areas.

2.6.3 There are no Noise Important Areas (NIAs) located within 600m of this design change.

Future baseline

2.6.4 The future baseline for operation remains unchanged from that reported in paragraphs 12.7.30 to 12.7.32 of the ES.

2.7 Summary of DCO Design Likely Significant Effects

Introduction

2.7.1 The potential likely significant effects of noise and vibration were identified in paragraphs 12.10.53 to 12.10.68 of the ES for the area Penrith to Temple Sowerby. The potential likely significant effects within the study area of the design change are summarised below.

Construction

2.7.2 In the area of the design change, there is one residential receptor at 1 Lane Ends predicted to experience construction noise levels above the significant observed adverse effect level (SOAEL). There are another four residential and one non-residential receptors with the potential to be subject to construction impacts. The greatest potential for construction noise levels to exceed the SOAEL is during Phase 2: Road construction

(details of construction phases are presented in paragraph 12.4.13 of the ES and in Appendix 12.2 Construction Assessment Assumptions (APP-212)). A construction significant effect is likely if sensitive receptors are exposed to construction noise levels exceeding SOAEL for ten or more days and/or nights in any 15 consecutive days/or nights or a total number of 40 or more days in any six consecutive months. The construction programme was not finalised at the time the ES was prepared so, as a worst-case, all these receptors were assessed as adverse likely significant effects.

2.7.3 The ES reported potential temporary vibration significant effects on human receptors, at any sensitive receptors located within 100m of the scheme, during start-up and run-down of vibratory roller/compactor; within 70m during steady state operation of vibratory roller/compactor and within 50m of vibratory piling. Sensitive receptors located around Lane End are within approximately 100m of the design change. These receptors were assessed as temporary construction vibration significant effects in the ES.

Operation

2.7.4 There is one residential property and one non-residential property where traffic noise levels currently exceed the SOAEL and a noise reduction greater than 1dB would occur with the scheme, bringing the traffic noise level to between LOAEL and SOAEL. The resulting noise impacts at the receptors are major and moderate beneficial. These receptors would therefore experience a beneficial likely significant effect. The receptors are located immediately east of the Centre Parcs junction. The non-residential property has the use of village hall or other community facility.

2.8 Potential impacts

2.8.1 The design change is unlikely to affect noise and vibration impacts during construction and operation.

Construction

2.8.2 It is anticipated that the construction activities associated with the design change would not result in any new or different impacts to those reported in Section 12.8 of the ES. Any potential impacts associated with construction noise and vibration of the design change, including construction of the bridge, will be controlled through the implementation of the Environmental Management Plan (Application Document 2.7 Environmental Management Plan (Rev 4)) and the Noise and Vibration Management Plan (NVMP, REP6-011).

Design and embedded mitigation

2.8.3 The design and embedded mitigation for the construction phase is the same as those reported in paragraphs 12.8.4 to 12.8.11 of the original ES.

Operation

2.8.4 The inversion of the mainline alignment has the potential to change the noise impacts reported in the ES, since the design change substantially lowers the carriageway centrelines (as opposed to being elevated on an 8m high embankment). As a result, the distance between the road centrelines and nearby receptors is increased and the incident traffic noise levels may be lower than those reported in the ES. The three-dimensional noise model developed for the assessment of operational road traffic noise (see paragraphs 12.4.39 to 12.4.45 of the ES) has been updated to enable an assessment of the change in noise emissions resulting from the design change. As noted in section 2.9 below, the noise modelling shows that the design change would not result in any significant effects that are new or different to those reported in the ES.

Design and embedded mitigation

2.8.5 The design and embedded mitigation for the operational phase is the same as those reported in paragraph 12.8.18 of the original ES.

2.9 Essential mitigation and enhancement measures

Construction

Essential mitigation

2.9.1 No essential mitigation measures are proposed in addition to those reported in paragraphs 12.9.1 to 12.9.5 of the ES.

Enhancement

2.9.2 Further detailed enhanced mitigation measures will be developed at the detailed design stage when detailed construction methods and programme are finalised.

Operation

Essential mitigation

2.9.3 No essential mitigation measures are proposed in addition to those described in paragraphs 12.9.6 to 12.9.10 of the ES.

Enhancement

2.9.4 In addition to the mitigation integrated within the Project design, further consideration will be given to developing enhancements during detailed design of the Project.

2.10 Assessment of likely significant effects

Construction

2.10.1 Any potential construction noise and vibration impacts associated with the design change, including construction of the bridge, will be controlled through the implementation of the Environmental Management Plan (Application Document 2.7 Environmental Management Plan (Rev 4)) and

the Noise and Vibration Management Plan (NVMP, REP6-011) so no change in the likely significant effects, predicted in the ES, are anticipated.

Operation

2.10.2 The results of the updated noise model, based on the design change, suggest that the operational noise levels at sensitive receptors would not be significantly altered by the design change. The design change would therefore not result in likely significant effects that are new or of different significance to those reported in the ES.

2.11 Monitoring

Construction

2.11.1 Monitoring methodologies described in paragraph 12.12.4 of the ES are considered appropriate and are not affected by the design change.

Operation

2.11.2 Monitoring measures described in paragraph 12.12.5 of the ES are considered sufficient and no additional monitoring measures are proposed as a result of the design change.

2.12 Glossary

2.12.1 See Application Glossary (APP-005).

1 DC-19

1.1 Introduction

1.1.1 This chapter assesses potential for design change DC-19 to introduce new or different likely significant effects upon the environment when compared to the findings of the original Development Consent Order (DCO) Environmental Statement (ES) (doc ref. 3.1 to 3.4, APP-043 to APP-233).

1.1.2 Only the environmental topics which were scoped in as requiring a full assessment are detailed within this document. For further information in regard to the rational as to why any environmental disciplines have been scoped out of requiring a full assessment, please refer to ES Addendum Volume I. Topics scoped in for further assessment within this chapter are Population and Human Health only.

1.1.3 This design change is summarised in Section 1 and a detailed description is provided in Section 3 of the Change Application (Document Reference 8.1, CR1-002). An updated Project description is provided in Environmental Statement Addendum Volume III: Updated Project Description.

2 Population and Human Health

2.1 Introduction

2.1.1 The following chapter details the assessment undertaken in order to quantify whether or not DC-19 results in any new or different likely significant when compared to those reported within the ES Chapter 13 for Population and Human Health (APP-056).

2.1.2 The assessment undertaken as part of this ES Addendum has followed the methodology set out in the Design Manual for Roads and Bridges (DMRB) LA112 and any other relevant guidance is summarised in section 13.4 of ES Chapter 13 for Population and Human Health (APP-056). It details the methodology followed, summarises the legislation and policy framework relevant to the Population and Health assessment and describes the existing environment in the area surrounding the project and the Appleby to Brough scheme where the design change is located. It then considers the design, mitigation and residual effects of the project, and the Appleby to Brough scheme, including taking account of relevant characteristics of the future baseline environment. Any key assumptions and limitations applicable to the assessment are also identified.

2.1.3 Where any of the aforementioned sections are unchanged from ES Chapter 13 (APP-056) a cross reference back to the original ES Chapter has been provided. This ES addendum highlights any changes or updates from the ES Chapter 13, in particular any new or different likely significant effects upon Population and Health receptors are identified in Section 2.10 of this chapter.

2.1.4 This chapter has been prepared by competent experts with relevant experience and expertise. The professional qualifications and experience of the technical lead are summarised in ES Chapter 13 Population and Human Health (APP-056).

2.2 Legislation and policy framework

Legislation

2.2.1 The key legislation, national, regional and local policy; and other relevant policy and guidance applicable to the noise and vibration assessment is listed in Section 13.3 of ES Chapter 13. No updates to any of the afore mentioned documents has occurred since the production of ES Chapter 13. Therefore, all information detailed within Section 13.3 of ES Chapter 13 remains applicable to this assessment.

2.3 Assessment methodology

2.3.1 The methodology for the Population and Health assessment follows the guidance set out within DMRB LA112. The methodology for the Population and Health assessment for the design change remains the same as outlined in Section 13.4 in Chapter 13 of the ES.

Scoping

2.3.2 Table 13-4: Summary of scoping opinion and response in Chapter 13 of the ES sets out the key points from the Planning Inspectorate Scoping Opinion relevant to the noise and vibration assessment. The full Scoping Opinion is provided in Appendix 4.2 (APP-149) of the ES. There has been no further scoping opinion received since the submission of the ES.

Consultation

2.3.3 The design change has been presented to statutory consultees and other stakeholders. Responses relevant to Population and Human Health have been received and these comments are detailed in the Change Application Consultation Report (Document Reference 8.2, CR1-007) and have been taken into account in this assessment.

2.4 Assumptions and limitations

2.4.1 The assumptions and limitations of the population and human health assessment described in Section 13.5 of Chapter 13 of the ES are not anticipated to be changed due to the design change.

2.5 Study area

2.5.1 The study area has been defined as described in Section 13.6 of Chapter 13 of the ES.

2.6 Baseline conditions

2.6.1 A full assessment of baseline conditions are outlined in Section 13.7 within Chapter 13 of the ES. Due to the nature of the design change, there are no further changes to baseline conditions within the study area being considered. The design change is located within the Appleby to Brough scheme. A detailed assessment for receptors located within the study area for the design change is outlined within Section 13.7 of Chapter 13 of the ES.

Future baseline

2.6.2 A detailed analysis of the future baseline has been outlined within Section 13.7 within Chapter 13 of the ES.

2.6.3 The future baseline has been set as 2044. It is acknowledged that populations will increase locally, particularly given the numerous housing related planning applications. However, it is not predicted that any growth would occur in such a way that development will be outside of the existing conurbation. It is also noted that agricultural, businesses and community facilities may open and close, and the level of usage of community resources including PRoWs may change.

2.6.4 It is not possible to predict any changes to the population and human health baseline with any degree of accuracy. As such, potential changes to population and human health receptors in the future would not be noticeable.

2.6.5 The in-combination climate change assessment has used a future climate baseline that is based on representative concentration pathway 8.5 (RCP 8.5) of the UK climate change 2018 projections (UKCP18).

2.7 Summary of DCO Design Likely Significant Effects

Construction

2.7.1 No likely significant effects have been identified within the direct vicinity of the design change during construction. Section 13.10 of Chapter 13 of the ES (APP-056) outlines the likely significant effects in the wider Appleby to Brough section of the scheme, of which there are 12 significant adverse effects identified as a result of either permanent land take or temporary disruption as a result of the construction phase (i.e. increased noise, dust or vibration; landscape and visual impacts; or impacts to accessibility). It should be noted that in line with relevant DMRB guidance significant effects are not identified as part of the Health element of the Population and Health assessment.

Operation

2.7.2 No likely significant effects have been identified within the direct vicinity of the design change during operation. Section 13.10 within Chapter 13 in the ES (APP-056) outlines the likely significant effects in the wider Appleby to Brough section of the scheme, of which all 13 identified significant effects are beneficial due to the improvement in accessibility. It should be noted that in line with relevant DMRB guidance significant effects are not identified as part of the Health element of the Population and Health assessment.

2.8 Potential impacts

Construction

Design and embedded mitigation

2.8.1 The EMP (Application Document 2.7 Environmental Management Plan (Rev 4)) provides a list of mitigation measures that will be implemented during the construction stage. Annex B6 of the EMP provides an expanded essay plan of the Public Rights of Way Management Plan that will be further developed and implemented at construction stage. The plan will detail the proposed diversions and new routes before and during construction, which seek to mitigate impacts on the PRoW network. It will also set out a hierarchy of mitigation to help maintain access across the PRoW network during construction, for example through the use of appropriate signage, diversions and/or public liaison where necessary. The preparation and delivery of the detailed Public Rights of Way Management Plan will incorporate inputs from the local community through the appointed Public Liaison Officer.

Potential Impacts before essential mitigation and enhancement

2.8.2 The design change results in permanent diversions and therefore no temporary impacts are identified during construction.

2.8.3 The design change seeks to-reroute a small section of the walking and cycling route to move it away from the new A66 to the old, de-trunked A66. The speed on this road will be reduced to 30mph to make the route safer. This design change would require some additional land take outside of the existing order limits to be located on the de-trunked A66. The alternative route is anticipated to increase the journey length, however the route is likely to be used recreationally so the additional journey length would not be significant. As outlined in Section 13.7 of the ES (APP-056) the sensitivity of all PRoW within the vicinity of this design change has been assessed to be medium. The increase in journey length is assessed to have a negligible magnitude of impact upon users as the route is used recreationally. Overall, the permanent effect of the design change upon users of the public is assessed to be permanent slight adverse. This does not change any assessment outcomes presented within the Environmental Statement.

Operation

Design and embedded mitigation

2.8.4 The EMP (Application Document 2.7 Environmental Management Plan (Rev 4)) provides an expanded essay plan for the Public Rights of Way Management Plan which sets out the operation mitigation for WCH and other users of rights of way/highway with public access. This includes changes to existing routes or new routes as part of the scheme design.

2.8.5 Throughout the preliminary design process, the need for providing east-west WCH provision has been raised during ongoing engagement with stakeholders. As a result, action was taken to provide more east-west connections on those schemes that were being dualled. For the majority of schemes, east-west provision has been made along the scheme extent, either parallel to the new dual carriageway, or in the verge along the old de-trunked A66, where it will remain.

Potential Impacts

2.8.6 As a result of the design change, several new footpaths and cycleways will be introduced. These are shown in the Walking, Cycling and Horse Riding Proposals (APP-010). The magnitude of impact is assessed to be minor beneficial as it will improve safety and access to a network of PRoWs. This does not change any assessment outcomes presented within the Environmental Statement.

2.9 Essential mitigation and enhancement measures

Construction

Essential mitigation

2.9.1 No specific essential mitigation measures have been identified beyond those listed in Section 13.9 of Chapter 13 of the ES.

Enhancement

2.9.2 No specific enhancement measures have been identified beyond those listed in Section 13.9 of Chapter 13 of the ES.

Operation

Essential mitigation

2.9.3 No specific essential mitigation measures have been identified beyond those listed in Section 13.9 of Chapter 13 of the ES.

Enhancement

2.9.4 No specific enhancement measures have been identified beyond those listed in Section 13.9 of Chapter 13 of the ES.

2.10 Assessment of likely significant effects

2.10.1 No likely significant effects have been identified as a result of this design change and no further changes to outcomes presented within Chapter 13 of the ES have been identified.

2.11 Monitoring

2.11.1 Beyond the recommendations for monitoring made in other relevant assessments and supporting documents, there are no proposals for monitoring arising from this chapter.

2.12 Glossary

2.12.1 See Application Glossary (APP-005).

1 DC-21

1.1 Introduction

1.1.1 This chapter assesses potential for design change DC-21 to introduce new or different likely significant effects upon the environment when compared to the findings of the original Development Consent Order (DCO) Environmental Statement (ES) (doc ref. 3.1 to 3.4, APP-043 to APP-233).

1.1.2 Only the environmental topics which were scoped in as requiring a full assessment are detailed within this document. For further information in regard to the rational as to why any environmental disciplines have been scoped out of requiring a full assessment, please refer to ES Addendum Volume I. Topics scoped in for further assessment within this chapter are Cultural Heritage, Geology and Soils and Landscape and Visual.

1.1.1 DC-21 is summarised in Section 1 and detailed in Section 3 of the Change Application (Document Reference 8.1, CR1-002). An updated Project description is provided in Environmental Statement Addendum Volume III: Updated Project Description.

2 Cultural Heritage

2.1 Introduction

2.1.1 The following chapter details the assessment undertaken in order to quantify whether or not DC-21 results in any new or different likely significant when compared to those reported within ES Chapter 8 Cultural Heritage (APP-051).

2.1.2 The assessment undertaken as part of this ES Addendum has followed the methodology set out in the Design Manual for Roads and Bridges (DMRB) LA106 and any other relevant guidance. It details the methodology followed, summarises the legislation and policy framework relevant to the Cultural Heritage assessment and describes the existing environment in the area surrounding the Project. It then considers the design, mitigation and residual effects of the Project, including taking account of relevant characteristics of the future baseline environment. Any key assumptions and limitations applicable to the assessment are also identified.

2.1.3 Where any of the sections of this addendum are unchanged compared to the ES, a cross reference has been provided and this document will highlight any changes or updates.

2.1.4 Any new or different likely significant effects during construction upon Cultural Heritage receptors are identified in Section 2.10 of this chapter.

2.1.5 This chapter has been prepared by competent experts with relevant experience and expertise. The professional qualifications and experience of the technical lead are summarised in ES Chapter 8 Cultural Heritage (APP-051).

2.2 Legislation and policy framework

2.2.1 The key legislation, national level policy, regional and local level policy; and other relevant policy and guidance applicable to the cultural heritage assessment is listed in Section 8.4 of the ES. No updates to any of the aforementioned documents has occurred since the production of the ES. Therefore, all information detailed within Section 8.4 remains applicable to this assessment.

2.3 Assessment methodology

2.3.1 The methodology for the Cultural Heritage assessment follows the guidance set out within DMRB LA 106 Cultural Heritage Assessment (Highways England, 2020) and the Chartered Institute for Archaeologists (CIfA) Standard and guidance for historic environment desk-based assessment (CIfA, 2020).

2.3.2 ES Chapter 8 Cultural Heritage (APP-051), table 8.7 sets out the key points from the Planning Inspectorate Scoping Opinion relevant to the assessment. The full Scoping Opinion is provided in Appendix 4.2 (APP-149) of the ES. There has been no further scoping opinion received since the submission of the ES.

Consultation

2.3.3 The design change has been presented to statutory consultees and other stakeholders. Responses relevant to the Cultural Heritage topic have been received from Historic England and the English Heritage Trust. These comments are detailed in the Change Application Consultation Report (Document Reference 8.2, CR1-007) and have been taken into account in this assessment.

2.4 Assumptions and limitations

2.4.1 No new assumptions or limitations apply to this assessment so those detailed in ES Chapter 8 Cultural Heritage (APP-051) are unchanged. This assessment relies on one of the assumptions made within the ES, which is that it is assumed that any Cultural Heritage resources within the Order Limits will be affected by the construction of the Project.

2.5 Study area

2.5.1 The study area considered for the Cultural Heritage assessment in the ES was 1km from the Order Limits for designated heritage resources and 300m from the Order Limits for non-designated heritage resources.

2.5.2 A 2km study area was used to identify designated heritage resources located within the 2m Digital Surface Model (DSM) Zone of Visual Influence (ZVI) and Historic Landscape Character Areas (HLCA).

2.5.3 No change has been made to the study area considered for this assessment.

2.6 Baseline conditions

2.6.1 The baseline conditions relevant to the locale of this design change can be found in the Appleby to Brough section of ES Chapter 8 Cultural Heritage (APP-051), paragraphs 8.6.146-8.6.186. Specific elements relevant to the design change locale are described here.

2.6.2 A number of heritage resources of an uncertain date were identified through AP/LiDAR survey and largely comprise earthworks corresponding with field boundaries, enclosures, lynchets or cropmarks as well as dykes (06-0108), drainage systems (06-0114, 06- 0116), and platforms (06-0118).

2.6.3 Archaeological trenching undertaken in AD2021 identified a number of enclosure ditches and pits, one of which contained a large amount of burnt material, along the route of the Roman road (00-0001) and to the north of Warcop (06-0228). While the date of these features was determined to be broadly Prehistoric, a more precise date could not be concluded.

2.6.4 Archaeological trenching in 2021 also identified a number of other features whose dates could not be conclusively dated, primarily consisting of linear features such as gullies and ditches and pits (06- 0231).

2.6.5 Three Bronze Age barrows are recorded at Sandford Moor (06-0078, 06-0080, 06-0081), with their location recorded within or immediately adjacent to the existing route of the A66. Two are recorded as having been excavated historically; a watching brief at one of these locations did not

record any associated evidence though the HER records faint traces being present in the field where it is recorded.

2.6.6 Seventeenth century documentary evidence records the site of the Sandford ring cairn (06-0079) as being located less than 200 m to the north-north-west of the barrows at Sandford Moor. The AP/LiDAR survey notes that records do not cover its location, however, it did record a pair of linear banks (06-0112) theorised to potentially be a 'corridor' between the barrow cluster and the ring cairn, as well as a small ring ditch (06-0111), which may represent a badly eroded barrow not recorded in the HER.

2.6.7 The recorded evidence from the Romano-British period within the study area is focused upon the Roman road (00-0001), along with a fort, settlement, and temporary camp along its route.

2.6.8 The alignment of the Roman road (00-0001) broadly follows that of the current A66 through the study area. It diverges in the central area north of Warcop, where the A66 moves northwards, and the Roman road continues straight across what are now fields. Associated earthworks were visible in the AP/LiDAR survey in this section. The Roman road alignment also diverges slightly northwards in the western end of the study area.

2.6.9 Evidence of a 200 m length of the Roman road is recorded on the southern side of the Scheduled site of the Warcop Roman camp (06- 0003). Here the road survives as a slight terrace on the hillslope to the south of the camp and north of the modern road. The AD2020 AP/LiDAR survey identified an east-west aligned bank likely associated with the road, which is recorded as extending to the east and west of the Scheduled area.

2.6.10 Warcop Roman camp (06-0003) is located on northern side of the existent A66. It is visible as cropmarks on an aerial photograph which highlights features such as the camp's infilled defensive ditch, faint traces of a possible smaller and earlier Roman camp partly underlying the larger camp's south-western corner, and a curvilinear feature immediately to the east of the larger camp. However, the AD2020 AP/LiDAR survey was only able to identify the bank likely associated with the road and not any clear features of the camp itself.

2.6.11 Archaeological trenching undertaken in AD2021 identified a concentration of Romano-British features to the east of Warcop, primarily consisting of gullies, ditches and pits (06-0229). A second concentration of Romano-British activity was identified to the west of Warcop (06-0227), which included a section of cobbled trackway/road on a south-east to north-west alignment, potentially representing an iteration or diversion of The Street (00-0001). Additional features found in this area included a possible enclosure, drainage ditches, small pits, and postholes (06-0226, 06-0227).

2.6.12 The antiquarian excavation of one of the Bronze Age tumuli at Warcop (06-0078) is reported as having a secondary burial which has been interpreted as possibly Early Medieval in date. Contemporary reporting records that it was an urned cremation within a secondary vessel, with grave goods

including a double-edged sword and a spear head (O'Sullivan, 1980)[1]. A 2001 watching brief associated with the erection of a BT mast upon the site did not record any archaeological feature or finds.

2.6.13 To the northeast of Warcop, along the Eastfield Sike, is a Scheduled Medieval moated site (06-0006). The site includes the earthworks and buried remains of Eastfield Sike Medieval moat, an associated fishpond, and adjacent Medieval wood banks and ditches at Burtergill Wood and Kiln Hill. It lies on the fringe of open moorland which gradually rises northwards before joining the limestone scars of Warcop Fell. Surrounding the platform is a flat-bottomed ditch which is dry on all sides except the north where a small stream flows through the northeast corner of the moat before exiting through a break in the west ditch. Remains of an inlet channel which originally supplied water to the moat survive on the eastern side. To the south of the moat the bank and ditch continue and define a piece of land on the western side of Kiln Hill which, although now largely treeless, is shown on nineteenth century maps as being a continuation of Burtergill Wood.

2.6.14 Warcop developed through the Post Medieval period. This is reflected in the way in which the majority of the listed structures in the study area are predominately located in the settlement, with most being residences and associated structures.

2.6.15 Evidence of agricultural activity continued from the Medieval into the Post Medieval period, as evidenced by the built heritage of the study area which includes named farmsteads such as Toddygill Hall (06-0208, 06-0209) and Warcop Tower and Farmstead (06-0032). Ancillary agricultural structures also survive, some associated with houses or repurposed, as testament to the enduring agricultural land usage (06-0035, 06-0036). Agricultural landscape evidence from the Post Medieval period is also seen across the study area through the presence of enclosures (06- 0217) and field boundaries (06-0146, 06-0148).

2.6.16 The Warcop Walk mill (06-0094) lies to the north of Warcop, on the northern side of the existent A66, with the building and signs of the mill race surviving. The existing A66 incorporates the Walk Mill High Bridge (06-0092), which spans the Hayber Gill waterway to the south of the Warcop Walk Mill.

2.6.17 The mid-nineteenth century saw the introduction of the railway into the area, with the Eden Valley Branch of the North and Eastern Railway (06-0100) opening in AD1862. The line was intended as a connection between the coal fields in the north-east and the iron ore of West Cumbria, but also served to link the settlements of the Eden Valley. The line remained in service until AD1962. Part of the line, between Warcop and Appleby-in-Westmorland, is being preserved and restored by the Eden Valley Railway

[1] O'Sullivan, D. M. (1980) A reassessment of the early Christian' archaeology of Cumbria, Durham theses, Durham University. Available at Durham E-Theses Online: http://etheses.dur.ac.uk/7869/; Preston, W. (1775) Account of opening one of the largest barrows on Sandford Moor, Westmoreland in a letter from Mr William Preston, dated Warcop Hall, Sept 5, 1766, to Bishop Lyttleton. Archaeologia, Vol 3.

Trust (Eden Valley Railway Trust, 2022)[2]. Warcop Railway Station (06-0095) survives adjacent to the line.

Future baseline

2.6.18 There are no changes to the future baseline, relevant to the design change, which have been identified since the submission of the ES (Chapter 8 Cultural Heritage, APP-051).

2.7 Summary of DCO Design Likely Significant Effects

Construction

2.7.1 Seven assets will be subject to large and moderate adverse effects resulting from the construction of the Project. These effects are the result of the loss of physical evidence arising from the construction of the Project and will be permanent.

2.7.2 The Scheduled Monument of Warcop Roman Camp (06-0003) is located within the Zone of Visual Influence and partially within the Order Limits. The works include the construction of a new offline section of road within the boundary of the Roman Camp. Any below ground works will result in the loss of associated physical evidence in the area within the Order Limits and a moderate adverse impact to the high value asset resulting in a large adverse effect. This will be a moderate adverse effect following essential mitigation.

2.7.3 The Sandford Moor Barrows group is located within the Order Limits, consisting of Sandford Moor Barrow (06-0078), Sandford Ring Cairn Site (06-0079), Sandford Moor Barrow Flint Find (06-0080) and Sandford Moor Barrow (06-0081). The proposed works include the widening of the A66 involving the construction of a new offline section of road over the recorded area of the location of the prehistoric features. However, the survival of the barrow and associated features is currently uncertain and the sites may already have been subject to extensive truncation and removal as a result of antiquarian investigation as well as the construction of the modern A66. As a result, there may be no impact from the Project on the prehistoric features at Sandford; however, should any medium value buried archaeological remains survive they will experience a major adverse impact resulting in a large adverse effect, resulting in a moderate adverse effect following essential mitigation.

2.7.4 Two concentrations of archaeological features were identified during archaeological evaluation in 2021, a Roman trackway and associated features (06-0227) and prehistoric features north of Warcop (06-0228). The works at both locations consist of the construction of a new offline section of road over the identified sites of medium value buried archaeological remains. These buried archaeological remains will experience a major adverse impact resulting in a large adverse effect, resulting in a moderate adverse effect following essential mitigation.

[2] Eden Valley Railway Trust (2022) Eden Valley Railway, available at: https://www.evr-cumbria.org.uk [accessed 22-02-2023]

Operation

2.7.5 No significant effects will occur during the operation phase of the Project.

2.8 Potential impacts

2.8.1 Based on the Project design and associated construction activities, the design change has the potential to impact upon Cultural Heritage during construction.

2.8.2 Potential impacts of the Project (incorporating the design change) are described in this section prior to the implementation of the essential mitigation described in Section 2.9 below. The residual effects of the Project, taking into account this essential mitigation, are then described in Section 2.10.

Construction

Design and embedded mitigation

2.8.3 No essential mitigation measures are proposed in addition to those reported in Section 8.8 of the cultural heritage assessment (APP-051).

Potential Impacts before essential mitigation and enhancement

2.8.4 The ES (Chapter 8 Cultural Heritage (APP-051) identified seven likely significant effects within the locale of the design change, relating to the permanent loss of archaeological remains within the Order Limits, including to the Scheduled Monument of Warcop Roman Camp (06-0003).

2.8.5 There will be no change to the impact assessed within the ES on these seven heritage resources. However, the design change to the Order Limits means that there will be potential impacts on three heritage resources not previously impacted by the Project. The potential for new impacts is included in this section. Additionally, although there will be no physical change to Warcop Roman Camp Scheduled Monument (06-0003) beyond that resulting from the DCO design, it is possible that there could be an additional impact to the setting of the Scheduled Monument owing to the proximity of the change.

2.8.6 The design change involves the removal of ecological mitigation woodland planting which had been included in the DCO design as replacement habitat. This area of woodland was not identified as a source of impact to the Scheduled Monument and its removal will not result in a change to the magnitude of impact assessed in the ES.

2.8.7 New areas of ecological mitigation woodland are proposed to the immediate west of the scheduled area and to the north-east. Although located within the setting of the monument, the new woodland will not alter the character of its setting, which includes existing woodland. The visual change which will result from the planting and establishment of the woodland will be experienced in the context of the construction activities assessed in the ES, which included moving plant, lighting and noise resulting in a slight adverse effect. There will be no worsening of this effect arising from the design change.

2.8.8 There will be no additional construction required within the Warcop Roman Camp Scheduled Monument (06-0003) as a result of the design change.

2.8.9 Two earthworks identified in the aerial photography and LiDAR assessment (06-0107 an undated former field boundary and 06-0122 an undated section of curving bank) of low value previously located outside of the Order Limits and not impacted by the DCO design will be included within the Order Limits as part of the design change. It is assumed that any archaeological remains within the Order Limits will be affected by construction (see ES Chapter 8, paragraph 8.5.2 (APP-051)). The removal of the earthworks by construction will be a major adverse magnitude of impact, resulting in a slight adverse effect. This is not a significant effect.

2.8.10 The southernmost part of an earthwork (06-0146) of low value was located within the Order Limits assessed as part of the DCO design. The partial removal of the resource, assumed in the ES, was assessed as a negligible adverse magnitude of impact, resulting in a neutral effect. The design change will mean that more, approximately half, of the heritage resource will be included within the Order Limits. There will be a worsening of the magnitude of impact from negligible adverse to moderate adverse. This will be result in a slight adverse effect which is not significant.

Operation

Design and embedded mitigation

2.8.11 No essential mitigation measures are proposed in addition to those reported in Section 8.8 of the cultural heritage assessment (APP-051).

Potential Impacts

2.8.12 The operation of the Project will not introduce any new impacts than those assessed within the ES (APP-051).

2.9 Essential mitigation and enhancement measures

Construction

Essential mitigation

2.9.1 No change to the essential mitigation proposed in Section 8.8 of the ES (APP-051) is proposed.

Enhancement

2.9.2 No change to the enhancement measure proposed in Section 8.8 of the ES (APP-051) is proposed.

Operation

Essential mitigation

2.9.3 No change to the essential mitigation proposed in Section 8.8 of the ES (APP-051) is proposed.

Enhancement

2.9.4 No change to the enhancement measure proposed in Section 8.8 of the ES (APP-051) is proposed.

2.10 Assessment of likely significant effects

2.10.1 No likely significant effects have been identified in relation to the design change that are new or different to those reported in Section 8.9 of the ES (APP-051).

2.11 Monitoring

Construction

2.11.1 No new monitoring is proposed in relation to the design change. The existing measures proposed are laid out in the EMP (Application Document 2.7 (Rev 4)).

Operation

2.11.2 There is no requirement to monitor Cultural Heritage resources during the operational phase.

2.12 Glossary

2.12.1 See Application Glossary (APP-005).

3 Geology and Soils

3.1 Introduction

3.1.1 The following chapter details the assessment undertaken in order to quantify whether or not DC-21 results in any new or different likely significant when compared to those reported within the ES for Geology and Soils (APP-052).

3.1.2 The assessment undertaken as part of this ES Addendum has followed the methodology set out in the Design Manual for Roads and Bridges (DMRB) LA109[3] and any other relevant guidance. It details the methodology followed, summarises the legislation and policy framework relevant to the Geology and Soils assessment and describes the existing environment in the area surrounding the Project. It then considers the design, mitigation and residual effects of the Project, including taking account of relevant characteristics of the future baseline environment. Any key assumptions and limitations applicable to the assessment are also identified.

3.1.3 Where any of the sections of this addendum are unchanged compared to the ES, a cross reference has been provided and this document will highlight any changes or updates.

3.1.4 Any new or different likely significant effects during construction upon Geology and Soils receptors are identified in Section 3.10 of this chapter.

3.1.5 This chapter has been prepared by competent experts with relevant experience and expertise. The professional qualifications and experience of the technical lead are summarised in ES Chapter 9 Geology and Soils (APP-052).

3.2 Legislation and policy framework

3.2.1 The key legislation, national level policy, regional and local level policy; and other relevant policy and guidance applicable to the geology and soils assessment is listed in Section 9.3 of the ES. No updates to any of the aforementioned documents has occurred since the production of the Environmental Statement. Therefore, all information detailed within Section 9.3 remains applicable to this assessment.

3.3 Assessment methodology

3.3.1 The methodology for the Geology and Soils assessment follows the guidance set out within DMRB LA 1093 and considers the potential impacts on:

- Bedrock geology and superficial deposits, including geological designations and sensitive/ valuable non-designated features.
- Soil resources, including Agricultural Land Classification (ALC) and Best and most versatile (BMV) soils (BMV soils are ALC Grades 1, 2 and 3a).
- Human health, surface water and groundwater arising from the Project's interaction with contamination.

3 Highways England (now National Highways) (2019) Design Manual for Roads and Bridges (DMRB) LA 109 - Geology and soils. Volume 11, Section 3, Part 11 & Part 6]

3.3.2 See ES Chapter 9 Geology and Soils (APP-052), Section 9.4 for the Contamination assessment methodology, Geological geodiversity assessment methodology and Soils assessment methodology.

Scoping

3.3.3 Table 9.8 of the geology and soils assessment sets out the key points from the Planning Inspectorate Scoping Opinion relevant to the assessment. The full Scoping Opinion is provided in Appendix 4.2 (APP-149) of the ES. There has been no further scoping opinion received since the submission of the ES.

Consultation

3.3.4 The design change has been presented to statutory consultees and other stakeholders. These comments are detailed in the Change Application Consultation Report (Document Reference 8.2, CR1-007), no specific comments in relation to Geology and Soils have been received.

3.4 Assumptions and limitations

3.4.1 See Environmental Statement Chapter 9 Geology and Soils (APP-052), Section 9.5 for the assumptions and limitations relevant to the assessment and design change.

3.4.2 The baseline data used for the Environmental Statement Chapter 9 Geology and Soils (APP-052) is used in this assessment. The baseline data has not been updated.

3.4.3 Pollution incidents between 2021 to 2022 have been reviewed using publicly available open-source data. The pollution incidents recorded in the area have been reviewed and assessed against the design change.

3.4.4 Soil surveys have not been completed outside the Order Limits. Where the design change falls outside the Order Limits, the Agricultural Land Classification has been assumed using the Natural England Provisional Agricultural land classification maps and nearby factual soil survey findings.

3.4.5 Soil losses have not been recalculated across the scheme, due to lack of updated available data at the time of writing. It is considered that the worse-case scenario has been assessed in the ES.

3.4.6 There is a foot and mouth burial site located to the north of the additional land. There are no details of the size or extent of the burial site. Limited details are available for the site with only a grid reference point provided.

3.5 Study area

3.5.1 The study area for this specific design change (DC-21) is a 250m buffer beyond the Order Limits as defined in the Environmental Statement Chapter 9 Geology and Soils (APP-052). Section 9.6 sets out the study area for the assessment. See Figure 1 for the study area and Order Limits for the design change.

3.6 Baseline conditions

3.6.1 Section 9.7 of ES Chapter 9 Geology and Soils (APP-052) sets out the Baseline Conditions relevant to the Geology and Soils assessment and the design change.

Future baseline

3.6.2 The in-combination climate change assessment has used a future climate baseline that is based on representative concentration pathway 8.5 (RCP 8.5) of the UK climate change 2018 projections (UKCP18). This future climate baseline is presented in the Environmental Statement Chapter 7: Climate (APP-050).

3.6.3 The predicted rise in UK average temperature will lead to more rain falling in intense storms and increased summer temperatures. Such events will lead to increased drought and increased soil erosion.

3.6.4 Changes to soil temperature and moisture levels will increase pressures on farming, due to reduced soil fertility and the loss of high-quality agricultural soils and BMV land. Soils will become increasingly less fertile, damaging wildlife and the ecosystem services that soils provide.

3.6.5 Increased summer temperatures will lead to physical impacts to soils, such as desiccation cracks and settlement.

3.6.6 The predicted climatic changes have the potential to impact the mobility and migration of contaminant within the ground and groundwater. The potential combined effects relating to geology and contamination and future climate change for the Project include, but not limited to:

- the risk of contamination migration through changes in temperature and atmospheric pressure;
- the risk of contamination migration through fluctuating groundwater levels; and
- increased erosion of geology and soils (extremes in temperatures, increased rainfall intensity).

3.6.7 The Environmental Statement Chapter 9 Geology and Soils (APP-052) Section 9.7 further sets out the future baseline relevant to the assessment and design change.

3.7 Summary of DCO Design Likely Significant Effects

Construction

3.7.1 Section 9.10.9 of the Geology and Soils chapter of the Environmental Statement (APP-052) sets out the construction related Assessment of Likely Significant Effects relevant to the Geology and Soils assessment. Key findings are summarised below.

Geology and geodiversity

3.7.2 A UNESCO Global Geopark, of very high receptor value, is located within Appleby to Brough and Bowes Bypass schemes, only. The scheme encroaches approximately 0.3km^2 into the southern boundary of the UNESCO Global Geopark, which is less than 0.1% of the overall Geopark

area, which is approximately is 1,983km^2 in total.
The magnitude of impact to the UNESCO Global Geopark is considered negligible, with very minor loss or detrimental alteration to the site. The overall integrity of the geological feature will not be affected. The significance of the effect, as assessed in the Environmental Statement Chapter 9 Geology and Soils Section 9.10.10 (APP-052) is a slight adverse effect, which is not considered significant. Figures 2 and 3 show the superficial and bedrock geology within the scheme. The UNESCO Global geopark is shown on Figure 4 of the ES addendum.

Contamination

3.7.3 The assessment of potential temporary effects on human health, groundwater, surface water, buildings or ecological receptors during the construction phase, was carried out and is presented in section 1.2 of ES Appendix 9.3: Geology and Soils Detailed Risk Assessment and Conceptual Site Models (APP-194), see Figure 5 of the ES Addendum.

3.7.4 The impact during construction, with embedded and mitigation measures applied for the identified receptors within the study area, was assessed in the Environmental Statement Chapter 9 Geology and Soils Section 9.10.14 (APP-052). The magnitude of impact is negligible. The highest receptor sensitivity in the scheme is classed as Very High. The significance of the effects is neutral to slight adverse effect, which is not considered significant.

Soils

3.7.5 A major magnitude of impact is predicted, for the topic of geology and soils, as a result of the construction phase of the Project. Major impacts are anticipated on ALC Grade 3a (high sensitivity) with over 20 ha of land permanently lost in this scheme. Major impacts are anticipated to Grade 3b soils (medium sensitivity) with approximately 50ha of land permanently sealed. The significance of effect on BMV is assessed as large. These are impacts are considered significant. Figure 6 of the ES addendum shows the final factual soils survey data, used for this assessment.

Operation

3.7.6 Section 9.10.38 of the Geology and Soils chapter of the Environmental Statement (APP-052) sets out the operation related Assessment of Likely Significant Effects relevant to the Geology and Soils assessment and the design change. There are no likely significant effects predicted on the topic of geology and soils as a result of the operational phase of the Project.

3.8 Potential impacts

3.8.1 Based on the design change and associated construction activities, the design change has the potential to impact upon Geology and Soils during both construction and operation.

3.8.2 Potential impacts of the design change are described in this section prior to the implementation of the essential mitigation described in Section 3.9 below. The residual effects of the design change, taking into account this essential mitigation, are then described in Section 3.10.

3.8.3 An assessment of all likely significant effects that could arise as a result of the construction and operation of the design change has been carried out. In accordance with the Infrastructure Planning EIA Regulations, which require the identification of significant effects, and to ensure this ES is proportionate.

Construction

Design and embedded mitigation

3.8.4 The locations to the north of the Order Limits fall within the UNESCO Global Geopark. The design changes are required for environmental mitigation. The DCO application together with the design changes will encroach less than 0.1% of the overall UNESCO Geopark area. The magnitude of impact to the UNESCO Global Geopark is considered negligible, which is defined as 'very minor loss or detrimental alteration to the site. The overall integrity of the geological feature will not be affected'. The sensitivity of the UNESCO site is very high. The significance of the effect is slight adverse, which is not considered significant.

3.8.5 There is evidence of a foot and mouth burial site located to the north of the additional land, adjacent to Moor House Hilton Road. The extent and each location of the burial site is unknown. If animal burial sites are encountered during construction of the Project existing measures are presented in section 9.11 of the Environmental Statement Chapter 9 Geology and Soils (APP-052) and within the EMP (Application Document 2.7 (Rev 4)).

3.8.6 Site specific soil data is unavailable for those sites located outside of the DCO Order Limits, therefore no site specific soil data is available for the Order Limits beyond DCO Order Limits for the design change. The removal of one parcel of land, which is located on Grade 3a soil, is no longer required. The new land is equal in size to that originally suggested. The soil beneath the additional land is of equal or less agricultural land quality according to the NE Provisional ALC mapping, and so no change is anticipated in overall terms.

3.8.7 No new design and embedded mitigation have been proposed in relation to the design change as a result. Key aspects of the design and embedded mitigation, directly applicable to the geology and soils are presented in Section 8.8 of the Geology and Soils chapter (APP-052) and include measures for the foot and mouth burial sites.

Potential Impacts before essential mitigation and enhancement

3.8.8 There would be no change to the impact assessed within the Environmental Statement Chapter 9 Geology and Soils (APP-052).

3.8.9 The overall integrity of the geological feature UNESCO Global Geopark will not be affected. The significance of the effect, as assessed in the Environmental Statement Chapter 9 Geology and Soils Section 9.10 (APP-052) is a slight adverse effect, which is not considered significant.

3.8.10 Major impacts are anticipated with the loss and permanent sealing of over 20ha of ALC Grade 3a and Grade 3b soils. The significance of effect on BMV, as assessed in the Environmental Statement Chapter 9 Geology and Soils Section 9.10 (APP-052) is assessed as large. These are impacts considered significant.

Operation

Design and embedded mitigation

3.8.11 No new design and embedded mitigation have been proposed in relation to the design change. Key aspects of the design and embedded mitigation, directly applicable to the geology and soils are presented in Section 9.9 of the Geology and Soils chapter (APP-052).

Potential Impacts

3.8.12 The operation of the design change would not introduce any new impacts in addition to those identified in the ES Chapter 9 Geology and Soils (APP-052).

3.9 Essential mitigation and enhancement measures

Construction

Essential mitigation

3.9.1 There are no new essential mitigation measures to be applied in relation to the design change.

Enhancement

3.9.2 There are no new enhancement measures to be applied in relation to the design change.

Operation

Essential mitigation

3.9.3 There are no new essential mitigation measures to be applied in relation to the design change.

Enhancement

3.9.4 There are no new enhancement measures to be applied in relation to the design change.

3.10 Assessment of likely significant effects

3.10.1 There are no new likely significant effects identified for Geology and Soils as a result of the design change.

3.10.2 Monitoring

Construction

3.10.3 No new construction monitoring is proposed in relation to the design change. The existing measures proposed are presented in the laid out in section 9.11 of the Environmental Statement Chapter 9 Geology and Soils (APP-052) and within the EMP (Application Document 2.7 (Rev 4)).

Operation

3.10.4 No new operational monitoring is proposed in relation to the design change. The existing measures proposed are presented in the laid out in section 9.11 of the Environmental Statement Chapter 9 Geology and Soils (APP-052) and within the EMP (Application Document 2.7 (Rev 4)).

3.11 Glossary

3.11.1 See Application Glossary (APP-005).

4 Landscape and visual

4.1 Introduction

4.1.1 The following chapter details the assessment undertaken in order to quantify whether or not DC-21 results in any new or different likely significant effects when compared to those reported within the ES Chapter 10 Landscape and Visual (APP-053).

4.1.2 This assessment undertaken as part of this ES Addendum follows the methodology set out in the Design Manual for Roads and Bridges (DMRB) LA 107 Landscape and Visual Effects and any other relevant guidance. It details the methodology followed, summarises the legislation and policy framework relevant to the Landscape and Visual assessment and describes the existing environment in the area surrounding the Project. It then considers the design, mitigation and residual effects of the Project, including taking account of relevant characteristics of the future baseline environment. Any key assumptions and limitations applicable to the assessment are also identified.

4.1.3 Where any of the sections of this addendum are unchanged compared to the ES, a cross reference has been provided and this document will highlight any changes or updates.

4.1.4 Any new or different likely significant effects during construction upon Landscape or Visual receptors are identified in Section 4.10 of this chapter.

4.1.5 This chapter of the ES has been undertaken by competent experts with relevant experience and expertise. The professional qualifications and experience of the technical lead are summarised in ES Chapter 10 Landscape and Visual (APP-53).

4.2 Legislation and policy framework

Legislation

4.2.1 Please refer to ES Chapter 10 Landscape and Visual (section 10.3 Legislation and policy framework, para 10.3.1) (APP-053) for key legislation that is applicable to the assessment.

National level policy

National Policy Statement for National Networks

4.2.2 The primary basis for the Secretary of State deciding whether or not to grant a Development Consent Order (DCO) for the Project is the National Policy Statement for National Networks (NPSNN).

4.2.3 Please refer to 3.2 Environmental Statement Chapter 10 Landscape and Visual (section 10.3 Legislation and policy framework, para 10.3.2) (APP-053) for NSPNN applicable to the assessment.

Regional and local level policy

4.2.4 Other regional and local level policies have been considered as part of the landscape and visual assessment where these have informed the identification of receptors and resources and their sensitivity; the

assessment methodology; the potential for likely significant environmental effects; and required mitigation. These policies are listed in ES Chapter 10 Landscape and Visual (section 10.3 Legislation and policy framework, para 10.3.5) (APP-053).

4.2.5 Please refer to 3ES Chapter 10 Landscape and Visual (section 10.3 Legislation and policy framework, para 10.3.7) (APP-053) for other relevant policy guidance.

4.3 Assessment methodology

4.3.1 The methodology for the landscape and visual assessment follows the guidance set out within DMRB LA107 Landscape and visual effects and LA104 Environmental assessment and monitoring.

4.3.2 The assessment methodology is set out in ES Chapter 10 Landscape and Visual section 10.4 Assessment Methodology (APP-053).

Scoping

4.3.3 Summary of Scoping Opinion and Response Appendix 10.1 Landscape and Visual Policy and Consultation Tables (APP-197) sets out the points from the Planning Inspectorate Scoping Opinion relevant to the landscape and visual assessment. The full Scoping Opinion is provided in ES Appendix 4.2: EIA Scoping Opinion (APP-149).

4.3.4 There are no changes to the scope from the ES as noted above.

Consultation

4.3.5 The design change has been presented to statutory consultees and other stakeholders. Responses relevant to the Landscape and Visual topic have been received and these comments are detailed in the Change Application Consultation Report (Document Reference 8.2, CR1-007) and have been taken into account in this assessment where applicable.

4.4 Assumptions and limitations

4.4.1 The assumptions and limitations are set out in ES Chapter 10 Landscape and Visual section 10.5 Assumptions and Limitations (APP-053).

4.5 Study area

4.5.1 The study area is set out in ES Chapter 10 Landscape and Visual (APP-053) Section 10.6 Study area.

4.6 Baseline conditions

4.6.1 The baseline conditions are set out in ES Chapter 10 Landscape and Visual (section 10.7 Baseline conditions, para 10.7.212 – 10.7.270) (APP-053). Due to the intervisibility the landscape baseline applies throughout this section. The visual baseline is similarly relevant due to the design changes relating to five individual sites across the scheme.

4.7 Summary of DCO Design Likely Significant Effects

Construction

Construction Landscape Effects

4.7.1 Within the Appleby to Brough scheme the only significant effects on landscape receptors during construction are the moderate adverse effects anticipated during construction for the LCA 08b Broad Valleys and large adverse effects on LCA 11a Foothills. There are no other significant effects anticipated during construction for landscape receptors within this scheme.

4.7.2 The full assessment for construction effects is set out in ES Appendix 10.5 Schedule of Landscape Effects (APP-201), para 10.5.2 Table 1.

Construction Visual Effects

4.7.3 Within Appleby to Brough scheme there are large adverse visual effects anticipated during construction from Viewpoints 6.1, 6.7, 6.8, 6.9, 6.11a and 6.12. There are moderate adverse visual effects anticipated during construction from Viewpoints 6.4 and 6.5.

4.7.4 The full assessment for construction visual effects is set out ES Appendix 10.6 Schedule of Visual Effects (APP-202), para 10.6.2 Table 1.

Operation

Operation Landscape Effects Year 1

4.7.5 Within Appleby to Brough scheme there remain significant effects on landscape receptors at Year 1 with moderate adverse effects anticipated for the LCA 08b Broad Valleys and large adverse effects on LCA 11a Foothills. There are no other significant effects anticipated at Year 1 for landscape receptors.

4.7.6 The full assessment for operational landscape effects is set out in ES Appendix 10.5 Schedule of Landscape Effects (APP-201), para 10.5.3 Table 2.

Operation Visual Effects Year 1

4.7.7 Within Appleby to Brough scheme there are large adverse visual effects anticipated during operation Year 1 from Viewpoints, 6.8 and 6.9. There are moderate adverse visual effects anticipated during operation Year 1 from Viewpoints 6.1, 6.7, 6.11a and 6.12.

4.7.8 The full assessment in operation for visual effects is set out in ES Appendix 10.6 Schedule of Visual Effects (APP-201), para 10.6.3 Table 2.

Operation Landscape Effects Year 15

4.7.9 There are no residual significant effects anticipated in operation for landscape receptors within this scheme.

4.7.10 The full assessment for operational landscape effects is set out in ES Appendix 10.5 Schedule of Landscape Effects (APP-201), para 10.5.4 Table 3.

Operation Visual Effects Year 15

4.7.11 Within Appleby to Brough scheme there remain significant moderate adverse effects anticipated for Viewpoint 6.8.

4.7.12 The full assessment for operational visual effects is set out in ES-Appendix 10.6 Schedule of Visual Effects (APP-201), para 10.6.4 Table 3.

4.8 Potential impacts

4.8.1 Based on the Project design and associated construction activities, the design change has the potential to impact upon landscape and visual during both construction and operation.

4.8.2 For this design change there are five elements. Changes 1, 4 and 5 remove elements from the original assessment and therefore would have no additional or different significant effects. Change 2 removes a strip of linear woodland and replaces it with a larger block of woodland planting along Moorhouse Lane, within the AONB and reinforces roadside edge planting alongside the A66. Change 3 adds a block of woodland planting within the AONB north of Street House. Changes 2 and 3 are located close together and would have similar additional effects. Both changes 2 and 3 are required for the relocation of biodiversity mitigation measures. The effects listed below relate to changes 2 and 3.

4.8.3 Potential impacts of the design change are described in this section prior to the implementation of the essential mitigation described in Section 4.8 below. The residual effects of the Project, taking into account essential mitigation, are then described in Section 4.9.

Construction

Design and embedded mitigation

4.8.4 The landscape mitigation for the Project seeks to offset impacts on landscape character and visual impact. There are no proposed changes to the Embedded and Essential Mitigation and Enhancement Measures described in section 10.9 of Document 3.2 Environmental Statement Chapter 10 Landscape and Visual (APP-053) which are also indicated on Environmental Mitigation Maps (Application document 2.8, Figure 2.8.5) (APP-041).

4.8.5 No new design and embedded mitigation measures have been proposed in relation to the design change or to address the principles in Application Document 5.11 Project Design Principles (Rev 4) in Table 4-8: Appleby to Brough Scheme Specific Design Principles.

Potential Impacts before essential mitigation and enhancement

4.8.6 The landscape mitigation described in section 10.9 of Document 3.2 Environmental Statement Chapter 10 Landscape and Visual (APP-053) which are also indicated on Environmental Mitigation Maps (Application document 2.8, Figure 2.8.5) (APP-041) and align with the principles in Application Document 5.11 Project Design Principles (Rev 4) in Table 4-8: Appleby to Brough Scheme Specific Design Principles would provide a careful balance between the need to replace screen planting removed during construction and the objective of retaining existing valued views

both to the south and north to the North Pennines AONB. Departure from the DCO mitigation design, particularly in respect of obscuring views to the AONB by introducing additional blocks of woodland planting, could compromise these objectives and this is considered further below.

Construction Landscape Effects

4.8.7 The design changes relocate mitigation woodland planting into areas within the AONB. This would increase construction activity in the AONB and therefore, due to the high sensitivity and moderate adverse magnitude of impact, would introduce a moderate adverse and therefore significant effect on that landscape character during construction. The significance has been assessed as moderate rather than large as it represents a small peripheral part of the AONB. This constitutes a change from the slight adverse effect predicted in document 3.4 4 Environmental Statement Appendix 10.5 Schedule of Landscape Effects (APP-201).

4.8.8 There would remain significant landscape effects anticipated for the LCA 08b Broad Valleys and Large Adverse effects on LCA 11a Foothills.

Construction Visual effects

4.8.9 The introduction of woodland planting within the AONB close to Moor House Farm, identified as change 2, would require construction traffic within the current open field to prepare the land and undertake the planting. This would affect views of the ridge line within the AONB from the minor road. This road serves as an access to Moor House Farm and for the MOD land beyond. Due to the low sensitivity of the receptor this would not alter the assessment made in the ES. Any views from the farmhouse would be unaffected by the design changes due to existing screen planting. The proposed woodland would not extend northwards enough to affect any potential views for residents to the ridge line of the AONB.

4.8.10 Other viewpoints which could be affected by the design changes include 6.6, 6.7 and 6.8. Due to retained vegetation, topography, angle of view and distance there would be no perceptible change to the views already assessed and therefore no change to the assessment in the ES.

Operation

Design and embedded mitigation

4.8.11 No new design and embedded mitigation measures have been proposed in relation to the design change or to address the principles in document Application Document 5.11 Project Design Principles (Rev 4)) in Table 4-8: Appleby to Brough Scheme Specific Design Principles.

Potential Impacts Operation Landscape effects

4.8.12 At year 1 during operation there would be no change to the predicted significant landscape effects already reported in document 3.4 4 Environmental Statement Appendix 10.5 Schedule of Landscape Effects (APP-201) for both change 2 and 3. This is because the construction activities have ceased, and the area of planting is consistent with other planting areas within this landscape character type.

4.8.13 Due to the high sensitivity and minor adverse magnitude of impact the design changes would introduce a slight adverse and therefore not significant effect on the landscape character during operation at both year 1 and year 15. The significance has been assessed as slight rather than moderate as it represents a small peripheral part of the AONB.

4.8.14 As the scale and type of proposed woodland for both changes 2 and 3 are in keeping with the overall landscape character for the area, by year 15 when the planting reaches a level of maturity there would be no residual significant landscape effects.

Potential Impacts Operation Visual effects

4.8.15 At year 1, due to the limited size of the plants there would be no additional or different effects on any other viewpoints as a result of both of these design changes. The current open fields would be perceived as an open area of farmland.

4.8.16 At year 15 for design change , introducing woodland planting by Moor House Farm, into what is currently an open field of grazing, will increase the visual magnitude of impact for views to the north east. As there are a limited number of receptors affected this would not alter the assessment conclusion that the effects on this viewpoint are not significant.

4.8.17 Other viewpoints which could be affected by the changes include 6.6, 6.7 and 6.8. Due to retained vegetation, topography, angle of view and distance there would be no perceptible change to the views already assessed and therefore no change to the assessment in the ES Chapter 10 Landscape and Visual (APP-053).

4.9 Essential mitigation and enhancement measures

Construction

Essential mitigation

4.9.1 No change from essential mitigation in the ES Chapter 10 Landscape and Visual (APP-053) has been proposed.

Enhancement

4.9.2 No new enhancement measures have been proposed for this design change.

Operation

Essential mitigation

4.9.3 No change from essential mitigation in the ES Chapter 10 Landscape and Visual (APP-053) has been proposed.

Enhancement

4.9.4 No new enhancement measures have been proposed for this design change.

4.10 Assessment of likely significant effects

4.10.1 This section identifies the new or different likely landscape and visual effects of the Project incorporating the design change that are predicted to be significant.

4.10.2 Likely effects that have not changed are presented in Appendix 10.5 Schedule of Landscape Effect and Appendix 10.6 Schedule of Visual Effects.

Table 4-1: Summary of significant effects (construction)

Receptor	Attribute	Receptor sensitivity	Potential impact before essential mitigation	Essential mitigation/ enhancement	Impact magnitude	Residual effect
North Pennines Area of Outstanding Natural Beauty		High	Moderate	Nothing additional has been proposed	Moderate	Moderate
Viewpoint 6.5 Minor road leading to Moor House Farm looking south	Visual receptor relating to road users.	Low	Major	Nothing additional proposed	Major	Moderate

Table 4-2: Summary of significant effects (operation year 15)

Receptor	Attribute	Receptor sensitivity	Potential Impact before essential mitigation	Essential mitigation/ enhancement	Impact magnitude	Residual effect
North Pennines Area of Outstanding Natural Beauty		High	Minor	Nothing additional proposed	Minor	Slight
Viewpoint 6.5 Minor road leading to Moor House Farm looking south	Visual receptor relating to road users.	Low	Major	Nothing additional proposed	Moderate	Slight

4.10.3 For changes 2 and 3 there is a change in the effect on the AONB during construction from slight adverse to moderate adverse, which is significant. This is because both design changes consist of new areas of woodland planting within the AONB. Which would require construction activities in an otherwise pastoral landscape.

4.10.4 During construction there would be a difference in the extent of the visible change from VP 6.5. The focus of the change identified in ES Chapter 10 Landscape and Visual (APP-053) is to the south. The additional woodland added as part of change 2 would alter the view to the north east. However, the overall effect would remain moderate and still significant during construction.

4.10.5 At year 1 and year 15 there are minor changes in the assessment from neutral to slight for landscape impacts, but this would not change the significance.

4.10.6 At year 1 and 15 there would be no changes to the predicted visual effects noted in ES Chapter 10 Landscape and Visual (APP-053).

4.11 Monitoring

Construction

4.11.1 No new monitoring has been proposed for the design change. The existing measures in 2.7 Environmental Management Plan Annex B1 Outline Landscape and Ecological Management Plan (Rev 2) (REP3-003) would apply.

Operation

4.11.2 No new monitoring has been proposed for the design change. The existing measures in 2.7 Environmental Management Plan Annex B1 Outline Landscape and Ecological Management Plan (Rev 2) (REP3-003) would apply.

4.12 Glossary

4.12.1 See Application Glossary (APP-005).

1 DC-24

1.1 Introduction

1.1.1 This chapter assesses potential for design change DC-24 to introduce new or different likely significant effects upon the environment when compared to the findings of the original Development Consent Order (DCO) Environmental Statement (ES) (doc ref. 3.1 to 3.4, APP-043 to APP-233).

1.1.2 Only the environmental topics which were scoped in as requiring a full assessment are detailed within this document. For further information in regard to the rational as to why any environmental disciplines have been scoped out of requiring a full assessment, please refer to ES Addendum Volume I. Topics scoped in for further assessment are Material assets and Waste; and Road Drainage and Water Environment.

1.1.1 DC-24 is summarised in Section 1 and detailed in Section 3 of the Change Application (Document Reference 8.1, CR1-002). An updated Project description is provided in Environmental Statement Addendum Volume III: Updated Project Description.

2 Material Assets and Waste

2.1 Introduction

2.1.1 The following chapter details the assessment undertaken in order to quantify whether or not DC-24 results in any new or different likely significant when compared to those reported within the ES Chapter 11, for Material Assets and Waste (APP-054).

2.1.2 The assessment undertaken as part of this ES Addendum has followed the methodology set out in the Design Manual for Roads and Bridges (DMRB) LA110 and any other relevant guidance. DMRB LA 110 and other relevant guidance is summarised in section 11.3 of ES Chapter 11 for Material Assets and Waste (APP-054). It details the methodology followed, summarises the legislation and policy framework relevant to the Material Assets and Waste assessment and describes the existing environment in the area surrounding the Project and the Appleby to Brough scheme (where the design change is located). It then considers the design, mitigation and residual effects of the Project and the Appleby to Brough scheme, including taking account of relevant characteristics of the future baseline environment. Any key assumptions and limitations applicable to the assessment are also identified.

2.1.3 Where any of the aforementioned sections are unchanged a cross reference back to the original ES has been provided and this document will highlight any changes or updates.

2.1.4 Any new or different likely significant effects during construction upon Material Assets and Waste receptors are identified in Section 2.10 of this chapter.

2.1.5 This chapter has been prepared by competent experts with relevant experience and expertise. The professional qualifications and experience of the technical lead are summarised in ES Chapter 11 Material Assets and Waste (APP-054).

2.2 Legislation and policy framework

2.2.1 The key legislation, national, regional and local policy; and other relevant policy and guidance applicable to the material assets and waste assessment is listed in Section 11.2 of ES Chapter 11. No updates to any of the aforementioned documents has occurred since the production of ES Chapter 11. Therefore, all information detailed within Section 11.2 of ES Chapter 11 (APP-054) remains applicable to this assessment.

2.3 Assessment methodology

2.3.1 The methodology for the material assets and waste assessment follows the guidance set out within DMRB LA 110. The assessment methodology utilised for this addendum is the same as within ES Chapter 11, where it is detailed in Section 11.3.

Scoping

2.3.2 Table 11.4 of the Material Assets and Waste assessment within ES Chapter 11 (APP-054) sets out the key points from the Planning Inspectorate Scoping Opinion relevant to the Material Assets and Waste assessment and the design change. The full Scoping Opinion is provided in Appendix 4.2 (APP-149) of the ES. There has been no further scoping opinion received since the submission of the ES.

Consultation

2.3.3 The design change has been presented to statutory consultees and other stakeholders. These comments are detailed in the Change Application Consultation Report (Document Reference 8.2, CR1-007), however no specific comments in relation to Material Assets and Waste have been received.

2.4 Assumptions and limitations

2.4.1 Section 11.4 of the Material Assets and Waste assessment (Document Reference 3.2, APP-054) sets out the assumptions and limitations relevant to the assessment and the design change.

2.5 Study area

2.5.1 Section 11.5 of ES Chapter 11 (APP-054) sets out the study areas relevant to the assessment and the design change.

2.5.2 Study area 1 is the area within the Order Limits, as within these areas construction materials will be consumed. For the purpose of this material assets and waste assessment, Study area 1 now incorporates the change to the Order Limits for the design change. Study area 2 remains unchanged and is the area where the main construction materials will be sourced and construction waste will be treated or disposed of, and comprises waste infrastructure in the North East, the North West and Yorkshire and The Humber.

2.6 Baseline conditions

2.6.1 Section 11.6 of ES Chapter 11 (APP-054) sets out the Baseline Conditions relevant to the Material Assets and Waste assessment and the design change.

2.6.2 For the purpose of this material assets and waste assessment for the design change, the baseline conditions remain unchanged as they are still relevant. The design change is located in the Appleby to Brough scheme.

2.6.3 The baseline conditions relating to mineral safeguarding sites for the Appleby to Brough scheme are identified in Table 11.7 of the ES using information provided by Cumbria County Council during consultation.

Future baseline

2.6.4 Section 11.6.28 of the Material Assets and Waste assessment (Document Reference 3.2, APP-054) sets out the Future baseline relevant to the Material Assets and Waste assessment and the design change.

2.7 Summary of DCO Design Likely Significant Effects

Construction

2.7.1 Section 11.9 of the Material Assets and Waste assessment (Document Reference 3.2, APP-054) sets out the construction related Assessment of Likely Significant Effects relevant to the Material Assets and Waste assessment and the design change.

2.7.2 The potential sterilisation to mineral safeguarding sites for the Appleby to Brough scheme are assessed in Table 11.34 of the ES assessment (Document Reference 3.2, APP-054) using information provided by Cumbria County Council during consultation.

2.7.3 There are no Likely Significant Effects for Construction for the Appleby to Brough scheme.

Operation

2.7.4 Section 11.9.34 of the Material Assets and Waste assessment (Document Reference 3.2, APP-054) sets out the operation related Assessment of Likely Significant Effects relevant to the Material Assets and Waste assessment and the design change.

2.7.5 There are no Likely Significant Effects for operation for the Appleby to Brough scheme.

2.8 Potential impacts

2.8.1 The design change seeks to introduce a lower speed limit, leading to opportunities to implement road design standards more in keeping with the local rural road network. Based on the Project design and associated construction activities the design change has the potential to impact material assets and waste during both construction and operation. However the design change is unlikely to alter the conclusions of the likely significant effects assessment reported in Section 11.7 of the ES Chapter 11 (APP-054) during construction and operation.

2.8.2 The potential construction and operation impacts on material assets included in the assessment, as identified in DMRB LA 110, are:

- The sterilisation of mineral safeguarding sites and/or peat resources.
- The consumption of virgin materials.

2.8.3 The potential construction and operation impacts on waste included in the assessment, as identified in DMRB LA 110, are:

- The reduction in regional landfill capacity.
- The reduction in national landfill capacity.

Construction

Design and embedded mitigation

2.8.4 Sections 11.7.2 and 11.8.2 of the material assets and waste assessment (APP-054) set out the construction embedded design mitigation relevant to the material assets and waste assessment and the design change.

2.8.5 For the purpose of this material assets and waste assessment for the design change, the design and embedded mitigation for construction remain unchanged as the changes are not of a size that alters the requirements proposed in the ES and the Environmental Management Plan (Application Document 2.7 Environmental Management Plan (Rev 4)).

Potential Impacts before essential mitigation and enhancement

2.8.6 Section 11.7 of the material assets and waste assessment (APP-054) sets out the construction potential impacts relevant to the material assets and waste assessment and the design change.

2.8.7 For the purpose of this material assets and waste assessment for the design change, the Potential Impacts before essential mitigation and enhancement for construction remain unchanged as the changes are not of a size that alters the requirements proposed in the ES and the EMP (Application Document 2.7 Environmental Management Plan (Rev 4)).

Operation

Design and embedded mitigation

2.8.8 Section 11.7.10 of the material assets and waste assessment (APP-054) sets out the operation embedded design mitigation relevant to the material assets and waste assessment and the design change.

2.8.9 For the purpose of this material assets and waste assessment for the design change, the Design and embedded mitigation for Operation remain unchanged as the changes are not of a size that alters the requirements proposed in the ES and the EMP (Application Document 2.7 Environmental Management Plan (Rev 4)).

Potential Impacts

2.8.10 Section 11.7.11 of the material assets and waste assessment (APP-054) sets out the operation potential impacts relevant to the material assets and waste assessment and the design change.

2.8.11 For the purpose of this material assets and waste assessment for the design change, the Potential Impacts for operation remain unchanged as the changes are not of a size that alters the requirements proposed in the ES and the EMP (Application Document 2.7 Environmental Management Plan (Rev 4)).

2.9 Essential mitigation and enhancement measures

Construction

Essential mitigation

2.9.1 No essential mitigation measures are proposed in addition to those reported in Section 11.8.45 of the material assets and waste assessment (APP-054).

Enhancement

2.9.2 No enhancement measures are proposed in addition to those reported in paragraphs Section 11.8.66 of the Material Assets and Waste assessment (APP-054).

Operation

Essential mitigation

2.9.3 No essential mitigation measures are proposed in addition to those reported in section 11.8.67 of the material assets and waste assessment (APP-054).

Enhancement

2.9.4 No enhancement measures are proposed in addition to those reported in paragraphs Section 11.8.67 of the Material Assets and Waste assessment (APP-054).

2.10 Assessment of likely significant effects

2.10.1 This section identifies whether or not there are any new or different likely significant effects upon material assets and waste as a result of DC-24.

Mineral Safeguarding Sites

2.10.2 The design change, focused on a change in speed limit, is located close to a Mineral Consultation Area (MCA) for sand and gravel. However, there are no new likely significant effects during construction for the sterilisation of mineral safeguarding sites for DC-24 or the Appleby to Brough scheme with the design change due to the following reasons:

- The land take would be no larger than that assessed in the ES (APP-054) as detailed below in section 2.10.3.
- The change to the Order Limits is minor when compared to the scheme as whole;
- Take land close to the existing A66, which land is unlikely to be suitable for mineral development; and
- Take land close to residential areas near Brough, which land is unlikely to be suitable for mineral development.

2.10.3 The potential sterilisation to mineral safeguarding sites for the Appleby to Brough scheme are assessed in Table 11.34 of the ES assessment (APP-054) using information provided by Cumbria County Council during

consultation. A minor adverse impact was identified for the Appleby to Brough scheme for the sterilisation of mineral safeguarding sites. Widespread new engineering structures could impact or limit future extraction around the immediate vicinity of road. However, when considered in the context of wider resource the scheme would not diminish access. The design change DC-24 does not give cause to alter this assessment. Therefore this minor adverse impact would also be applied for the design change and would not represent a likely significant effect.

2.10.4 Section 11.9.5 of the material assets and waste assessment (APP-054) sets out the sensitivity of mineral safeguarding sites. Each mineral safeguarding site and allocation was considered to have a value (sensitivity) of Medium. Therefore the minor adverse impact for the design change would remain unchanged and would not represent a likely significant effect.

2.10.5 Therefore, there are no new or different likely significant effects anticipated during construction or operation as a result of DC-24.

2.11 Monitoring

Construction

2.11.1 Monitoring methodologies described in Section 11.10.1 of ES Chapter 11 (APP-054) are considered appropriate and are not affected by the design change.

Operation

2.11.2 Monitoring methodologies described in Section 11.10.4 of ES Chapter 11 (APP-054) are considered appropriate and are not affected by the design change.

2.12 Glossary

2.12.1 See Application Glossary (APP-005).

3 Road Drainage and Water Environment

3.1 Introduction

3.1.1 The following chapter details the assessment undertaken in order to quantify whether or not DC-24 results in any new or different likely significant when compared to those reported within the ES within Chapter 14 Road Drainage and the Water Environment (APP-057).

3.1.2 The assessment undertaken as part of this ES Addendum has followed the methodology set out in the Design Manual for Roads and Bridges (DMRB) LA 104 and LA 113 and any other relevant guidance as noted in the ES. This ES addendum details the methodology followed, summarises the legislation and policy framework relevant to the Road Drainage and the Water Environment assessment and describes the existing environment in the area surrounding the Project. It then considers the design, mitigation and residual effects of the Project, including taking account of relevant characteristics of the future baseline environment. Any key assumptions and limitations applicable to the assessment are also identified.

3.1.3 Where any of the sections of this addendum are unchanged compared to the ES, a cross reference has been provided and this document will highlight any changes or updates.

3.1.4 Any new or different likely significant effects upon Road Drainage and the Water Environment receptors are identified in Section 3.10 of this chapter.

3.1.5 The road drainage and water environment assessment is supported by a number of figures and Technical Appendices as listed on the contents page.

3.1.6 This chapter of the ES has been undertaken by competent experts with relevant experience and expertise. The professional qualifications and experience of the technical lead are summarised in ES Chapter 14 (APP-057).

3.2 Legislation and policy framework

Legislation

3.2.1 There have been no changes in the legislation and policy framework since the submission of the Environmental Statement Chapter 14 Road Drainage and the Water Environment (APP-057).

3.3 Assessment methodology

3.3.1 The methodology for the road drainage and water environment assessment follows the guidance set out within DMRB LA 104 (Highways England, 2020a1 and DMRB LA 113 (Highways England, 2020b)[2].

Scoping

3.3.2 There is no change from the ES Scoping Opinion provided in Appendix 4.2 (APP-149).

3.3.3 Where assessment has been undertaken in accordance with the Scoping Opinion, the wording of each point raised with a response and reference to the relevant ES section is provided. Where further discussion and/or an alternative approach has been agreed with the relevant stakeholders and the Planning Inspectorate, an explanation is provided.

Consultation

3.3.4 The design change has been presented to statutory consultees and other stakeholders. There are responses relevant to Road Drainage and the Water Environment. These comments are detailed in Change Application Consultation Report (Document Reference 8.2, CR1-007) and have been taken into account in this assessment

3.4 Assumptions and limitations

3.4.1 There are no changes to the assumptions and limitations presented in ES Chapter 14 Road Drainage and the Water Environment (Document Reference APP-057).

3.4.2 Details of the design change DC-24 are presented in Section 3 of the Change Application (Document Reference 8.1, CR1-002). The new section of cutting introduced by design change DC-24 has the potential to be, at a maximum, 6m deep. This is outside the LoDs assessed in ES Chapter 14 Road Drainage and the Water Environment (APP-057). Due to an evolving design, specific depths along the cutting length were not available, so, for the purpose of the Hydrogeological Impact Assessment and the Ground Water Dependant Terrestrial Ecosystem Assessment, a conservative assumption has been made that the cutting will be 6m deep on both sides of the alignment for the full length of the cutting. The cutting is located on the de-trunked existing A66 the locations of which is assumed to correspond to the A66 mainline equivalent chainage 45+130 to 45+950.

3.4.3 The nature of the design change does not increase flood risk extent of depth from any source than is reported in ES Appendix 14.2 Flood Risk Assessment and Outline Drainage Strategy. Therefore, this document has not been updated for design change DC-24.

3.5 Study area

3.5.1 There are no changes to the study area that is presented in ES Chapter 14 Road Drainage and the Water Environment (Document Reference APP-057).

3.6 Baseline conditions

3.6.1 There are no changes to the baseline that is presented in ES Chapter 14 Road Drainage and the Water Environment (Document Reference APP-057).

3.6.2 DC-24 is located in the Appleby to Brough scheme, to the eastern extent of the scheme, situated north of Flitholme Farm.

Future baseline

3.6.3 There are no changes to the future baseline that is presented in ES Chapter 14 Road Drainage and the Water Environment (Document Reference APP-057).

3.7 Summary of DCO Design Likely Significant Effects

Construction

3.7.1 ES Chapter 14 Road Drainage and the Water Environment (APP-057) reported that with suitable mitigation no residual likely significant effects on road drainage and the water environment receptors during construction of the scheme are expected.

Operation

3.7.2 ES Chapter 14 Road Drainage and the Water Environment (APP-057) reported that there is a significant risk from the scheme to some habitats with the potential to support GWDTEs. These are Flitholme Fen and Flitholme Woodland which have both been categorised as highly important habitat with the potential to be highly dependent on groundwater, and therefore classified as a very high value receptor. Due to the nature of the design at this location, it was not possible in the ES to guarantee that impacts on Flitholme Fen and Flitholme Woodland can be avoided. The impact on these habitats, that are of high dependency (very high value), is considered to be of major adverse impact magnitude and therefore of significant risk[1], which is considered to be significant.

3.8 Potential impacts

3.8.1 Potential impacts of the Project are described in this section prior to the implementation of the essential mitigation described in Section 3.8 below. The residual effects of the Project, taking into account this essential mitigation, are then described in Section 3.9.

Construction

Design and embedded mitigation

3.8.2 An Environmental Management Plan (EMP) (Application Document 2.7 Environmental Management Plan (Rev 4)), detailed in Chapter 2: The Project has been developed that contains measures to ensure compliance with relevant standards and legislation. The EMP sets out the environmental mitigation requirements and the Project level expectations on how the Project will be constructed. An EMP (Application Document 2.7 Environmental Management Plan (Rev 4)) has been developed that

[1] Residual risk is applied as per Appendix B in DMRB LA 113, Significant Risk is equivalent to a very large adverse effect and therefore significant

contains measures to ensure compliance with relevant standards and legislation. The EMP sets out the environmental mitigation requirements and also the Project level expectations on how the Project will be constructed.

3.8.3 Annex B7 (REP3-011) of the EMP presents the Ground and surface water management plan and outlines additional measures to mitigation effects on groundwater receptors during construction.

3.8.4 Given that changes in groundwater levels and flows may impact upon identified groundwater dependent features, such as aquifers and springs, mitigation has been included within the design to reduce the overall impact on receptors to negligible. Water will be retained within the same catchments and suitable replacements for features such as springs which could be lost or significantly impacted as a result of the Project will be provided, as committed to in the EMP REAC Table reference D-RDWE-09 (Application Document 2.7 Environmental Management Plan (Rev 4)).

Potential impacts before essential mitigation and enhancement

3.8.5 There are no changes to the potential impacts that are presented in ES Chapter 14 Road Drainage and the Water Environment (Document Reference APP-057).

3.8.6 Section 14.8.48 to 14.8.53 present potential impacts representative of design change DC-24 during construction. Therefore, the potential impacts that may arise as a result of design change DC-24 have been assessed within ES Chapter 14 Road Drainage and the Water Environment (Document Reference APP-057).

Operation

Design and embedded mitigation

3.8.7 Design and embedded mitigation considered for the operational phase of the proposed road scheme in this road drainage and water environment assessment addendum is the same as that used in the Environmental Statement Chapter 14 Road Drainage and the Water Environment (APP-057).

Potential Impacts

3.8.8 There are no changes to the potential impacts that are presented in ES Chapter 14 Road Drainage and the Water Environment (APP-057).

3.8.9 Section 14.8.99 to Section 14.8.101 of ES Chapter 14 Road Drainage and the Water Environment (APP-057) presents potential impacts representative of design change DC-24 during operation. Therefore, the potential impacts that may arise as a result of design change DC-24 have been assessed within ES Chapter 14 Road Drainage and the Water Environment (APP-057).

3.9 Essential mitigation and enhancement measures

Construction

Essential mitigation

3.9.1 DC-24 does not require essential mitigation measures additional to those presented in Section 14.9.2 to Section 15.9.3 of ES Chapter 14 Road Drainage and the Water Environment (APP-057)

Enhancement

3.9.2 There are no changes to the enhancement measures that are presented in ES Chapter 14 Road Drainage and the Water Environment (APP-057).

Operation

Essential mitigation

3.9.3 DC-24 does not require essential mitigation measures additional to those presented in Section 14.9.4 to Section 14.9.18 of ES Chapter 14 Road Drainage and the Water Environment (APP-057)

Enhancement

3.9.4 There are no changes to the enhancement measures that are presented in ES Chapter 14 Road Drainage and the Water Environment (Document Reference APP-057).

3.10 Assessment of likely significant effects

3.10.1 The Appendix 1 WFD Compliance Assessment Addendum confirms that the activities required for the construction and operation of DC-24 will not cause deterioration in the status of any WFD water bodies or prevent them from achieving either ‘Good Ecological Status’ or ‘Good Ecological Potential’ by 2021 or 2027. DC-24 is not anticipated to impact any new receptors, or to cause greater impact to those receptors already identified as being impacted in ES Chapter 14 Road Drainage and the Water Environment (APP-057).

3.10.2 The Appendix 4 Ground Water Dependant Terrestrial Ecosystem Assessment Addendum assesses the potential impacts of DC-24 on potential ground water dependant terrestrial ecosystems.

3.10.3 The Appendix 5 Hydrogeological Impact Assessment Addendum assesses the potential impacts of DC-24 during construction and operation to groundwater flows, levels, and quality.

3.10.4 As a result, there are no new likely significant effects for construction or operation for DC-24 for the Appleby to Brough scheme.

3.11 Monitoring

Construction

3.11.1 There are no changes to monitoring that is presented in ES Chapter 14 Road Drainage and the Water Environment (APP-057).

Operation

3.11.2 There are no changes to monitoring that is presented in ES Chapter 14 Road Drainage and the Water Environment (APP-057).

3.12 Glossary

3.12.1 See Application Glossary (APP-005).

1 DC-27

1.1 Introduction

1.1.1 This chapter assesses potential for design change DC-27 to introduce new or different likely significant effects upon the environment when compared to the findings of the original Development Consent Order (DCO) Environmental Statement (ES) (doc ref. 3.1 to 3.4, APP-043 to APP-233).

1.1.2 Only the environmental topics which were scoped in as requiring a full assessment are detailed within this document. For further information in regard to the rational as to why any environmental disciplines have been scoped out of requiring a full assessment, please refer to ES Addendum Volume I. Topics scoped in for further assessment in this chapter are Material Assets and Waste only.

1.1.1 DC-27 is summarised in Section 1 and detailed in Section 3 of the Change Application (Document Reference 8.1, CR1-002). An updated Project description is provided in Environmental Statement Addendum Volume III: Updated Project Description.

2 Material Assets and Waste

2.1 Introduction

2.1.1 The following chapter details the assessment undertaken in order to quantify whether or not DC-27 results in any new or different likely significant when compared to those reported within the ES Chapter 11, for Material Assets and Waste (APP-054).

2.1.2 The assessment undertaken as part of this ES Addendum has followed the methodology set out in the Design Manual for Roads and Bridges (DMRB) LA110 and any other relevant guidance. DMRB LA 110 and other relevant guidance is summarised in section 11.3 of ES Chapter 11 for Material Assets and Waste (APP-054). It details the methodology followed, summarises the legislation and policy framework relevant to the Material Assets and Waste assessment and describes the existing environment in the area surrounding the Project and the Appleby to Brough scheme (where the design change is located). It then considers the design, mitigation and residual effects of the Project and the Appleby to Brough scheme, including taking account of relevant characteristics of the future baseline environment. Any key assumptions and limitations applicable to the assessment are also identified.

2.1.3 Where any of the aforementioned sections are unchanged a cross reference back to the original ES has been provided and this document will highlight any changes or updates.

2.1.4 Any new or different likely significant effects during construction upon Material Assets and Waste receptors are identified in Section 2.10 of this chapter.

2.1.5 This chapter has been prepared by competent experts with relevant experience and expertise. The professional qualifications and experience of the technical lead are summarised in ES Chapter 11 Material Assets and Waste (APP-054).

2.2 Legislation and policy framework

2.2.1 The key legislation, national, regional and local policy; and other relevant policy and guidance applicable to the material assets and waste assessment is listed in Section 11.2 of ES Chapter 11. No updates to any of the aforementioned documents has occurred since the production of ES Chapter 11. Therefore all information detailed within Section 11.2 of ES Chapter 11 (APP-054) remains applicable to this assessment.

2.3 Assessment methodology

2.3.1 The methodology for the material assets and waste assessment follows the guidance set out within DMRB LA 110. The assessment methodology utilised for this addendum is the same as within ES Chapter 11, where it is detailed in Section 11.3.

Scoping

2.3.2 Table 11.4 of the Material Assets and Waste assessment within ES Chapter 11 (APP-054) sets out the key points from the Planning Inspectorate Scoping Opinion relevant to the Material Assets and Waste assessment and the design change. The full Scoping Opinion is provided in Appendix 4.2 (APP-149) of the ES. There has been no further scoping opinion received since the submission of the ES.

Consultation

2.3.3 The design change has been presented to statutory consultees and other stakeholders. These comments are detailed in the Change Application Consultation Report (Document Reference 8.2, CR1-007), however no specific comments in relation to Material Assets and Waste have been received.

2.4 Assumptions and limitations

2.4.1 Section 11.4 of ES Chapter 11 (APP-054) sets out the assumptions and limitations relevant to the assessment and the design change.

2.5 Study area

2.5.1 Section 11.5 of ES Chapter 11 (APP-054) sets out the study areas relevant to the assessment and the design change.

2.5.2 Study area 1 is the area within the Order Limits, as within these areas construction materials will be consumed. For the purpose of this material assets and waste assessment, Study area 1 now incorporates the change to the Order Limits for the design change. Study area 2 remains unchanged and is the area where the main construction materials will be sourced and construction waste will be treated or disposed of, and comprises waste infrastructure in the North East, the North West and Yorkshire and The Humber.

2.6 Baseline conditions

2.6.1 Section 11.6 of ES Chapter 11 (APP-054) sets out the Baseline Conditions relevant to the Material Assets and Waste assessment and the design change.

2.6.2 For the purpose of this material assets and waste assessment for the design change, the baseline conditions remain unchanged as they are still relevant. The design change is located in the Appleby to Brough scheme.

2.6.3 The baseline conditions relating to mineral safeguarding sites for the Appleby to Brough scheme are identified in Table 11.7 of the ES using information provided by Cumbria County Council during consultation.

Future baseline

2.6.4 Section 11.6.28 of the material assets and waste assessment (APP-054) sets out the future baseline relevant to the material assets and waste assessment and the design change.

2.7 Summary of DCO Design Likely Significant Effects

Construction

2.7.1 Section 11.9 of ES Chapter 11 (APP-054) sets out the construction material assets and waste assessment of likely significant effects. The potential sterilisation to mineral safeguarding sites for the Appleby to Brough scheme are assessed in Table 11.34 of the ES assessment using information provided by Cumbria County Council during consultation.

2.7.2 The reported effects remain valid for the introduction of the design change and no likely significant effects for construction are anticipated.

Operation

2.7.3 Section 11.9.34 of ES Chapter 11 (APP-054) sets out the operational material assets and waste assessment of likely significant effects. The reported effects remain valid for the introduction of the design change and no likely significant effects for operation are anticipated.

2.8 Potential impacts

2.8.1 Based on the project design and associated construction activities the design change has the potential to impact material assets and waste during both construction and operation. However the design change is unlikely to alter the conclusions of the likely significant effects assessment reported in Section 11.7 of the ES Chapter 11 (APP-054) during construction and operation.

2.8.2 The potential construction and operation impacts on material assets included in the assessment, as identified in DMRB LA 110, are:

- The sterilisation of mineral safeguarding sites and/or peat resources.
- The consumption of virgin materials.

2.8.3 The potential construction and operation impacts on waste included in the assessment, as identified in DMRB LA 110, are:

- The reduction in regional landfill capacity.
- The reduction in national landfill capacity.

Construction

Design and embedded mitigation

2.8.4 Sections 11.7.2 and 11.8.2 of the material assets and waste assessment (APP-054) set out the construction embedded design mitigation relevant to the material assets and waste assessment and the design change.

2.8.5 For the purpose of this material assets and waste assessment for the design change, the Design and embedded mitigation for construction remain unchanged as the changes are not of a size that alters the ES and the Environmental Management Plan (EMP) (Application Document 2.7 Environmental Management Plan (Rev 4)).

Potential Impacts before essential mitigation and enhancement

2.8.6 Section 11.7 of the material assets and waste assessment (APP-054) sets out the construction potential impacts relevant to the material assets and waste assessment and the design change.

2.8.7 For the purpose of this material assets and waste assessment for the design change, the Potential Impacts before essential mitigation and enhancement for construction remain unchanged as the changes are not of a size that alters the ES and the EMP.

Operation

Design and embedded mitigation

2.8.8 Section 11.7.10 of the material assets and waste assessment (APP-054) sets out the operation embedded design mitigation relevant to the material assets and waste assessment and the design change.

2.8.9 For the purpose of this material assets and waste assessment for the design change, the Design and embedded mitigation for Operation remain unchanged as the changes are not of a size that alters the ES and the EMP.

Potential Impacts

2.8.10 Section 11.7.11 of the material assets and waste assessment (APP-054) sets out the operation potential impacts relevant to the material assets and waste assessment and the design change.

2.8.11 For the purpose of this material assets and waste assessment for the design change, the Potential Impacts for operation remain unchanged as the changes are not of a size that alters the ES and the EMP.

2.9 Essential mitigation and enhancement measures

Construction

Essential mitigation

2.9.1 No essential mitigation measures are proposed in addition to those reported in Section 11.8.45 of the material assets and waste assessment (APP-054).

Enhancement

2.9.2 No enhancement measures are proposed in addition to those reported in paragraphs Section 11.8.66 of the Material Assets and Waste assessment (APP-054).

Operation

Essential mitigation

2.9.3 No essential mitigation measures are proposed in addition to those reported in section 11.8.67 of the material assets and waste assessment (APP-054).

Enhancement

2.9.4 No enhancement measures are proposed in addition to those reported in paragraphs Section 11.8.67 of the Material Assets and Waste assessment (APP-054).

2.10 Assessment of likely significant effects

2.10.1 This section identifies whether or not there are any new or different likely significant effects upon material assets and waste as a result of DC-27.

Mineral Safeguarding Sites

2.10.2 The design change is located close to a Mineral Consultation Area (MCA) for sand and gravel as displayed in Figure 8. However there are no new likely significant effects during construction for the sterilisation of mineral safeguarding sites for DC-27 or the Appleby to Brough scheme as the design change would:

- The change to the Order Limits is minor when compared to the scheme as whole;
- Take land close to the existing A66, which land is unlikely to be suitable for mineral development; and
- Take land close to residential areas near Brough, which land is unlikely to be suitable for mineral development.

2.10.3 The potential sterilisation to mineral safeguarding sites for the Appleby to Brough scheme are assessed in Table 11.34 of the ES assessment (APP-054) using information provided by Cumbria County Council during consultation. A minor adverse impact was identified for the Appleby to Brough scheme for the sterilisation of mineral safeguarding sites. The design change DC-27 does not give cause to alter this assessment. Therefore this minor adverse impact would also be applied for the design change and would not represent a likely significant effect.

2.10.4 Therefore, there are no new or different likely significant effects anticipated during construction or operation as a result of DC-27.

2.11 Monitoring

Construction

2.11.1 Monitoring methodologies described in Section 11.10.1 of ES Chapter 11 (APP-054) are considered appropriate and are not affected by the design change.

Operation

2.11.2 Monitoring methodologies described in Section 11.10.4 of ES Chapter 11 (APP-054) are considered appropriate and are not affected by the design change.

2.12 Glossary

2.12.1 See Application Glossary (APP-005).

1 DC-28

1.1 Introduction

1.1.1 This chapter assesses potential for design change DC-28 to introduce new or different likely significant effects upon the environment when compared to the findings of the original Development Consent Order (DCO) Environmental Statement (ES) (doc ref. 3.1 to 3.4, APP-043 to APP-233).

1.1.2 Only the environmental topics which were scoped in as requiring a full assessment are detailed within this document. For further information in regard to the rational as to why any environmental disciplines have been scoped out of requiring a full assessment, please refer to ES Addendum Volume I (Document Reference 8.4, CR1-016).

1.1.3 DC-28 is summarised in Section 1 and detailed in Section 3 of the Change Application (Document Reference 8.1, CR1-002). An updated Project description is provided in Environmental Statement Addendum Volume III: Updated Project Description.

2 Landscape and Visual Impacts

2.1 Introduction

2.1.1 The following chapter details the assessment undertaken in order to quantify whether or not DC-28 results in any new or different likely significant effects when compared to those reported within the ES Chapter 10 Landscape and Visual (APP-053).

2.1.2 This assessment undertaken as part of this ES Addendum follows the methodology set out in the Design Manual for Roads and Bridges (DMRB) LA 107 Landscape and Visual Effects and any other relevant guidance. It details the methodology followed, summarises the legislation and policy framework relevant to the Landscape and Visual assessment and describes the existing environment in the area surrounding the Project. It then considers the design, mitigation and residual effects of the Project, including taking account of relevant characteristics of the future baseline environment. Any key assumptions and limitations applicable to the assessment are also identified.

2.1.3 Where any sections are unchanged a cross reference back to the original ES has been provided and this document will only highlight any changes or updates.

2.1.4 Any new or different likely significant effects during construction upon Landscape or Visual receptors are identified in Section 2.10 of this chapter.

2.1.5 This chapter of the ES has been undertaken by competent experts with relevant experience and expertise. The professional qualifications and experience of the technical lead are summarised in ES Chapter 10 Landscape and Visual (APP-053).

2.2 Legislation and policy framework

Legislation

2.2.1 Please refer to ES Chapter 10 Landscape and Visual (APP-053) (section 10.3 Legislation and policy framework, para 10.3.1) for key legislation that is applicable to the assessment.

National level policy

National Policy Statement for National Networks

2.2.2 The primary basis for the Secretary of State deciding whether or not to grant a Development Consent Order (DCO) for the Project is the National Policy Statement for National Networks (NPSNN).

2.2.3 Please refer to 3.2 Environmental Statement Chapter 10 Landscape and Visual (section 10.3 Legislation and policy framework, para 10.3.2) (APP-053) for NSPNN applicable to the assessment.

Regional and local level policy

2.2.4 Other regional and local level policies have been considered as part of the landscape and visual assessment where these have informed the identification of receptors and resources and their sensitivity; the assessment methodology; the potential for likely significant environmental effects; and required mitigation. These policies are listed in ES Chapter 10 Landscape and Visual (APP-053) (section 10.3 Legislation and policy framework, para 10.3.5).

2.2.5 Please refer to ES Chapter 10 Landscape and Visual (APP-053) (section 10.3 Legislation and policy framework, para 10.3.7) for other relevant policy guidance.

2.3 Assessment methodology

2.3.1 The methodology for the landscape and visual assessment follows the guidance set out within DMRB LA107 Landscape and visual effects and LA104 Environmental assessment and monitoring.

2.3.2 The assessment methodology is set out in document ES Chapter 10 Landscape and Visual (APP-053) section 10.4 Assessment Methodology.

Scoping

2.3.3 Summary of Scoping Opinion and Response Appendix 10.1 Landscape and Visual Policy and Consultation Tables (APP-197) sets out the points from the Planning Inspectorate Scoping Opinion relevant to the landscape and visual assessment. The full Scoping Opinion is provided in ES Appendix 4.2: EIA Scoping Opinion (APP-149).

2.3.4 There are no changes to the scoping from the ES as noted above.

Consultation

2.3.5 The design change has been presented to statutory consultees and other stakeholders. There are responses relevant to Landscape and Visual. These comments are detailed in Change Application Consultation Report (Document Reference 8.2, CR1-007) and have been taken into account in this assessment.

2.4 Assumptions and limitations

2.4.1 The assumptions and limitations are set out in ES Chapter 10 Landscape and Visual (APP-053) section 10.5 Assumptions and Limitations.

2.5 Study area

2.5.1 The study area is set out in ES Chapter 10 Landscape and Visual (APP-053) Section 10.6 Study area.

2.6 Baseline conditions

2.6.1 The design changes are located in the Broad Character Area (BCA) Bowes and adjacent to BCA Lower Greta. It is these landscape character types

that could be affected by the design change. The selected viewpoints (VP) that could be affected by the design changes are VP7.7, VP7.7A and VP7.7B. The baseline conditions for both landscape and visual receptors are set out in ES Chapter 10 Landscape and Visual (APP-053) (section 10.7 Baseline conditions, para 10.7.271 – 10.7.353).

2.7 Summary of DCO Design Likely Significant Effects

Construction

Construction Landscape Effects

2.7.1 Within the Bowes Bypass scheme, the only significant effects on landscape receptors during construction are the moderate adverse effects anticipated during construction for the Urban Areas Bowes BCA. This is not within the vicinity of the design change and therefore will not be impacted by it. There are no other significant effects anticipated during construction for landscape receptors.

2.7.2 The full assessment for construction effects is set out in ES Appendix 10.5 Schedule of Landscape Effects (APP-201), para 10.5.2 Table 1.

Construction Visual Effects

2.7.3 Within the Bowes Bypass scheme, there are large adverse visual effects anticipated during construction from Viewpoints 7.7, 7.7A and 7.7B

2.7.4 The full assessment for construction visual effects is set out in ES Appendix 10.6 Schedule of Visual Effects (APP-202), para 10.6.2 Table 1.

Operation

Operation Landscape Effects Year 1

2.7.5 Within the Bowes Bypass scheme there are no significant effects anticipated in operation for landscape receptors.

2.7.6 The full assessment for operational landscape effects is set out in ES Appendix 10.5 Schedule of Landscape Effects (APP-201), para 10.5.3 Table 2.

Operation Visual Effects Year 1

2.7.7 Within the Bowes Bypass scheme there is a significant large adverse operational effect anticipated from Viewpoint 7.7 at Year 1 and significant moderate adverse effects from Viewpoints 7.7A and 7.7B.

2.7.8 The full assessment in operation for visual effects is set out in ES Appendix 10.6 Schedule of Visual Effects (APP-202), para 10.6.3 Table 2.

Operation Landscape Effects Year 15

2.7.9 There are no residual significant effects anticipated in operation for landscape receptors within this scheme.

2.7.10 The full assessment for operational landscape effects is set out in ES Appendix 10.5 Schedule of Landscape Effects (APP-201), para 10.5.4 Table 3.

Operation Visual Effects Year 15

2.7.11 Within Bowes Bypass scheme there are significant moderate adverse operational effects anticipated from Viewpoints 7.7 and 7.7B.

2.7.12 The full assessment for operational visual effects is set out in ES Appendix 10.6 Schedule of Visual Effects (APP-202), para 10.6.4 Table 3.

2.8 Potential impacts

2.8.1 Based on the Project design and associated construction activities, the Project has the potential to impact upon landscape and visual during both construction and operation.

2.8.2 Potential impacts of the design change are described in this section prior to the implementation of the essential mitigation described in Section 2.5 below. The residual effects of the Project, taking into account this essential mitigation, are then described in Section 2.6.

Construction

Design and embedded mitigation

2.8.3 The landscape mitigation for the Project seeks to offset impacts on landscape character and visual impact. There are no proposed changes to the Embedded and Essential Mitigation and Enhancement Measures described in section 10.9 of Document 3.2 Environmental Statement Chapter 10 Landscape and Visual (APP-053) which are also indicated on Environmental Mitigation Maps (Application document 2.8, Figure 2.8.5) (APP-041).

2.8.4 No new design and embedded mitigation measures have been proposed in relation to the design change or to address the principles in the Application Document 5.11 Project Design Principles (Rev 4) in Table 4-10: Bowes Bypass Scheme Specific Design Principles.

Potential Impacts before essential mitigation and enhancement

2.8.5 The landscape mitigation measures, described in section 10.9 of Document 3.2 Environmental Statement Chapter 10 Landscape and Visual (APP-053), which are also indicated on Environmental Mitigation Maps (Application document 2.8, Figure 2.8.5) (APP-041) for the area around the East Bowes Overbridge, shows an ‘L’ shaped woodland strip to the west of the junction that ties into the existing field pattern and provides additional habitat. This would be impacted by the design change as it would be separated and lose its connectivity. The design change would also extend the proposed earthworks for the scheme into the adjacent field to the west of the overbridge to facilitate the field access.

Construction Landscape Effects

2.8.6 The design change will require the removal of several large field edge trees and a small section of field edge hedgerow to enable the construction of the new field access track to the west of the northern embankment leading up to the East Bowes Accommodation Overbridge.

2.8.7 This removal is unlikely to notably impact any of the surrounding landscape receptors due to the large number of large field edge trees in the immediate surroundings. The embankment for the field access will extend earthworks activity into the adjacent field to the west of the overbridge and as such the proposed environmental mitigation strategy will not be able to be implemented as previously shown. Based on the current environmental mitigation strategy there would be no screen planting proposed to the north of the field access track.

2.8.8 The loss of vegetation and extension of earthworks sit wholly within the Bowes landscape character area which has a medium sensitivity.

2.8.9 The design change would cause a small change in the valued field pattern, effectively removing one of the rectilinear fields that comprise this ordered landscape. Due to the degree of loss and the extent of the remaining rectilinear fields there would be no change to the magnitude of impact and therefore no change to the original assessment of effect predicted in document 3.4 4 Environmental Statement Appendix 10.5 Schedule of Landscape Effects (APP-201).

Construction Visual effects

2.8.10 The removal of field boundary trees to the north of the dual carriageway would alter the view from Viewpoint 7.7B. The DCO design has been assessed as causing a significant negative adverse effect on this viewpoint due to the elevated view of construction operations giving a moderate impact overall on a high sensitivity receptor resulting in a large adverse and therefore significant effect. The design change would not alter this assessment as the works involved in this change would not alter what has already been assessed.

2.8.11 The design change would not alter the expected effects on viewpoints 7.7 and 7.7A as they are located on the south of the dual carriageway and there would be no perceptible change to the view already assessed.

Operation

Design and embedded mitigation

2.8.12 No new design and embedded mitigation has been proposed in relation to the design change or to address the principles in Application Document 5.11 Project Design Principles (Rev 4) in Table 4-10 Bowes Bypass Scheme Specific Design Principles.

Potential Impacts Operation Landscape effects

2.8.13 Due to the modest scale of the removal of vegetation, and its influence on landscape character, there would be no change to the significance identified in the ES for landscape receptors due to this change at either year 1 or year 15.

Potential Impacts Operation Visual effects

2.8.14 The removal of field boundary trees to the north of the dual carriageway would alter the view from Viewpoint 7.7B. The DCO design has been assessed as causing a significant negative adverse effect on this viewpoint

at year 1. The design change would increase the significance of effect to large due to the tree removal. However, it would also constitute a significant effect and therefore not change the assessment conclusion.

2.8.15 At year 15 the magnitude of impact alters to moderate due to the tree removal balancing the positive effects of the mitigation measures, but due to the scale of the design change this would result in the level of overall assessment remaining the same as moderate and significant.

2.8.16 The design change would not alter the expected effects on viewpoints 7.7 and 7.7A as they are located on the south of the dual carriageway.

2.9 Essential mitigation and enhancement measures

Construction

Essential mitigation

2.9.1 No change from essential mitigation in ES Chapter 10 Landscape and Visual (APP-053) has been proposed.

Enhancement

2.9.2 No new enhancement measures have been proposed for this design change.

Operation

Essential mitigation

2.9.3 No change from essential mitigation in ES Chapter 10 Landscape and Visual (APP-053) has been proposed.

Enhancement

2.9.4 No new enhancement measures have been proposed for this design change.

2.10 Assessment of likely significant effects

2.10.1 This section identifies the new or different likely landscape and visual effects of the Project incorporating the design change that are predicted to be significant.

2.10.2 There is a slight change in the visual impact assessment due to this design change. The magnitude of impact at year 15 for the receptor at VP7.7B is predicted to be moderate rather than minor. This does not alter the residual effect which remains moderate and therefore significant.

Table 2-1: Summary of significant effects (construction)

Receptor	Attribute	Receptor sensitivity	Potential impact before essential mitigation	Essential mitigation/enhancement	Impact magnitude	Residual effect
Viewpoint 7.7B View from PRoW (footpath) no.6, looking south	Visual receptor relating to users of the PRoW	High	Moderate	Nothing additional proposed	Moderate	Large

Table 2-2: Summary of significant effects (operation year 15)

Receptor	Attribute	Receptor sensitivity	Potential Impact before essential mitigation	Essential mitigation/ enhancement	Impact magnitude	Residual effect
Viewpoint 7.7B View from PRoW (footpath) no.6, looking south	Visual receptor relating to users of the PRoW	High	Moderate	Nothing additional proposed	Moderate	Moderate

2.11 Monitoring

Construction

2.11.1 No new monitoring has been proposed for the design change. The existing measures in 2.7 Environmental Management Plan Annex B1 Outline Landscape and Ecological Management Plan (Rev 2) (REP6-005) would apply.

Operation

2.11.2 No new monitoring has been proposed for the design change. The existing measures in 2.7 Environmental Management Plan Annex B1 Outline Landscape and Ecological Management Plan (Rev 2) (REP6-005) would apply.

2.12 Glossary

2.12.1 See Application Glossary (APP-005).

3 Material Assets and Waste

3.1 Introduction

3.1.1 The following chapter details the assessment undertaken in order to quantify whether or not DC-28 results in any new or different likely significant when compared to those reported within the ES Chapter 11, for Material Assets and Waste (APP-054).

3.1.2 The assessment undertaken as part of this ES Addendum has followed the methodology set out in the Design Manual for Roads and Bridges (DMRB) LA 110 and any other relevant guidance. DMRB LA 110 and other relevant guidance is summarised in section 11.3 of ES Chapter 11 for Material Assets and Waste (APP-054). It details the methodology followed, summarises the legislation and policy framework relevant to the Material Assets and Waste assessment and describes the existing environment in the area surrounding the Project and the Bowes Bypass scheme (where the design change is located). It then considers the design, mitigation and residual effects of the Project, and the Bowes Bypass scheme, including taking account of relevant characteristics of the future baseline environment. Any key assumptions and limitations applicable to the assessment are also identified.

3.1.3 Where any of the aforementioned sections are unchanged a cross reference back to the original ES has been provided and this document will highlight any changes or updates.

3.1.4 Any new or different likely significant effects during construction upon Material Assets and Waste receptors are identified in Section 3.10 of this chapter.

3.1.5 This chapter has been prepared by competent experts with relevant experience and expertise. The professional qualifications and experience of the technical lead are summarised in ES Chapter 11 Material Assets and Waste (APP-054).

3.2 Legislation and policy framework

3.2.1 The key legislation, national, regional and local policy; and other relevant policy and guidance applicable to the material assets and waste assessment is listed in Section 11.2 of ES Chapter 11. No updates to any of the aforementioned documents has occurred since the production of ES Chapter 11. Therefore all information detailed within Section 11.2 of the ES Chapter 11 (APP-054) remains applicable to this assessment.

3.3 Assessment methodology

3.3.1 The methodology for the material assets and waste assessment follows the guidance set out within DMRB LA 110. The assessment methodology utilised for this addendum is the same as within ES Chapter 11, where it is detailed in Section 11.3.

Scoping

3.3.2 Table 11.4 of the Material Assets and Waste assessment within ES Chapter 11 (APP-054) sets out the key points from the Planning Inspectorate Scoping Opinion relevant to the Material Assets and Waste assessment and the design change. The full Scoping Opinion is provided in Appendix 4.2 (APP-149) of the ES. There has been no further scoping opinion received since the submission of the ES.

Consultation

3.3.3 The design change has been presented to statutory consultees and other stakeholders. These comments are detailed in the Change Application Consultation Report (Document Reference 8.2, CR1-007), however no specific comments in relation to Material Assets and Waste have been received.

3.4 Assumptions and limitations

3.4.1 Section 11.4 of ES Chapter 11 (APP-054) sets out the assumptions and limitations relevant to the assessment and the design change.

3.5 Study area

3.5.1 Section 11.5 of ES Chapter 11 (APP-054) sets out the study areas relevant to the assessment and the design change.

3.5.2 Study area 1 is the area within the Order Limits, as within these areas construction materials will be consumed. For the purpose of this material assets and waste assessment, Study area 1 now incorporates the change to the Order Limits for the design change. Study area 2 remains unchanged and is the area where the main construction materials will be sourced and construction waste will be treated or disposed of, and comprises waste infrastructure in the North East, the North West and Yorkshire and The Humber.

3.6 Baseline conditions

3.6.1 Section 11.6 of ES Chapter 11 (APP-054) sets out the Baseline Conditions relevant to the Material Assets and Waste assessment and the design change.

3.6.2 For the purpose of this material assets and waste assessment for the design change, the baseline conditions remain unchanged as they are still relevant. The design change is located in the Bowes Bypass scheme.

3.6.3 The baseline conditions relating to mineral safeguarding sites for the Bowes Bypass scheme are identified in Table 11.7 of the ES using information provided by Durham County Council during consultation.

Future baseline

3.6.4 Section 11.6.28 of the material assets and waste assessment (APP-054) sets out the Future baseline relevant to the material assets and waste assessment and the design change.

3.7 Summary of DCO Design Likely Significant Effects

Construction

3.7.1 Section 11.9 of ES Chapter 11 (APP-054) sets out the construction material assets and waste assessment of likely significant effects. The potential sterilisation to mineral safeguarding sites for the Bowes Bypass scheme are assessed in Table 11.34 of the ES assessment using information provided by Cumbria County Council during consultation.

3.7.2 The reported effects remain valid for the introduction of the design change and no likely significant effects for construction are anticipated.

Operation

3.7.3 Section 11.9.34 of ES Chapter 11 (APP-054) sets out the operational material assets and waste assessment of likely significant effects. The reported effects remain valid for the introduction of the design change and no likely significant effects for operation are anticipated.

3.8 Potential impacts

3.8.1 The design change relates to the realignment of local access road to be closer to the new dual carriageway. Based on the Project design and associated construction activities the design change has the potential to impact material assets and waste during both construction and operation. However the design change is unlikely to affect the material assets and waste impacts reported in Section 11.7 of the ES Chapter 11 (APP-054) during construction and operation.

3.8.2 The potential construction and operation impacts on material assets included in the assessment, as identified in DMRB LA 110, are:

- The sterilisation of mineral safeguarding sites and/or peat resources.
- The consumption of virgin materials.

3.8.3 The potential construction and operation impacts on waste included in the assessment, as identified in DMRB LA 110, are:

- The reduction in regional landfill capacity.
- The reduction in national landfill capacity.

Construction

Design and embedded mitigation

3.8.4 Sections 11.7.2 and 11.8.2 of the material assets and waste assessment (APP-054) set out the construction embedded design mitigation relevant to the material assets and waste assessment and the design change.

3.8.5 For the purpose of this material assets and waste assessment for the design change, the design and embedded mitigation for construction remain unchanged as the design changes are not of a size that alters the ES and the Environmental Management Plan (EMP).

Potential Impacts before essential mitigation and enhancement

3.8.6 Section 11.7 of the material assets and waste assessment (APP-054) sets out the construction potential impacts relevant to the material assets and waste assessment and the design change.

3.8.7 For the purpose of this material assets and waste assessment for the design change, the Potential Impacts before essential mitigation and enhancement for construction remain unchanged as the changes are not of a size that alters EMP.

Operation

Design and embedded mitigation

3.8.8 Section 11.7.10 of the material assets and waste assessment (APP-054) sets out the operation embedded design mitigation relevant to the material assets and waste assessment and the design change.

3.8.9 For the purpose of this material assets and waste assessment for the design change, the Design and embedded mitigation for Operation remain unchanged as the design changes are not of a size that alters the ES and the EMP.

Potential Impacts

3.8.10 Section 11.7.11 of the material assets and waste assessment (APP-054) sets out the operation potential impacts relevant to the material assets and waste assessment and the design change.

3.8.11 For the purpose of this material assets and waste assessment for the design change, the Potential Impacts for operation remain unchanged as the design changes are not of a size that alters the ES and the EMP.

3.9 Essential mitigation and enhancement measures

Construction

Essential mitigation

3.9.1 No essential mitigation measures are proposed in addition to those reported in Section 11.8.45 of the material assets and waste assessment (APP-054).

Enhancement

3.9.2 No enhancement measures are proposed in addition to those reported in paragraphs Section 11.8.66 of the Material Assets and Waste assessment (APP-054).

Operation

Essential mitigation

3.9.3 No essential mitigation measures are proposed in addition to those reported in section 11.8.67 of the material assets and waste assessment (APP-054).

Enhancement

3.9.4 No enhancement measures are proposed in addition to those reported in paragraphs Section 11.8.67 of the Material Assets and Waste assessment (APP-054).

3.10 Assessment of likely significant effects

3.10.1 This section identifies whether or not there are any new or different likely significant effects upon material assets and waste as a result of DC-28.

Mineral Safeguarding Sites

3.10.2 The design change relates to the realignment of local access road to be closer to the new dual carriageway. The design change is located close to a Mineral Safeguarding Area (MSA) for limestone. However there are no new likely significant effects during construction for the sterilisation of mineral safeguarding sites for DC-28 or the Bowes Bypass scheme with the design change due to the following reasons:

- The change to the Order Limits is minor when compared to the scheme as whole; and
- Take land close to the existing A66 which land is unlikely to be suitable for mineral development.

3.10.3 The potential sterilisation to mineral safeguarding sites for the Bowes Bypass scheme are assessed in Table 11.35 of the ES assessment (APP-054) using information provided by Durham County Council during consultation. A minor adverse impact was identified for the Bowes Bypass scheme for the sterilisation of mineral safeguarding sites. The design change DC-28 does not give cause to alter the assessment. This minor adverse impact would also be applied for the design change and would not represent a likely significant effect.

3.10.4 Section 11.9.5 of the material assets and waste assessment (APP-054) sets out the sensitivity of mineral safeguarding sites. Each mineral safeguarding site and allocation was considered to have a value (sensitivity) of Medium. Therefore the minor adverse for the design change would remain unchanged and would not represent a likely significant effect.

3.10.5 Overall there are no new or different likely significant effects anticipated during construction or operation as a result of DC-28.

3.11 Monitoring

Construction

3.11.1 Monitoring methodologies described in Section 11.10.1 of ES Chapter 11 (APP-054) are considered appropriate and are not affected by the design change.

Operation

3.11.2 Monitoring methodologies described in Section 11.10.4 of ES Chapter 11 (APP-054) are considered appropriate and are not affected by the design change.

3.12 Glossary

3.12.1 See Application Glossary (APP-005).

1 DC-31

1.1 Introduction

1.1.1 This chapter assesses potential for design change DC-31 to introduce new or different likely significant effects upon the environment when compared to the findings of the original Development Consent Order (DCO) Environmental Statement (ES) (doc ref. 3.1 to 3.4, APP-043 to APP-233).

1.1.2 Only the environmental topics which were scoped in as requiring a full assessment are detailed within this document. For further information in regard to the rational as to why any environmental disciplines have been scoped out of requiring a full assessment, please refer to ES Addendum I (Document Reference 8.4, CR1-016).Topics scoped in for further assessment in this chapter are Cultural Heritage and Material Assets and Waste.

1.1.3 DC-31 is summarised in Section 1 and detailed in Section 3 of the Change Application (Document Reference 8.1, CR1-002). An updated Project description is provided in Environmental Statement Addendum Volume III: Updated Project Description.

2 Cultural Heritage

2.1 Introduction

2.1.1 The following chapter details the assessment undertaken in order to quantify whether or not DC-31 results in any new or different likely significant effects when compared to those reported within the ES Chapter 8 Cultural Heritage (APP-051).

2.1.2 The assessment undertaken as part of this ES Addendum has followed the methodology set out in the Design Manual for Roads and Bridges (DMRB) LA106 and any other relevant guidance. It details the methodology followed, summarises the legislation and policy framework relevant to the Cultural Heritage assessment and describes the existing environment in the area surrounding the Project. It then considers the design, mitigation and residual effects of the Project, including taking account of relevant characteristics of the future baseline environment. Any key assumptions and limitations applicable to the assessment are also identified.

2.1.3 Where any of the aforementioned sections are unchanged a cross reference back to the original ES has been provided and this document will highlight any changes or updates.

2.1.4 Any new or different likely significant effects during construction upon Cultural Heritage receptors are identified in Section 2.10 of this chapter.

2.1.5 This chapter has been prepared by competent experts with relevant experience and expertise. The professional qualifications and experience of the technical lead are summarised in ES Chapter 8 Cultural Heritage.

2.2 Legislation and policy framework

2.2.1 The key legislation, national level policy, regional and local level policy; and other relevant policy and guidance applicable to the cultural heritage assessment is listed in Section 8.4 of the ES. No updates to any of the aforementioned documents has occurred since the production of the ES. Therefore, all information detailed within Section 8.4 remains applicable to this assessment.

2.3 Assessment methodology

2.3.1 The methodology for the Cultural Heritage assessment follows the guidance set out within DMRB LA 106 Cultural Heritage Assessment (Highways England, 2020) and the Chartered Institute for Archaeologists (CIfA) Standard and guidance for historic environment desk-based assessment (CIfA, 2020).

Scoping

2.3.2 ES Chapter 8 Cultural Heritage (APP-051), Table 8.7 sets out the key points from the Planning Inspectorate Scoping Opinion relevant to the assessment. The full Scoping Opinion is provided in Appendix 4.2 (APP-149) of the ES. There has been no further scoping opinion received since the submission of the ES.

Consultation

2.3.3 Design change has been presented to statutory consultees and other stakeholders. Responses relevant to the Cultural Heritage topic have been received from Historic England and the English Heritage Trust. These comments are detailed in the Change Application Consultation Report (Document Reference 8.2, CR1-007) and have been taken into account in this assessment.

2.4 Assumptions and limitations

2.4.1 No new assumptions or limitations apply to this assessment so those detailed in ES Chapter 8 Cultural Heritage (APP-051) are unchanged. This assessment relies on one of the assumptions made within the ES, which is that it is assumed that any Cultural Heritage resources within the Order Limits will be affected by the construction of the Project.

2.5 Study area

2.5.1 The study area considered for the Cultural Heritage assessment in the ES was 1km from the Order Limits for designated heritage resources and 300m from the Order Limits for non-designated heritage resources.

2.5.2 A 2km study area was used to identify designated heritage resources located within the 2m Digital Surface Model (DSM) Zone of Visual Influence (ZVI) and Historic Landscape Character Areas (HLCA).

2.5.3 No change has been made to the study area considered for this assessment.

2.6 Baseline conditions

2.6.1 The baseline conditions relevant to the locale of this design change can be found in the Stephen Bank to Carkin Moor section of ES Chapter 8 Cultural Heritage (APP-051), paragraphs 8.6.293-8.6.340. Specific elements relevant to the design change locale are described here.

2.6.2 A number of heritage resources of an uncertain date have been identified throughout the study area. These resources include slight but important features such as palaeochannels (09-0035) which could provide important evidence for past human activity associated with the Prehistoric (500,000BC-AD43) or Romano-British (AD43-AD410) periods – as well as more easily identified earthwork features.

2.6.3 Earthwork features identified include circular enclosures (09-0036 and 09-0044), which are indicative of possible Bronze Age (2,200BC-700BC) activity. Evidence for Medieval (AD1066-AD1540) activity within the study area could also be increased should the undated mounds identified by Wessex Archaeology during the AP & LiDAR survey of AD2020 (09-0031) be confirmed as pillow mounds. Serving as artificial warrens, pillow mounds are long, low, broadly cigar-shaped earthwork mounds – sometimes constructed in groups – built to farm rabbits. Permission to construct an artificial rabbit warren and farm rabbits for their fur and meat was granted via a licence (a ‘Right to Warren’) from the King. Those

charged with undertaking rabbit farming and maintaining the mounds were called 'Warreners'. As well as their distinctive form, physical evidence for possible pillow mounds can also be complemented by place name evidence, as shown by the proximity of 'Warrener Lane.'

2.6.4 As with almost all of Britain, the earliest observable change in cultural practice between the Neolithic (4,000BC–2,200BC) and Bronze Age in Yorkshire comes from a distinct change in burial practice. Neolithic Long Barrows, which housed the remains of groups of individuals, fall out of direct use and a practice of individual inhumations surmounted by circular burial mounds (barrows) is adopted. In a further change to funerary practice, grave goods – such as pottery, weapons, and other high-status objects – are also deposited with the deceased. As well as the advances in metallurgy, pottery typologies also change during this period; with insular British ceramic types replaced with the Beaker-type vessels of the pan-European ceramic tradition (Roskams, 2005)[1].

2.6.5 The AP & LiDAR assessment identified an example of possible Bronze Age activity identified within the study area lies located approximately 65 m south of the Roman Fort (09-0001) at Carkin. Comprising a series of ring ditches (09-0047) it is not yet understood if this feature is evidence of possible settlement activity – as some of the ditch features appear to overlap – or the possible remains of funerary or ritual monuments. The remains of a possible burnt mound (09-0020), dated to no later than the Bronze Age, were uncovered in trenching to the east of the fort at the site of a Romano-British roadside settlement (09-0020).

2.6.6 Evidence for Iron Age settlement within the study area can be found alongside the more visible remains of the later Roman Fort (09-0001). Although no longer visible as an earthwork, the remains of the settlement at Carkin Moor were identified through aerial photographs. The settlement site (09-0001) comprises a rectangular enclosure some 100 m by 75 m in size and, although recorded as 'Prehistoric', is thought to be of Iron Age date based on evidence provided by similar enclosures identified in other parts of north-eastern England (Historic England)[2]. This evidence suggests that the enclosure probably housed a farmstead comprising circular domestic buildings, stock pens and other structures, and small agricultural areas. Although their form is not confirmed, traces of internal features and a probable smaller, parallel enclosure have been noted at Carkin Moor.

2.6.7 The relationship between the Iron Age settlement (09-0001) and the Roman fort (09-0001) at Carkin is clearly one of great complexity and nuance. As is the possible relationship between the Roman fort (09- 0001) and Iron Age settlement (09-0001) with a second, smaller rectilinear enclosure (09-0012) located approximately 42 m to the northwest. Dating from the late Iron Age (100BC-AD43) to early Romano-British (AD43-

[1] Roskams, S. and Whyman, M. (2005) Yorkshire Archaeological Research Framework: Resource Assessment
[2] Historic England, (n.d.) Roman fort and prehistoric enclosed settlement 400m west of Carkin Moor Farm

AD410) transitionary period, it is possible that this enclosure (09-0012) could relate to either the Roman fort, the Iron Age settlement, or both.

2.6.8 A Roman road, the Street (00-0001), passes through Carkin Moor before proceeding further westward (Petts, 2006)[3]. The Roman Roads Research Association advise that the A66 follows the alignment of the Roman Road for over half of its route, and that the section of the A66 from Stephen Bank to Carkin Moor almost certainly overlays the original road (Haken, 2021)[4]. The Roman fort (09-0001) itself is set upon the summit of a small flat-topped hill alongside an existing Iron Age (800BC–AD43) settlement site (09-0001). Rectangular in shape, the fort measures 150m north-east to south-west by 132 m north-west to south-east. Clearly visible as earthworks, the north-eastern corner is the most well preserved and survives as a raised platform that extends up to 2 m high in places. Other defensive features, such as a ditch, have been identified on the northern edge of the fort and are thought to survive as below-ground remains to its south, where the degree of upstanding earthwork remains is limited. Other than their proximity to one another, the relationship between the Roman fort (09-0001) and the Iron Age settlement (09-0001) – and how this changed over time – is not fully understood.

2.6.9 Efforts to better understand the development of the Roman fort (09- 0001) have been made, and in AD2013 Oxford Archaeology North opened three test pits in its north-eastern corner (within the Scheduled area). The remains of an external cobbled surface placed directly on top of the natural geology was identified in Test Pit 14 while Test Pit 13 produced evidence of a substantial ditch cut into the sub-soil (Oxford Archaeology North, 2013)[5]. Several small sherds of abraded Romano-British pottery and ten fragments of a lava quern were recovered from the layer above the ditch. Test Pit 15 did not produce any archaeological evidence.

2.6.10 In AD2015 archaeological excavations at Mainsgill Farm, approximately 125 m west of the Roman fort (09-0001) on the south side of the A66, anticipated encountering the projected remains of The Street (00-0001) as it exited the fort en-route to Greta Bridge. While evidence for The Street (00-0001) was encountered, so was evidence for a previously unknown Romano-British roadside settlement (09-0020). The archaeological remains were accompanied by material culture deposits (comprising mostly pottery) and revealed six roadside enclosures – two of which had been walled – areas of separate cobbled surfaces distinct from The Street, the footing for a possible building, wheel ruts and drainage gullies, occupational refuse dumps and, most significantly, a fourth century pottery kiln comprising bowl, flue, and stokehole pit with a secondary flue exiting the site to the south (Northern Archaeology Associates, 2015)[6].

[3] Petts, D. and Gerrard, C. (2006) Shared Visions: The North-East Regional Research Framework for the Historic Environment
[4] Haken (2021) Notes on Roman Roads potentially impacted by the A66 NTP project
[5] Oxford Archaeology North (2013) A66 (Package A) Road Improvement Scheme, Greta Bridge to Scotch Corner Archaeological Archive Report
[6] Northern Archaeological Associates (2015) Carkin Moor Roman Fort to West Layton: Pipeline renewal

2.6.11 Northern Archaeological Associates, who conducted the excavation work, have interpreted the remains as an industrial centre[7] that was probably established as part of a roadside settlement, which itself may have incorporated the existing Iron Age (09-0001) settlement situated alongside the Roman fort (09-0001). The industrial centre at Mainsgill has provided "the only evidence of pottery making on the entire length of the Stainmore Pass between Catterick and Penrith,"[8] and probably extends further along The Street to both the west and east along the southern and northern sides of the A66.

2.6.12 Subsequent archaeological trenching in AD2022 (09-0020) identified numerous Romano-British features thought to be industrial in nature, including a series of pits, gullies, and ditch with multiple fills (containing charcoal, burnt stone and clay) interpreted as a kiln or furnace structure. Two further pits were discovered also with evidence for in-situ burning, both of which were interpreted as kilns. This programme of trenching also revealed the likely boundary ditch of the fort measuring 8.7 m wide though no evidence for a palisade was found. Other Romano-British features include a cobbled surface within a sharp cut, several characteristic V-shaped ditches and a possible 'dark earth' layer.

2.6.13 Geophysical survey undertaken between AD2020-AD2021 uncovered further evidence likely associated with the vicus, including a rectilinear anomaly immediately west of the Scheduled area as well as linear anomalies that are oriented south-west by north-east and clearly aligned with the footprint of the fort.

2.6.14 The network of former holloways, lanes and roads (for example, The Street (00-0001)) that connected the Medieval (AD1066-1540) settlements scattered round the edge of the study area, survived largely undisturbed into the early Post Medieval period. Between AD1555 and AD1835, the maintenance of roads was the responsibility of the local parish. By the later seventeenth century, however, many parishes were unable to maintain their roadways successfully because of the increased damage caused by larger volumes of wheeled traffic and greater use brought about by the changing economic profile of the country and north-east region.

2.6.15 In order to address the issue, the responsibility for managing and maintaining many of the major roads was assumed by Turnpike Trusts. Carkin (which was part of historic parish of Forcett until AD2015) was part of the Middleton Tyas Lane to Greta Bridge and Bowes Turnpike Trust. Established in AD1744 (Rosevar 2017)[9], the Trust managed the route of The Street (00-0001) from Scotch Corner, through Carkin Moor and Rokeby and on to the western boundary of Bowes parish; the approximate route of the A66 today. Besides the route of the road itself (00-0002), the only surviving remains of the original Post Medieval road network found within the study area is a milestone located beside the A66 close to Carkin Moor Roman Fort (09-0017). The milestone is recorded as being lost since

[7] ibid
[8] ibid
[9] Rosevar, A. (2017) Turnpike Roads in England and Wales

AD2007 by the Milestone Society (Moore, 2021)[10], meaning that it has not been possible to confirm their presence visually, rather than being no longer extant.

2.6.16 There is evidence to suggest that at least some of the areas of woodland located within the study area may have been actively managed during this period. Although currently confined to an area of plantation (09-0066) rather than natural woodland, the management of woodlands for pannage, hunting, and timber was often an integral part of the rural economy during the latter parts of the Medieval (AD1066- AD1540) period and, to a steadily reducing degree, during the Post Medieval – when the focus began to switch to private management linked to large, landed estates and sport rather than a companion to subsistence.

2.6.17 The route of The Street (000-01) has remained a key feature of the study area since the Romano-British (AD43-AD410) period. Its role as the primary conduit for east-west travel and trade has continued uninterrupted since this time. Furthermore, the alignment of the road as remained largely unchanged with the modern A66, and its later expansion during the late twentieth century, hardly deviating from its original course.

Future baseline

2.6.18 There are no changes to the future baseline, relevant to the design change, which have been identified since the submission of the ES (Chapter 8 Cultural Heritage, APP-051).

2.7 Summary of DCO Design Likely Significant Effects

Construction

2.7.1 Two heritage resources within the locale of the design change will be subject to permanent moderate adverse effects resulting from the construction of the Project. These effects are the result of permanent physical impacts to the resources as a result of construction activities and as a result of changes to their setting.

2.7.2 The Roman Fort and Prehistoric enclosed settlement 400m west of Carkin Moor Farm (09-0001; high value) is bisected by the course of the A66 which runs in cutting through the centre of the Roman fort, following the approximate line of the Roman road. The resource lies partially within the Order Limits and will experience permanent, physical construction impacts as a result of the Project. To the south of the current road corridor, a small section of the resource will be removed to enable the construction of the retaining wall, which will form the southern side of the improved road corridor. This wall will abut the remaining monument, creating a defined boundary for the resource and protecting it from subsequent encroachment and erosion from any future works carried out within the corridor. To the north, a small section from each corner immediately adjacent to the existing road corridor will be removed to facilitate the construction of the embankment. This will overlay the resource along the carriageway,

[10] Moore (2021) A66 NTP Project – Milestone Society: Interests

enabling the new road corridor to sit within a 'cutting' without further impacts to the scheduled area being incurred. All works will take place in areas of the monument which border the existing carriageway and may therefore have experienced previous impacts from previous phases of construction and maintenance of the A66.

2.7.3 The Project will result in permanent changes to the setting of the resource, as a result of the new, offline, section curving north immediately to the west. The Scheduled Monument is intrinsically linked to the course of the A66; a road of at least Roman date which passed directly through the Roman fort. The retention of the road as it passes through the fort enables that historic connection to continue. The original line of the road to the west will be retained as a local access road, however, the new offline section will alter the setting of the fort and change the course of the road as the primary route through the landscape surrounding the resource, a position it has maintained for nearly two millennia. A new access road will be constructed to the south of the resource, extending the route of Warrener Lane to the north-west, past the Scheduled Monument, intersecting with the original route of the A66 to the south of the new offline section. The new road will serve as access to four new balancing ponds which will be located to the southwest and north-east of the resource, introducing landscaped elements immediately adjacent to the southern part of the fort.

2.7.4 The combination of physical impacts from the construction of the Project and the changes to the asset's setting will, without mitigation, result in a moderate adverse impact, resulting in a moderate adverse significance of effect.

2.7.5 As outlined in ES Chapter 8 Cultural Heritage, section 8.8 (APP-051), a programme of archaeological mitigation will be put in place to ensure preservation by record of any archaeological remains within the footprint of the works. This preservation by record of any archaeological features will reduce the physical impacts on the resource alone from a moderate adverse impact to a minor adverse impact. However, the combination of impacts including changes to the resource's setting, outlined above, will result in a moderate adverse impact on this high value resource, resulting in a moderate adverse significance of effect.

2.7.6 A probable Roman roadside settlement has been identified to the west of Carkin Moor Roman fort, lying to the south of remains of the Roman road (09-0020). It is possible that these remains may be of schedulable quality and, as a result, it has been assessed as being of high value. Trial trenching evaluation has further confirmed the presence of archaeological remains in this area, suggesting a settlement which extended some way back from the Roman road and which may have also included industrial and/or craft areas, within the settlement. These, and previously identified features of the resource immediately south of the A66, lie within the Order Limits and will be removed by construction activities associated with the widening of the carriageway and construction of access road to the south (creation of verges, landscaping and laying of hardstanding). Without mitigation the result of the proposed works will be a moderate adverse impact on an asset of high value, generating a moderate adverse

significance of effect. The effect is considered to be moderate, as opposed to large, since the DCO design impacts only parts of the resource.

2.7.7 Following the implementation of the mitigation outlined in ES Chapter 8 Cultural Heritage, section 8.8 (APP-051), the high value of the resource means that the Project will still result in a moderate adverse effect, generating a moderate adverse significance of effect. The significance of effect may be lower if the site is subsequently demonstrated to be of moderate or lower heritage value, however as the extent of the settlement has yet to be fully defined it must be assumed to be of high value until shown to be otherwise.

Operation

2.7.8 No significant effects will occur during the operation phase of the Project.

2.8 Potential impacts

2.8.1 Based on the Project design and associated construction activities, the design change has the potential to impact upon Cultural Heritage during construction.

2.8.2 Potential impacts of the Project incorporating the design change are described in this section prior to the implementation of the essential mitigation described in Section 2.9 below. The residual effects of the Project, taking into account this essential mitigation, are then described in Section 2.10.

Construction

Design and embedded mitigation

2.8.3 No new design and embedded mitigation measures have been proposed In relation to the design change. Details of the design and mitigation relating to cultural heritage within the DCO design can be found in ES Chapter 8 Cultural Heritage (APP-051).

Potential Impacts before essential mitigation and enhancement

2.8.4 The ES Chapter 8 Cultural Heritage (APP-051) identified two likely significant effects within the locale of the design change, relating to the permanent loss of archaeological remains within the Order Limits.

2.8.5 The design change will not alter the assessment of physical impacts to the Scheduled Roman Fort and Prehistoric enclosed settlement 400m west of Carkin Moor Farm (09-0001) as the Limit of Deviation change to the Warrener Lane alignment will not extend north into the Scheduled area. There will also be no change to the assessment of the impact arising from the introduction of the new access road south of the Scheduled Monument, as the limit of deviation change neither removes nor adds a new element to the setting of the monument from that proposed within the DCO design. There will, therefore, be no change to the assessment of moderate adverse effect to the Scheduled Monument.

2.8.6 Although no change to the Order Limits is proposed in association with this design change, there will be an alteration of the arrangement of works required within and in the vicinity of the Romano-British roadside settlement (09-0020) identified immediately south of the existing A66 east of Mainsgill Farm. The design change will alter the footprint of the access road, built as an extension to the existing Warreners Lane to the south and west of the Scheduled Monument. The limit of deviation change will allow Warrener Lane to be moved northwards, closer to the A66, reducing the land required. This will mean a likely increase in impact to buried remains close to the existing road, but a potential reduction to the south, all within the same projected extent of the settlement. As construction will remain within the Order Limits, the worst-case assumption that there will be an impact on buried remains is maintained. The result of this is that there will be a change to the limit of deviation for the footprint of the access road, there will be no change to the significant effect assessed within ES Chapter 8 (APP-051).

Operation

Design and embedded mitigation

2.8.7 No essential mitigation measures are proposed in addition to those reported in Section 8.8 of the cultural heritage assessment (APP-051).

Potential Impacts

2.8.8 The operation of the Project will not introduce any new impacts than those assessed within the ES (APP-051).

2.9 Essential mitigation and enhancement measures

Construction

Essential mitigation

2.9.1 No change to the essential mitigation proposed in Section 8.8 of the ES (APP-051) is proposed.

Enhancement

2.9.2 No change to the enhancement measure proposed in Section 8.8 of the ES (APP-051) is proposed.

Operation

Essential mitigation

2.9.3 No change to the essential mitigation proposed in Section 8.8 of the ES (APP-051) is proposed.

Enhancement

2.9.4 No change to the enhancement measure proposed in Section 8.8 of the ES (APP-051) is proposed.

2.10 Assessment of likely significant effects

2.10.1 No likely significant effects have been identified in relation to the design change that are new or different to those reported in Section 8.9 of the ES (APP-051).

2.11 Monitoring

Construction

2.11.1 No new monitoring is proposed in relation to the design change. The existing measures proposed are laid out in the EMP (Application Document 2.7 Environmental Management Plan (Rev 4)).

Operation

2.11.2 There is no requirement to monitor Cultural Heritage resources during the operational phase.

2.12 Glossary

2.12.1 See Application Glossary (APP-005).

3 Material Assets and Waste

3.1 Introduction

3.1.1 The following chapter details the assessment undertaken in order to quantify whether or not DC-31 results in any new or different likely significant when compared to those reported within the ES Chapter 11, for Material Assets and Waste (APP-054).

3.1.2 The assessment undertaken as part of this ES Addendum has followed the methodology set out in the Design Manual for Roads and Bridges (DMRB) LA110 and any other relevant guidance. DMRB LA 110 and other relevant guidance is summarised in section 11.3 of ES Chapter 11 for Material Assets and Waste (APP-054). It details the methodology followed, summarises the legislation and policy framework relevant to the Material Assets and Waste assessment and describes the existing environment in the area surrounding the Project and the Stephen Bank to Carkin Moor scheme (where the design change is located). It then considers the design, mitigation and residual effects of the Project and the Stephen Bank to Carkin Moor scheme, including taking account of relevant characteristics of the future baseline environment. Any key assumptions and limitations applicable to the assessment are also identified.

3.1.3 Where any of the aforementioned sections are unchanged a cross reference back to the original ES has been provided and this document will highlight any changes or updates.

3.1.4 Any new or different likely significant effects during construction upon Material Assets and Waste receptors are identified in Section 3.10 of this chapter.

3.1.5 This chapter has been prepared by competent experts with relevant experience and expertise. The professional qualifications and experience of the technical lead are summarised in ES Chapter 11 Material Assets and Waste (APP-054).

3.2 Legislation and policy framework

3.2.1 The key legislation, national level policy, regional and local level policy; and other relevant policy and guidance applicable to the material assets and waste assessment is listed in Section 11.2 of ES Chapter 11. No updates to any of the aforementioned documents has occurred since the production of the ES Chapter 11. Therefore, all information detailed within Section 11.2 of ES Chapter 11 (APP-054) remains applicable to this assessment.

3.3 Assessment methodology

3.3.1 The methodology for the material assets and waste assessment follows the guidance set out within DMRB LA 110. The assessment methodology utilised for this addendum is the same as within ES Chapter 11, where it is detailed in Section 11.3.

Scoping

3.3.2 Table 11.4 of the Material Assets and Waste assessment within ES Chapter 11 (APP-054) sets out the key points from the Planning Inspectorate Scoping Opinion relevant to the Material Assets and Waste assessment and the design change. The full Scoping Opinion is provided in Appendix 4.2 (APP-149) of the ES. There has been no further scoping opinion received since the submission of the ES.

Consultation

3.3.3 The design change has been presented to statutory consultees and other stakeholders. These comments are detailed in the Change Application Consultation Report (Document Reference 8.2, CR1-007), however no specific comments in relation to Material Assets and Waste have been received.

3.4 Assumptions and limitations

3.4.1 Section 11.4 of ES Chapter 11 (APP-054) sets out the assumptions and limitations relevant to the assessment and the design change.

3.5 Study area

3.5.1 Section 11.5 of ES Chapter 11 (-054 sets out the study areas relevant to the assessment and the design change.

3.5.2 Study area 1 is the area within the Order Limits, as within these areas construction materials will be consumed. For the purpose of this material assets and waste assessment, Study area 1 now incorporates the change to the Order Limits for the design change. Study area 2 remains unchanged and is the area where the main construction materials will be sourced and construction waste will be treated or disposed of, and comprises waste infrastructure in the North East, the North West and Yorkshire and The Humber.

3.6 Baseline conditions

3.6.1 Section 11.6 of ES Chapter 11 (APP-054)) sets out the Baseline Conditions relevant to the Material Assets and Waste assessment and the design change.

3.6.2 For the purpose of this material assets and waste assessment for the design change, the baseline conditions remain unchanged as they are still relevant. The design change is located in the Stephen Bank to Carkin Moor scheme.

3.6.3 The baseline conditions relating to mineral safeguarding sites for the Stephen Bank to Carkin Moor scheme are identified in Table 11.7 of the ES assessment (APP-054) using information provided by North Yorkshire County Council during consultation.

Future baseline

3.6.4 Section 11.6.28 of the Material Assets and Waste assessment (APP-054) sets out the Future baseline relevant to the Material Assets and Waste assessment and the design change.

3.7 Summary of DCO Design Likely Significant Effects

Construction

3.7.1 Section 11.9 of ES Chapter 11 (APP-054) sets out the construction material assets and waste assessment of likely significant effects. The potential sterilisation to mineral safeguarding sites for the Stephen Bank to Carkin Moor scheme are assessed in Table 11.37 of the ES assessment using information provided by North Yorkshire County Council during consultation.

3.7.2 The reported effects remain valid for the introduction of the design change and no likely significant effects for construction are anticipated.

Operation

3.7.3 Section 11.9.34 of ES Chapter 11 (APP-054) sets out the operational material assets and waste assessment of likely significant effects. The reported effects remain valid for the introduction of the design change and no likely significant effects for operation are anticipated.

3.8 Potential impacts

3.8.1 Based on the Project design and associated construction activities the design change has the potential to impact material assets and waste during both construction and operation. However, the design change is unlikely to alter the conclusions of the likely significant effects assessment reported in Section 11.7 of the ES Chapter 11 (APP-054) during construction and operation.

3.8.2 The potential construction and operation impacts on material assets included in the assessment, as identified in DMRB LA 110, are:

- The sterilisation of mineral safeguarding sites and/or peat resources.
- The consumption of virgin materials.

3.8.3 The potential construction and operation impacts on waste included in the assessment, as identified in DMRB LA 110, are:

- The reduction in regional landfill capacity.
- The reduction in national landfill capacity.

Construction

Design and embedded mitigation

3.8.4 Sections 11.7.2 and 11.8.2 of the material assets and waste assessment (APP-054) set out the construction embedded design mitigation relevant to the material assets and waste assessment and the design change.

3.8.5 For the purpose of this material assets and waste assessment for the design change, the Design and embedded mitigation for construction remain unchanged as the changes are not of a size that alters the requirements proposed in the ES and the Environmental Management Plan (EMP).

Potential Impacts before essential mitigation and enhancement

3.8.6 Section 11.7 of the material assets and waste assessment (APP-054) sets out the construction potential impacts relevant to the material assets and waste assessment and the design change.

3.8.7 For the purpose of this material assets and waste assessment for the design change, the Potential Impacts before essential mitigation and enhancement for construction remain unchanged as the changes are not of a size that alters the requirements proposed in the ES and the EMP.

Operation

Design and embedded mitigation

3.8.8 Section 11.7.10 of the material assets and waste assessment (APP-054) sets out the operation embedded design mitigation relevant to the material assets and waste assessment and the design change.

3.8.9 For the purpose of this material assets and waste assessment for the design change, the Design and embedded mitigation for Operation remain unchanged as the changes are not of a size that alters the requirements proposed in the ES and the EMP.

Potential Impacts

3.8.10 Section 11.7.11 of the material assets and waste assessment (APP-054) sets out the operation potential impacts relevant to the material assets and waste assessment and the design change.

3.8.11 For the purpose of this material assets and waste assessment for the design change, the Potential Impacts for operation remain unchanged as the changes are not of a size that alters the requirements proposed in the ES and the EMP.

3.9 Essential mitigation and enhancement measures

Construction

Essential mitigation

3.9.1 No essential mitigation measures are proposed in addition to those reported in Section 11.8.45 of the material assets and waste assessment (APP-054).

Enhancement

3.9.2 No enhancement measures are proposed in addition to those reported in paragraphs Section 11.8.66 of the Material Assets and Waste assessment (APP-054).

Operation

Essential mitigation

3.9.3 No essential mitigation measures are proposed in addition to those reported in section 11.8.67 of the material assets and waste assessment (APP-054).

Enhancement

3.9.4 No enhancement measures are proposed in addition to those reported in paragraphs Section 11.8.67 of the Material Assets and Waste assessment (APP-054).

3.10 Assessment of likely significant effects

3.10.1 This section identifies whether or not there are any new or different likely significant effects upon material assets and waste as a result of DC-31.

Mineral Safeguarding Sites

3.10.2 The design change is located close to a Mineral Safeguarding Area (MSA) for limestone throughout the entire scheme as well as Sand and Gravel at Browson Bank farm, around Fox Well, north of New Lane. DC-31 could potentially impact on future extraction of the limestone resource. However there are no new likely significant effects during construction for the sterilisation of mineral safeguarding sites for DC-31 or the Stephen Bank to Carkin Moor scheme due to the following reasons:

- There is an overall reduction in land required.
- The land take is minor when compared to the scheme as whole and the changes are related to making Warriner Lane closer to the A66.
- The design change would take land close to the existing A66 that is unlikely to be suitable for mineral development.

3.10.3 The potential sterilisation to mineral safeguarding sites for the Stephen Bank to Carkin Moor scheme are assessed in Table 11.37 of the ES assessment (APP-054) using information provided by using information provided by North Yorkshire County Council during consultation. A minor adverse impact was identified for the Stephen Bank to Carkin Moor scheme for the sterilisation of mineral safeguarding sites. Therefore this minor adverse impact would also be applied for the design change and would not represent a likely significant effect. The design change DC-31 does not give cause to alter this assessment. Therefore, there are no new or different likely significant effects anticipated during construction or operation as a result of DC-31.

3.11 Monitoring

Construction

3.11.1 Monitoring methodologies described in Section 11.10.1 of ES Chapter 11 (APP-054) are considered appropriate and are not affected by the design change.

Operation

3.11.2 Monitoring methodologies described in Section 11.10.4 of ES Chapter 11 (APP-054) are considered appropriate and are not affected by the design change.

3.12 Glossary

3.12.1 See Application Glossary (APP-005).

A66 Northern Trans-Pennine Project
TR010062

8.3 Change Application – Appendix 1: WFD Compliance Assessment (Clean)

Planning Act 2008

Infrastructure Planning (Examination Procedure) Rules 2010

Volume 8

24 March 2023

1 WFD Compliance Assessment

1.1 Introduction

Background

1.1.1 This document reports on the compliance of the Project, updating as necessary any changes due to design change DC-04, with the objectives of the Water Framework Directive (WFD) 2000/60/EC as transposed in England and Wales via the Water Environment Regulations.

1.1.2 The Water Environment Regulations are described in Environmental Statement (ES) Chapter 14 Road Drainage and the Water Environment (Reference Document APP-057). The regulations set out several key objectives including:

- Preventing deterioration of the WFD status of waters
- Protecting, enhancing and restoring all bodies of surface water and groundwater
- Progressively reducing discharges of priority substances and ceasing, or phasing discharges, of priority hazardous substances for surface waters
- Ensuring progressive reduction of groundwater pollution
- Mitigating the effects of floods and droughts
- Ensuring sufficient supply of water. Regulation 5(2) (l) (iii) of the Infrastructure Planning Regulations 2009 (as amended) requires Nationally Significant Infrastructure Projects to provide an assessment of effects upon water bodies in a River Basin Management Plan (RBMP) alongside their application

1.1.3 The WFD compliance assessment aims to:

- Identify water bodies in a River Basin Management Plan (RBMP) that are of relevance to the scheme
- Assess the potential for effects on water bodies
- Highlight any mitigation required to ensure compliance with WFD legislation, if necessary

Purpose

1.1.4 This report is an addendum to ES Appendix 14.1 WFD Compliance Assessment (APP-220). It provides an update to all relevant sections where necessary to encapsulate the design changes DC-04 and DC-24.

Design changes

1.1.5 Design changes with potential to change the outcomes of ES Appendix 14.1 WFD Compliance Assessment (Reference Document APP-220) include:

- DC-04
- DC-24

1.1.6 Summaries of these design changes is outlined in the following sections. Full details of the design changes are provided in the Proposed Changes Application document.

DC-04

1.1.7 Penrith to Temple Sowerby (change reference DC-04) pertaining to Watercourse Crossing Point (WCP) 3 (Light Water, Light Water Culvert), WCP 4 (Unnamed Tributary of the Eamont 3.3, Culvert 301) and WCP 6 (Unnamed Tributary of the Eamont 3.5, Culvert 302).

1.1.8 Hereafter, the watercourse crossing locations will be referred to as WCP 3 (Light Water Culvert), WCP 4 (Culvert 301) and WCP 6 (Culvert 302).

1.1.9 WCP 3 (Light Water Culvert), WCP 4 (Culvert 301) and WCP 6 (Culvert 302) are situated along tributaries of the River Eamont, between approximate National Grid Reference (NGR) NY 54929 28963 to NGR NY 56425 28876.

Works: WCP 3 (Lightwater Culvert)

1.1.10 The design is largely as described in paragraph 14.4.3.2, sub-heading WCP 3 (Lightwater Culvert) of ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223). The only design change is that the location of the Lightwater Maintenance Lane Culvert has been moved within the Order Limits.

1.1.11 Based on a worst-case scenario for culvert placement, it has been assumed that the Lightwater Maintenance Lane Culvert shall be located a short distance (approximately 50m) downstream of the proposed A66 carriageway alignment. This placement gives limited spacing between the A66 carriageway culvert and the Lightwater Maintenance Lane Culvert, as a result posing a more conservative placement scenario than was completed at DCO. The longitudinal length (10m) of the culvert and all other dimensions are unchanged from that reported in ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223). However, the assumed longitudinal length originally reported in the ES Appendix 14.1 WFD Compliance Assessment (Reference Document APP-220) was 9m, and consequently this has been updated in the assessment.

Works: WCP 4 (Culvert 301)

1.1.12 WCP 4 (Culvert 301) will be relocated approximately 11m north of the main A66 alignment, within the Order Limits. The design and dimensions of the culvert will otherwise remain unchanged from that presented in ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223).

Works: WCP 6 (Culvert 302)

1.1.13 WCP 6 (Culvert 302) will also be relocated approximately 4m north of the main A66 alignment, within the Order Limits The design and dimensions of the culvert will otherwise remain unchanged from that presented in ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223).

DC-24

1.1.14 Appleby to Brough (change reference DC-24) pertaining to additional cutting within groundwater body Eden Valley and Carlisle Basin Permo-Triassic sandstone aquifers.

Works

1.1.15 An underpass which leads under the new A66 proposed alignment and onto the de-trunked section of the realigned existing A66 to provide local access in both directions.

1.1.16 Design change DC-24 introduces a new section of cuttings due to the existing A66 changing alignment to bring it closer to the new A66 proposed alignment. The new section of cutting introduced by design change DC-24 has the potential to be, at a maximum, 6m deep. This is outside the Limits of Deviation (LoDs) assessed in ES Chapter 14 Road Drainage and the Water Environment (APP-057). Due to an evolving design, specific depths along the cutting length were not available, so a conservative assumption has been made that the cutting will be 6m deep on both sides of the alignment for the full length of the cutting. The cutting is located on the de-trunked existing A66 the locations of which is assumed to correspond to the A66 mainline equivalent chainage 45+130 to 45+950.

Assumptions and limitations

1.1.17 No further assumptions and limitations to those submitted in ES Appendix 14.1 WFD Compliance Assessment (Reference Document APP-220).

1.1.18 Since the submission of ES Appendix 14.1 WFD Compliance Assessment (Reference Document APP-220), Environment Agency Cycle 3 RBMP data is now available. Following review the updated data does not introduce new classifications to the waterbodies assessed. As a result, there is no change to the baseline reported in ES Appendix 14.1 WFD Compliance Assessment (Reference Document APP-220).

1.2 Methodology

1.2.1 See methodology included within the assessment to those submitted in ES Appendix 14.1 WFD Compliance Assessment (Reference Document APP-220).

1.3 Stage 1: Baseline assessment - screening

1.3.1 There are no changes to the baseline assessment (screening) presented in ES Appendix 14.1 WFD Compliance Assessment (Reference Document APP-220).

1.4 Stage 2: Preliminary assessment - scoping

1.4.1 There are no changes to the baseline assessment (screening) presented in ES Appendix 14.1 WFD Compliance Assessment (Reference Document APP-220).

DC-04

1.4.2 Due to the nature of design change DC-04, the proposals do not introduce a new or greater risk pathway to groundwater WFD bodies. As a result they are not considered to have a potential impact on groundwater WFD status. Therefore groundwater has been scoped out of the assessment of design change DC-04.

DC-24

1.4.3 Due to the nature of design change DC-24, the proposals do not introduce a new or greater risk pathway to surface water WFD bodies. As a result they are not considered to have a potential impact on surface water WFD status. Therefore surface water has been scoped out of the assessment of design change DC-24.

1.5 Water body baseline information

WFD surface water bodies

1.5.1 DC-04 is located in the Eamont (Lower) (GB102076070990) surface water body catchment.

Eamont (Lower) Catchment

1.5.2 Eamont (Lower) (GB102076070990) is classified as a river located within the Solway Tweed River Basin District (RBD). The modification classification is not designated as artificial or heavily modified.

1.5.3 In Cycle 3 the overall status was designated as ‘Good’ meeting the objective to achieve 'Good’ by 2021.

1.5.4 Ecological status is ‘Good’, with Fish, Physico-chemical quality elements, and Specific pollutants achieving ‘High’ statuses. Chemical status is ‘Fail’, with the Priority hazardous substances classification failing due to the presence of Mercury and Its Compounds and Polybrominated diphenyl ethers (PBDE).

1.5.5 There are five watercourses within this water body affected by the Project as summarised in Annex A1 Surface Water of ES Appendix 14.1 WFD Compliance Assessment (Reference Document APP-220):

- Unnamed Tributary of Light Water 3.1
- Light Water
- Unnamed Tributary of River Eamont 3.3
- Unnamed Tributary of River Eamont 3.4
- Unnamed Tributary of River Eamont 3.5

1.5.6 A minor correction to Table 5-1 of ES Appendix 14.1 WFD Compliance Assessment (Reference Document APP-220), is for Eamont (Lower), it is stated that the objective is ‘Good’ by 2027 but should read ‘Good’ by 2021. The minor correction does not impact on assessment.

1.6 Stage 3: Detailed impact assessment

WFD surface water bodies

Eamont (Lower) Catchment

1.6.1 ES Appendix 14.1 WFD Compliance Assessment (Reference Document APP-220) reports the Lightwater Maintenance Lane Culvert to facilitate an access road that will impact 9m of the watercourse (see 14.1.9.13 of the WFD Compliance Assessment (Reference Document APP-220)). Due to the change of Lightwater Maintenance Lane Culvert being no more than 10m in length, a further 1m is assessed for loss of habitat. The movement of this crossing from approximately 50m south is also assessed.

1.6.2 The additional 1m crossing length increases the footprint, shading and changes to hydromorphology leading to changes in river processes and habitats upstream and downstream.

1.6.3 The watercourse crossing design of WCP 4 (Culvert 301) and WCP 6 (Culvert 302) experiences no change from that assessed in ES Appendix 14.1 WFD Compliance Assessment (Reference Document APP-220, the design change DC-04 is a minor locational movement. Due to the magnitude of the design change, no further impacts to those reported in ES Appendix 14.1 WFD Compliance Assessment (Reference Document APP-220) are anticipated.

Surface water

1.6.4 There are no changes to the surface water assessment presented in ES Appendix 14.1 WFD Compliance Assessment (APP-220).

Additional mitigation requirements

Eamont (Lower) Catchment

1.6.5 With the exception of an amendment to Table 15 from ES Appendix 14.1 WFD Compliance Assessment (APP-220), as detailed in 1.6.8 of this assessment, there are no further changes to the additional mitigation requirements presented in ES Appendix 14.1 WFD Compliance Assessment (APP-220) and secured in the EMP (Application Document 2.7 Rev 4).

1.6.6 For WCP 3 (Lightwater Culvert) the mitigation and compensation measures required to achieve WFD compliance include:

- Hydraulic modelling to understand the impact on quantity and dynamics of flow
- Riparian tree planting and buffer strip creation
- Creation of a pool at the culvert outlet to dissipate flows
- A baffle installed downstream of the culvert

1.6.7 For WCP 4 (Culvert 301) the mitigation and compensation measures required to achieve WFD compliance, include:

- Riparian tree planting and buffer strip creation

1.6.8 The measures outlined above to achieve WFD compliance are secured in the EMP (Application Document 2.7 Rev 4) and design change DC-04

does not impact the effectiveness of, or prevent the project from meeting, the mitigation requirements outlined within both the ES Chapter 14 Road Drainage and the Water Environment (APP-057) and the EMP (Application Document 2.7 Rev 4).

1.6.9 Design change DC-04 requires the following additional mitigation, which will be secured via the next draft of the first iteration EMP:

- Table 15: Summary of the additional mitigation requirements for each water body catchment reports that the "Total length of adversely affected watercourse (m)" for the Eamont (Lower) is 190.3m. To account for the additional 1m in length of the watercourse crossing as a result of design change DC-04, this value is now 191.3m. Subsequently the "total length of additional mitigation required (m)" increases to 571.9m.

Residual adverse effects with risk of deterioration in status

Eamont (Lower) Catchment

1.6.10 With the exception of the need to account for the additional length of the watercourse crossing as part of design change DC-04, there are no further changes to the residual adverse effects with risk of deterioration in status presented in ES Appendix 14.1 WFD Compliance Assessment (APP-220).

1.6.11 To account for the additional 1m in length of the watercourse crossing as part of the design change DC-04, the "length of additional mitigation required" increases to 571.9m.

Residual adverse effects with risk of prevention of achievement of status objectives

1.6.12 There are no changes to the residual adverse effects with risk of prevention of achievement of status objectives presented in ES Appendix 14.1 WFD Compliance Assessment (APP-220).

Cumulative effects across water bodies

1.6.13 There are no changes to the cumulative effects across water bodies presented in ES Appendix 14.1 WFD Compliance Assessment (APP-220).

Targeted monitoring of effects on current status

1.6.14 There are no changes to the targeted monitoring of effects on current status presented in ES Appendix 14.1 WFD Compliance Assessment (APP-220).

Groundwater

1.6.15 Design change DC-24 includes an additional cutting that has the potential to impact the status of the groundwater body Eden Valley and Carlisle Basin Permo-Triassic sandstone aquifers.

1.6.16 Impacts from design change DC-24 on potential ground water dependent terrestrial ecosystems (GWDTEs) are assessed in ES Addendum Volume II Appendix 4 (CR1-017).

1.6.17 Following scoping of the effects reported in Section 14.1.4.17 of ES Appendix 14.1 WFD Compliance Assessment (APP-220), it is considered

that the scale of these likely effects in terms of spatial extent and depth. The zone of influence of the design presented ES Addendum Volume II Appendix 5 (CR1-017) has been calculated to be small and localised, and therefore is considered to have negligible effect upon the large regional scale of the groundwater body affected.

1.6.18 Pollution prevention controls, such as water with a higher risk of contamination which requires discharge (including groundwater pumped out of pilings during concrete pouring) will be contained and treated using appropriate measures such as coagulation of sediments, dewatering and pH neutralisation prior to discharge (MW-RDWE-01), and consultation with the Environment Agency on future risk assessments for activities that may impede groundwater flow and quality (MW-RDWE-11), are secured within the EMP (Application Document 2.7 Rev 4) which will mitigate any risk to the chemical status of groundwater bodies.

1.6.19 Therefore, the potential effects from design change DC-24 are not anticipated to pose any risk quantitatively or chemically to the status of the groundwater bodies, and thus the groundwater bodies have been scoped out of detailed impact assessment.

1.7 Conclusions

1.7.1 There are no changes to the conclusions presented in ES Appendix 14.1 WFD Compliance Assessment (APP-220).

1.7.2 The waterbodies impacted by design change DC-04 have been scoped against the available updated 2022 RBMP Reasons for Not Achieving Good Status data for the relevant surface water bodies.

1.7.3 Design changes DC-04 and DC-24 are not anticipated to cause greater or further risk than reported in ES Appendix 14.1 WFD Compliance Assessment (APP-220) in preventing the future achievement of status objectives of the water bodies referred to within this report, as reported in ES Appendix 14.1 WFD Compliance Assessment (APP-220). Therefore, the Project remains compliant against the statutory WFD objectives of those water bodies potentially affected.

Effects on current status

1.7.4 There are no changes to the effects on current status across water bodies presented in ES Appendix 14.1 WFD Compliance Assessment (APP-220).

Effects on future status

1.7.5 There are no further changes to the effects on achievement of future status objectives presented in ES Appendix 14.1 WFD Compliance Assessment (APP-220).

Project compliance

1.7.6 There are no changes to the Project compliance presented in ES Appendix 14.1 WFD Compliance Assessment (APP-220).

1.8 References

Environment Agency (2023). Catchment Data Explorer

Legislation Gov UK (2009). The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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8.3 Change Application – Appendix 2: Hydromorphology (Clean)

Planning Act 2008

Infrastructure Planning (Examination Procedure) Rules 2010

Volume 8

24 March 2023

1 DC-04

1.1 Introduction

1.1.1 This report is an addendum to Appendix 14.4 Hydromorphology Assessment of the Environmental Statement for the A66 Northern Trans-Pennine Project Development Consent Order (DCO) submission (June 2022); referred to hereafter as 'ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223)'.

1.1.2 Specifically, this addendum contains updated assessment following design changes to the Penrith to Temple Sowerby scheme (design change DC-04) pertaining to Watercourse Crossing Point (WCP) 3 (Lightwater, Lightwater Culvert), WCP 4 (Unnamed Tributary of the Eamont 3.3, Culvert 301) and WCP 6 (Unnamed Tributary of the Eamont 3.5, Culvert 302).

1.1.3 Hereafter, the watercourse crossing locations are referred to as WCP 3 (Lightwater Culvert), WCP 4 (Culvert 301) and WCP 6 (Culvert 302).

Legislation overview

1.1.4 There have been no changes in the over-arching legislation since the submission of ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223).

1.1.5 The Water Framework Directive (WFD) came into force in 2000. The WFD imposes legal requirements to protect and improve the water environment. All activities in the water environment need to take the WFD into account.

1.1.6 The Water Environment (WFD) (England and Wales) Regulations 2017, as amended by the Floods and Water (Amendment) (EU exit) Regulations 2019, are hereafter referred to as the WFD Regulations (or simply, 'the WFD') in this report.

Purpose of the assessment

1.1.7 This assessment determines the effects of the Project, updating as necessary any changes due to design change DC-04, on hydromorphological quality and identify any potential impacts that are likely to cause deterioration in the current status of the water bodies or could hinder the water bodies from meeting their WFD objectives in the future.

1.1.8 There have been no changes in the purpose since the submission of ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223).

1.2 Methodology

1.2.1 There have been no changes in the methodology since the submission of ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223).

1.2.2 Further hydromorphology survey to support the assessment of DC-04 have not been completed, due to the design changes being within DCO survey areas. Therefore, this addendum and its supporting assessments are reliant upon the DCO survey information. The survey information presented

in ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223) is considered to remain valid as there is no anticipated change to the baseline conditions.

Desk assessment

1.2.3 As per ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223), existing documentation and updated design details have been reviewed to understand the nature of the proposals.

Surveys

1.2.4 Hydromorphological surveys were carried out at each crossing site between 25 October and 5 November 2021 as per the hydromorphology survey method statement in Annex B of ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223). As noted earlier, this survey information is considered to remain valid as there is no anticipated change to the baseline conditions

1.2.5 Full survey data are presented in ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223) and have not been reproduced here.

Impact assessment

1.2.6 This hydromorphology assessment acts as supporting evidence to the Environment Statement (ES) Chapter 14: Road drainage and the Water Environment ((Reference Document APP-057)) and ES Appendix 14.1: WFD Compliance Assessment (Reference Document APP-220).

1.2.7 As per ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223), the knowledge gained from desk and site-based work, the potential impact of the scheme at WCP 3 (Lightwater Culvert), WCP 4 (Culvert 301) and WCP 6 (Culvert 302) been assessed using published methods. The following elements were focused on, to assess the impact and the hydromorphological quality elements of each water body:

- Flow processes
- Sediment movement
- Boundary conditions (channel bed and banks)
- Riparian zones
- Floodplains
- Downstream and catchment-channel connectivity
- The general form and function of the channel and near-channel zones
- The setting of the watercourse within the wider catchment.

1.2.8 A figure showing the DCO design and location for WCP 3 (Lightwater Culvert) is provided in Annex A to this document.

1.2.9 A figure showing the DCO design and location for WCP 4 (Culvert 301) is provided in Annex A to this document.

1.2.10 A figure showing the DCO design and location for WCP 6 (Culvert 302) is provided in Appendix A to this document.

Identification of mitigation measures

1.2.11 As per ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223), this assessment is based on a precautionary worst-case scenario. As such the mitigation identified in this assessment are required to mitigate the likely significant effects are based on this worst-case scenario. It may be the case that as detailed design of the Project evolves, it becomes apparent that a lesser form of mitigation is required to achieve the same outcome.

1.2.12 As such, the Environmental Management Plan (EMP) (Application Document 2.7 Rev 4) secures the 'maximum' extent of mitigation required (as identified in this assessment) but also, where appropriate, includes mechanisms (eg by way of further surveys or modelling) to establish, pre-construction and during detailed design, whether the identified mitigation can be refined such that a lesser extent is required to achieve the outcome reported in this assessment. The fundamental point is that the mitigation identified in this assessment is secured by the EMP (Application Document 2.7 Rev 4), where required to achieve the outcome reported in this assessment.

1.2.13 Any potentially significant hydromorphological impacts identified during this process are clearly documented within the assessment, with mitigation measures identified to offset said impacts.

1.2.14 The mitigation measures stipulated within the impact assessment are secured by the Project Design Principles (Application Document 5.11 Rev 4) and the EMP (Application Document 2.7 Rev 4), which are certified documents under the DCO.

1.3 Scheme description

Scheme overview and proposed works

Scheme location and existing conditions

1.3.1 WCP 3 (Lightwater Culvert), WCP 4 (Culvert 301) and WCP 6 (Culvert 302) are situated along tributaries of the River Eamont, between approximate National Grid Reference (NGR) NY 54929 28963 to NGR NY 56425 28876. A figure showing the locations of the watercourse crossings, along with photographs of the watercourses to be crossed, is provided in Annex A.

1.3.2 Further detail on existing conditions is provided under the baseline hydromorphology desktop study and site observation sub-headings (within this document).

Proposed works

WCP 3 (Lightwater Culvert)

1.3.3 The design is largely as described in paragraph 14.4.3.2, sub-heading WCP 3 (Lightwater Culvert) of ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223). The only design change is that the location of the location of the Lightwater Maintenance Lane Culvert has been moved within the Order Limits.

1.3.4 Assuming a worst-case scenario for culvert placement, it has been assumed that the Lightwater Maintenance Lane Culvert shall be located a short distance (approximately 50m) downstream of the A66 carriageway. This suggests that there will be limited distance between the A66 carriageway culvert and the Lightwater Maintenance Lane Culvert. The longitudinal length (10m) of the Lightwater Maintenance Lane Culvert, along with all other dimensions, are unchanged.

WCP 4 (Culvert 301)

1.3.5 WCP 4 (Culvert 301) will also be moved locally within the Order Limits. The design and dimensions of the culvert will otherwise remain unchanged from that presented in ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223).

WCP 6 (Culvert 302)

1.3.6 WCP 6 (Culvert 302) will also be moved locally within the Order Limits. The design and dimensions of the culvert will otherwise remain unchanged from that presented in ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223).

Baseline hydromorphology desktop study

Survey scope

1.3.7 There are no changes to the baseline survey scope presented in ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223).

Catchment and character

1.3.8 There are no changes to the baseline catchment and character presented in ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223).

Historical trend analysis

1.3.9 There are no changes to the baseline historical trend analysis presented in ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223).

Assessment of LiDAR data

1.3.10 There are no changes to the baseline assessment of LiDAR data presented in ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223).

Baseline hydromorphology site observations

1.3.11 There are no changes to the baseline hydromorphology site observation data presented in ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223).

1.3.12 The baseline hydromorphology site observation data from ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223) are reproduced in Table 1-1, for completeness.

Table 1 1: Baseline hydromorphology for each watercourse with a crossing point*

Crossing Point/watercourse	Site Observations
WCP 3 (Lightwater Culvert)	**Wider Catchment Characteristics:** The Lightwater rises to the east of Clifton and flows in a generally northern direction towards Lightwater Cottages and the existing A66. The watercourse is subsequently culverted beneath the A66 and continues to flow in a northern direction before discharging into the River Eamont. Photographs of the location are shown in Annex A: Site Photograph Locations (of Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223)). **Observed In-Channel Modifications:** • Culvert beneath the existing A66 **Typical Flow Biotopes:** The upstream limit of the survey on the Lightwater is located in Hallstead's Wood approximately 500m to the south of the existing A66. The channel planform exhibits good sinuosity within the woodland which provides the flow with localised diversity and results in biotopes ranging from runs to riffles. The channel gradient within the woodland is steep, providing the watercourse with sufficient energy to generate moderate flow-energy biotopes. Where Hallstead's Wood ends and the Lightwater flows through agricultural fields, the typical flow biotopes change. The channel sinuosity reduces significantly, and it is clear that the channel has been realigned historically. As such, flow diversity reduces compared to upstream reaches. The channel gradient remains steep and a densely vegetated river bed results in a prevalence of riffle flow biotopes. This flow environment continues down to the culvert beneath the A66. Downstream of the A66 Culvert, the flow velocities remain high in the channel, likely a result of the steep channel gradient and the high rate of discharge out of the culvert beneath the A66. As such the typical flow biotopes range from riffles to runs throughout this reach of the Lightwater. Flow diversity is varied as a result of a sinuous channel planform and woody material within the channel, generating localised flow heterogeneity. **Typical Bed Substrate:** The bed material in the Lightwater ranges from cobbles to gravels, in reaches of the watercourse both upstream and downstream of the A66 culvert. The moderate flow energy within the channel results in finer material being transported to downstream reaches, leaving behind a matrix of coarser material. As such, the upstream and downstream reaches of the Lightwater can be categorised as a sediment transfer. **Typical Riparian Composition:** The riparian zone of the Lightwater upstream of the existing A66 varies considerably. Upstream of the confluence with the Unnamed Tributary of the Lightwater 3.1, the riparian cover is poor with almost no vegetation lining the riverbanks. As a result, there has been significant poaching of the riverbanks by the sheep occupying the field. In the vicinity of the confluence and further downstream, riparian cover improves significantly, with an isolated woodland area surrounding the confluence. Downstream

Crossing Point/watercourse	Site Observations
	of this woodland, riparian cover remains significant. Downstream of the existing A66, a riparian strip of trees exists on both the left and right bank of the channel. These trees provide a source of large woody material to the channel, which generates localised variation in sediment and flow dynamics. Further downstream, the riparian zone of the watercourse is populated with a dense strip of rushes, as the inset floodplain becomes frequently wetted. **Typical Floodplain Connectivity:** The floodplain connectivity of the Lightwater upstream of the A66 varies significantly. The channel within Hallsteads Wood has good connectivity to the floodplain, with evidence of the woodland on the right bank being inundated with water. Further downstream where Hallsteads Wood ends, the floodplain connectivity reduces. The channel has clearly been managed on the approach to the A66 culvert, with evidence of the watercourse being straightened and artificially deepened to increase the capacity of the channel. As a result, water is less able to spill into the floodplain, leading to a degradation in floodplain connectivity. Downstream of the existing A66, the floodplain connectivity remans poor. It is clear that the river bed has incised downwards historically, as the riverbanks are 4-5m above the river bed level. Despite this, there is no evidence of 'J' shaped trees, a typical indicator of bed incision. It is likely therefore that the riparian strip of trees has recently been planted following gradual bed incision. Further downstream an inset floodplain has developed between the steep sided floodplain. It is likely that this becomes frequently wetted, as the presence of rushes indicate.
WCP 4 (Culvert 301)	**Wider Catchment Characteristics:** The Unnamed Tributary of the Eamont 3.3 to the west of Park Cottages rises on the hills to the west of Whinfell Forest, before flowing in a generally north westerly direction towards Whinfell Park Cottages. The Unnamed Tributary of the Eamont 3.3 is subsequently culverted beneath the A66, before continuing to flow in a northern direction towards the River Eamont. Photographs of the location are shown in Annex A: Site Photograph Locations (of Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223)). **Typical Flow Biotopes:** Upstream of the existing A66, there were no distinguishable flow biotopes in the channel. The shallow channel gradient combined with the overgrown nature of the channel has resulted in low in-channel flow energy. It is also likely that a partial blockage within the culvert barrel beneath the existing A66 backs water up and further reduces flow velocities within the channel. Downstream of the existing A66, the flow velocities within the channel increase significantly compared to upstream. A high rate of discharge out of the culvert outfall has created a scour pool in the immediate vicinity of the outfall. The steep channel gradient combined with the straight channel planform has provided the watercourse with increased flow velocities. As such, a continuous riffle has developed. Despite the straight channel planform, the flow exhibits sinuous characteristics, meandering across the bed of the channel.

Crossing Point/watercourse	Site Observations
	There is the potential for this sinuous flow to influence the straight channel planform gradually over time, and for the channel to adopt a more sinuous planform in the future. On the approach to the confluence with the River Eamont, flow velocities reduce as the channel gradient reduces and the flow is controlled by a culvert directly upstream of the confluence. The flow is relatively homogeneous between the existing A66 and the River Eamont due to a lack of channel sinuosity and woody material in the channel. **Typical Bed Substrate:** Upstream of the existing A66, the bed substrate is difficult to discern due to the overgrown nature of the channel. However, in areas where the bed is exposed, the bed substrate is predominantly fine material, ranging from sands to silts. This fine material has likely be input into the channel from the surrounding agricultural land during heavy rainfall events. Downstream of the existing A66, the typical bed substrate is coarse, ranging from cobbles to gravels. This is likely a result of the increased channel velocities, which transport finer material downstream to the confluence with the River Eamont leaving behind a matrix of coarser material. The surrounding floodplain and river channel have a large volume of very coarse cobbles and boulders, which are likely derived from glacial material deposited on the surrounding floodplain during the last glacial retreat. **Typical Riparian Composition:** Upstream of the existing A66, the riparian strip is overgrown, and comprised of long grasses. There is a distinct lack of riparian tree cover on both banks. Downstream of the existing A66, the riparian cover on both banks deteriorates significantly. As such, the structural integrity of the riverbanks has deteriorated, and riverbank erosion, undercutting and slumping is widespread between the existing A66 and the confluence with the Eamont. **Typical Floodplain Connectivity:** Upstream of the existing A66, the connectivity of the floodplain to the channel is reasonable. The presence of rushes on the floodplain suggests that the floodplain becomes regularly wetted during heavy rainfall events. Downstream of the existing A66, the connectivity of the floodplain to the channel becomes significantly degraded compared to the upstream reach. The channel has undergone straightening, which has resulted in bed incision and the channel bed level to drop. This is further compounded by the trapezoidal channel shape, which reduced the ability of water to spill into the floodplain. Floodplain connectivity improves on the approach to the confluence with the Eamont, as the channel gradient reduces and in channel velocities decrease. Bed incision is less widespread in this reach, and as such water is able to spill into the floodplain.
WCP 6 (Culvert 302)	**Wider Catchment Characteristics:** The Unnamed Tributary of the Eamont 3.5 of the River Eamont rises from a number of agricultural field drains to the east of Whinfell Park Cottages that converge to the south of the existing A66, before being

Crossing Point/watercourse	Site Observations
	culverted and discharging into the channel to the north of the A66. The watercourse flows in a generally northern direction before discharging into the River Eamont. Photographs of the location are shown in Annex A: Site Photograph Locations (of Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223)). **Typical Flow Biotopes:** The flow within the channel from the existing A66 culvert to downstream is very low, with gliding flows being the typical flow biotope. The low channel gradient combined with the densely vegetated riverbanks and river bed results in low flow velocities. On the approach to the confluence with the River Eamont, the channel becomes very steep within a confined gully as the Unnamed Tributary of the Eamont 3.5 approaches the River Eamont from the left bank river terrace. The elevation difference between the river bed of the Eamont and the bed of the Unnamed Tributary of the Eamont 3.5 is approximately 15-20m. **Typical Bed Substrate:** The typical bed substrate in the Unnamed Tributary of the Eamont 3.5 is varied, ranging from coarse material such as gravels and cobbles to very fine material such as silts. It is likely that some of the coarse material found on the river bed is derived from glacial material deposited on the surrounding floodplain during the last glacial retreat, rather than being transported by the watercourse. The observed flow energy in the channel was low upstream of the gully, which suggests that the watercourse is unable to move coarse cobbles and boulders except during extreme events. **Typical Riparian Composition:** Riparian cover on the Unnamed Tributary of the Eamont 3.5 is mixed. There is a distinct lack of riparian tree cover on both riverbanks, although the riverbanks and river bed are overgrown with dense vegetation. As such, access for livestock to the riverbanks is prevented, and poaching of the riverbanks has been mitigated against. On the approach to the confluence with the River Eamont, a thicket of woodland exists, which improves the condition of the riparian corridor. **Typical Floodplain Connectivity:** Floodplain connectivity of the watercourse is mixed. Upstream of the confluence with the River Eamont the Unnamed Tributary of the Eamont 3.5 is well connected to the floodplain. It is likely that the low flow energy within the channel is not sufficient to mobilise and erode the coarse bed substrate, preventing the riverbank elevation from decreasing gradually over time. On the approach to the confluence with the River Eamont, floodplain connectivity decreases significantly. The 15-20m drop in river bed elevation between the Unnamed Tributary of the Eamont 3.5 and the River Eamont results in the watercourse having no access to the floodplain, as flow cascades down the significant drop to the River Eamont.

*Reproduced from Table 4 ‘Baseline hydromorphology for each watercourse with a crossing point’ of Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223).

1.4 Assessment

Stage 1: Hydromorphology screening

1.4.1 As per ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223), the screening assessment aims to screen in any works that require WFD assessment and to identify which WFD water bodies are within and near to the proposed works.

1.4.2 As per ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223), drainage channel outfalls have been screened out of the assessment as their design is secured by the EMP (Application Document 2.7 Rev 4), which is a certified document under DCO. Where hard outfalls currently exist, new drainage channel outfalls will be tied into the existing structure. Drainage channels in areas with natural banks will be designed as a natural outfall (i.e. without hard bank protection).

1.4.3 As per ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223), WCP 3 (Lightwater Culvert), WCP 4 (Culvert 301) or WCP 6 (Culvert 302) fall within the Eamont (Lower) WFD water body, and the same study area. Accordingly, there are no changes to the hydromorphology screening assessment presented in ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223).

1.4.4 For completeness, Table 1-2 identifies which water bodies have been screened in or out of the assessment, along with the reason for this decision. Note, only water bodies with potential to be impacted by WCP 3 (Lightwater Culvert), WCP 4 (Culvert 301) or WCP 6 (Culvert 302) have been listed.

Table 1 2: Screening of each water body*

Water body/ies	Reason	Screening outcome
Eamont (Lower)	The proposed works for Penrith to Temple Sowerby are located within the waterbody catchment and therefore, direct impact on this waterbody is possible.	Screened In

*Reproduced from Table 5 ‘Screening of each water body’ of Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223).

1.4.5 The baseline status of the hydromorphology quality elements within the water bodies screened into the assessment are discussed in this section. If there is potential for the proposed works to cause deterioration in the status of a water body or prevent it from achieving its status objectives as defined in the Solway Tweed River Basin Management Plan 2021, the relevant water body and its WFD quality elements associated with hydromorphological function have been taken forward and considered further in the scoping assessment at Stage 2.

Baseline status of screened-in water bodies: Eamont (Lower)

1.4.6 There are no changes to the baseline status for the Eamont (Lower) presented in ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223).

Table 1 3: Current WFD status of water body catchments in Cycle 3 (2019)

Water body ID	Name of water body	Hydromorphological designation	Current ecological Status/potential (	Ecological objective
GB102076070990	Eamont (Lower)	Not designated artificial or heavily modified	Good	Good by 2027

*Reproduced from Environment Agency Catchment Data Explorer (2023) .

1.4.7 Table 1-4 describes the current status of the hydromorphological quality elements for the Eamont (Lower), according to WFD RBMP Cycle 3 (2019).

Table 1-4: Hydromorphological quality element of Eamont (Lower)*

Hydromorphological Quality Element	Current Status	Objective
Hydrological Regime	Supports Good	Supports Good by 2015
Morphology	Supports Good	Not available

*Reproduced from Environment Agency Catchment Data Explorer (2023)1.

1.4.8 Table 1-5 describes the Reasons for Not Achieving Good (RNAGS) for the Eamont (Lower) WFD water body, according to WFD RBMP Cycle 3 (2019).

Table 1-5: RNAGs of Eamont (Lower)*

SWMI	Activities	Classification Element
Measures delivered to address reason, awaiting recovery	Not applicable	Polybrominated diphenyl ethers (PBDE)
Measures delivered to address reason, awaiting recovery	Not applicable	Mercury and Its Compounds

*Reproduced from Environment Agency Catchment Data Explorer (2023)1.

Stage 2: Hydromorphology scoping

1.4.9 As per ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223), the scoping assessment identifies whether the water body catchment's quality elements, identified during the screening assessment, are at risk from the proposed works. The proposed development works are being appraised in terms of their impact on WFD status and objectives. If any quality elements are found to be at risk of detrimental impact, further assessment and/or mitigation may be required.

Hydromorphological quality elements of the Eamont (Lower) water body

1.4.10 As per ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223), WCP 3 (Lightwater Culvert), WCP 4 (Culvert 301) and WCP 6 (Culvert 302) are all within the Eamont (Lower) WFD water body.

1.4.11 The potential impacts of the proposed works at each identified crossing point will have on the Eamont (Lower) water body have been assessed. Where there is the potential for the proposed works to impact the

geomorphological condition of watercourses within the Eamont (Lower) water body, the requirement for further assessment is identified.

1.4.12 The design changes at WCP 3 (Lightwater Culvert), WCP 4 (Culvert 301) or and WCP 6 (Culvert 302) do not introduce new infrastructure with the potential to create new impacts. Therefore, there are no changes to the potential impacts, against the hydromorphological quality elements for the Eamont (Lower) WFD water body catchment, as presented in ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223).

1.4.13 Minor updates to the assessment in ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223) have been made in Table 1-6 for WCP 3 (Lightwater Culvert) to reflect changes to design as part of DC-04. The only change to design is the proposed location of the maintenance culvert on the Lightwater (updated assessment is underlined in Table 1-6).

Table 1-6: Assessment of works at WCP 3 on the Lightwater against the hydromorphological quality elements for the Eamont (Lower) WFD water body catchment*

WFD Quality Element	Current Status	Potential Impact	Further assessment and/or mitigation required?
Hydrology: Quantity and Dynamics of flow	Not assessed**	Areas of the Lightwater that are currently open channel will be culverted following the completion of the works, which will alter the dynamics of flow (eg, flow velocity, water depth, wetted area etc.) and result in loss of open channel. Downstream of the existing culvert, the channel exhibits relatively good flow diversity and morphological condition. This is significant given that the total length of the Lightwater that exhibits good morphological condition is limited. <u>The maintenance culvert shall be located ~50m downstream of the existing Lightwater culvert</u> outfall and will lead to further disruption in the dynamics of flow. The proposed works represents a total loss of 13.73m of this existing morphological functioning on the Lightwater, but it is likely that the influence on flow dynamics will extend further downstream than the culvert extension footprint as the channel adjusts to the modification. Therefore, this quality element will be considered as part of the impact assessment for the Eamont (Lower) water body.	Yes
Hydrology: Connection to ground water bodies	Not assessed**	The proposed works are unlikely to impact the existing connectivity of the watercourse to ground water bodies. The extension of impermeable surface along the watercourse accounts for just 0.7% of the total length of the Lightwater. As such, this reduction in connectivity between the watercourse and ground water bodies is not significant enough to impact	No

WFD Quality Element	Current Status	Potential Impact	Further assessment and/or mitigation required?
		ground water connectivity at the water body scale of the Eamont (Lower) water body water body. Therefore, this quality element will not be considered as part of the impact assessment.	
River Continuity	Not assessed**	The existing culvert already limits the conveyance of flow and sediment from upstream of the culvert to downstream reaches. Extending the length of this control on flow and sediment conveyance will not further restrict flow and sediment conveyance; the internal clear span and height of the proposed culvert extension to the north and south will match that of the existing Lightwater Culvert. The addition of a maintenance culvert ~50m downstream of the exiting Lightwater culvert outfall is unlikely to further limit the continuity of the Lightwater. The existing control on sediment and flow conveyance from upstream to downstream reaches will remain in position, and the addition of another structure with the same dimensions ~50m further downstream will not lead to increased restriction on longitudinal connectivity. As such, the proposed works are unlikely to lead to a degradation of the existing river continuity of the watercourse. Therefore, this quality element will not be considered as part of the impact assessment for the Eamont (Lower) water body.	No
Morphology: River width and depth	Not assessed**	The replacement of a section of open channel with a culvert will result in a change to the existing width and depth of the Lightwater. Following the completion of the culvert extension and the installation of the maintenance culvert ~50m further downstream, the width and depth of the channel will be dictated by the geometry of the culvert barrel. The existing morphological characteristics on the Lightwater immediately downstream of the culvert are diverse in terms of river width and depth and exhibit relatively good morphological condition. This is significant given that the total length of the Lightwater that exhibits good morphological condition is limited. The proposed works represent a total loss of 13.73m of natural river width and depth on the Lightwater but it is likely the influence on the river width and depth will extend further downstream than the culvert extension footprint as the channel adjusts to the modification. As a result, this represents a degradation of the river width and depth compared to the current conditions. Therefore, this quality element will be considered as	Yes

WFD Quality Element	Current Status	Potential Impact	Further assessment and/or mitigation required?
		part of the impact assessment for the Eamont (Lower) water body.	
Morphology: Structure and substrate of the river bed	Not assessed**	The culvert extension and installation of the maintenance culvert ~50m further downstream will result in a loss of river bed substrate. The existing structure and substrate of the river bed on the Lightwater immediately downstream of the culvert is relatively diverse and exhibits good morphological condition. This is significant given that the total length of the Lightwater that exhibits good morphological condition is limited. In addition, the installation of a new maintenance culvert will lead to further loss of natural river bed substrate. The proposed works represent a total loss of 13.73m of natural river bed on the Lightwater but it is likely that the influence on the structure and substrate of the river bed will extend further downstream than the culvert extension footprint and maintenance culvert footprint as the channel adjusts to the modification. Therefore, this quality element will be considered as part of the impact assessment for the Eamont (Lower) water body.	Yes
Morphology: Structure of the riparian zone	Not assessed**	The culvert extension and installation of the maintenance culvert will involve the replacement of the existing riparian zone with an embankment to support the existing A66. In addition, the replacement of a section of open channel with a culvert barrel will significantly reduce the connectivity of the watercourse to the riparian zone and surrounding floodplain. The existing structure of the riparian zone immediately downstream of the culvert is relatively good with a diversity of tree cover and understorey vegetation, and patches of wet woodland due to the good river-floodplain. connectivity. This is significant given that the total length of the Lightwater that exhibits a good riparian zone is limited. The proposed works represent a total loss of 13.73m of riparian zone along the channel on both, but it is likely the influence on the riparian zone will extend further downstream than the culvert extension footprint due to access requirements. This combined loss of riparian zone and floodplain connectivity will lead to a degradation of the riparian zone on the Lightwater. Therefore, this quality element will be considered as part of the impact assessment for the Eamont (Lower) water body.	Yes

*Reproduced from Table 12 'Assessment of works at Watercourse Crossing Point 3 on the Lightwater against the hydromorphological quality elements for the Eamont (Lower) WFD water body catchment' of Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223).

**Assessed to reflect previous design but not assessed to reflect updated design.

1.4.14 The only design change at WCP 4 (Culvert 301) is to the location of the structure within the Order Limits. Accordingly, no updates have been made for the assessment for WCP 4 (Culvert 301) to reflect changes to design. The (unchanged) DCO assessment from ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223) is reproduced in Table 1-7.

Table 1-7: Assessment of works at WCP 4 ((Culvert 301) against the hydromorphological quality elements for the Eamont (Lower) WFD water body catchment*

WFD Quality Element	Current Status	Potential Impact	Further assessment and/or mitigation required?
Hydrology: Quantity and Dynamics of flow	Not assessed**	This change in culvert gradient has the potential to increase flow velocity in the culvert barrel, at the culvert outfall, and in the channel downstream. The increase in flow velocity downstream of the proposed culvert outfall has the potential to initiate geomorphological change in the channel and on the floodplain; an increase in flow velocity can change sediment transfer dynamics, and rates of erosion and deposition. Given the already active nature of the Unnamed Tributary of the Eamont 3.3 and the steep channel gradient, this has the potential to impact the dynamics of flow. Therefore, this quality element will be considered as part of the impact assessment for the Eamont (Lower) water body.	Yes
Hydrology: Connection to ground water bodies	Not assessed**	The extension of impermeable surface along the watercourse accounts for 1.27% of the Unnamed Tributary of the Eamont 3.3, and an 0.46% of the entire WFD waterbody. As such, this reduction in connectivity between the watercourse and ground water bodies is not significant enough to impact ground water connectivity at the water body scale of the Eamont (Lower) water body water body. Therefore, this quality element will not be considered as part of the impact assessment for the Eamont (Lower) water body.	No
River Continuity	Not assessed**	The existing culvert already limits the conveyance of flow and sediment from upstream of the culvert to downstream reaches. Extending the length of this control on flow and sediment conveyance will not further restrict flow and	No

WFD Quality Element	Current Status	Potential Impact	Further assessment and/or mitigation required?
		sediment conveyance. As such, the proposed works are unlikely to lead to a degradation of the existing river continuity of the watercourse. Therefore, this quality element will not be considered as part of the impact assessment for the Eamont (Lower) water body.	
Morphology: River width and depth	Not assessed**	The replacement of a section of open channel with a culvert will result in a change to the existing width and depth of the Unnamed Tributary of the Eamont 3.3. Following the completion of the culvert extension, the width and depth of the channel will be dictated by the geometry of the culvert barrel. Despite this, the existing river width and depth on the Unnamed Tributary of the Eamont 3.3 immediately downstream of the existing culvert outfall is homogeneous and lacks geomorphological diversity. The small size of the watercourse further limits the diversity in channel geometry. As such, the proposed works are unlikely to lead to a degradation of the river width and depth. Therefore, this quality element will not be considered as part of the impact assessment for the Eamont (Lower) water body.	No
Morphology: Structure and substrate of the river bed	Not assessed**	The change in gradient in the proposed extended culvert barrel has the potential to increase flow velocity in the culvert barrel, at the culvert outfall, and in the channel downstream. Site observations identified that river bed erosion is prevalent in this downstream river reach, and as such it is likely that the proposed works will increase rates of river bed erosion. Further increases to flow velocity in the channel also has the potential to exacerbate bank erosion in the reach downstream of the culvert. The channel gradient sharply increases downstream of the culvert before entering the Eamont floodplain adjacent to the confluence. As such, the proposed works have the potential to impact the structure and substrate of the river bed. Therefore, this quality element will be considered as part of the impact assessment for the Eamont (Lower) water body.	Yes
Morphology: Structure of	Not assessed**	The extension of the culvert will involve the replacement of the existing riparian zone with an	No

WFD Quality Element	Current Status	Potential Impact	Further assessment and/or mitigation required?
the riparian zone		embankment to support the existing A66. In addition, the replacement of a section of open channel with a culvert barrel will reduce the connectivity of the watercourse to the riparian zone and surrounding floodplain. Despite the loss of riparian zone in the immediate vicinity of the culvert, the existing condition of the riparian zone is already degraded. Riparian tree cover is sparse or non-existent in some reaches of the Unnamed Tributary of the Eamont 3.3. In addition, the surrounding agricultural land use has led to a further degradation to the condition of the riparian zone. As such, the proposed works are unlikely to lead to a degradation of the structure of the riparian zone. Therefore, this quality element will not be considered as part of the impact assessment for the Eamont (Lower) water body.	

*Reproduced from Table 13 'Assessment of works at Watercourse Crossing Point 4 (Culvert 301) on the Unnamed Tributary of the Eamont 3.3 against the hydromorphological quality elements for the Eamont (Lower) WFD water body catchment' of Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223).

** Assessed to reflect previous design but not assessed to reflect updated design.

1.4.15 The only design change at WCP 6 (Culvert 302) is to the location of the structure within the Order Limits. No updates have been made for the assessment for WCP 6 (Culvert 302) to reflect changes to design. The (unchanged) DCO assessment from ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223) is reproduced in Table 1-8.

Table 1-8: Assessment of works at WCP 6 (Culvert 302) against the hydromorphological quality elements for the Eamont (Lower) WFD water body catchment*

WFD Quality Element	Current Status	Potential Impact	Further assessment and/or mitigation required?
Hydrology: Quantity and Dynamics of flow	Not assessed**	A 50m length of the Unnamed Tributary of the Eamont 3.5 that is currently open channel will be culverted following the completion of the works, which will alter the dynamics of flow (eg, flow velocity, water depth, wetted area etc.) on a local scale at the Unnamed Tributary of the Eamont 3.5. This accounts for 7.84% of the total watercourse length and 0.58% of the total waterbody length. Despite this, the existing flow	No

WFD Quality Element	Current Status	Potential Impact	Further assessment and/or mitigation required?
		dynamics on the watercourse lack geomorphological diversity and can be described as already degraded as a result of anthropogenic and agricultural pressures. The small size of the watercourse further limits flow dynamics. As such, the proposed works are unlikely to lead to a degradation of the quantity and dynamics of flow. Therefore, this quality element will not be considered as part of the impact assessment for the Eamont (Lower) water body.	
Hydrology: Connection to ground water bodies	Not assessed**	The extension of impermeable surface along the watercourse accounts for 7.84% of the Unnamed Tributary of the Eamont 3.5, and 0.58% of the entire WFD waterbody. As such, this reduction in connectivity between the watercourse and ground water bodies is not significant enough to impact ground water connectivity. Therefore, this quality element will not be considered as part of the impact assessment for the Eamont (Lower) water body.	No
River Continuity	Not assessed**	The existing culvert already limits the conveyance of flow and sediment from upstream of the culvert to downstream reaches. Extending the length of this control will not further restrict flow and sediment conveyance; the internal clear span and height of the proposed culvert extension to the north will match that of the existing culvert. As such, the proposed works are unlikely to lead to a degradation of the existing river continuity of the watercourse. Therefore, this quality element will not be considered as part of the impact assessment for the Eamont (Lower) water body.	No
Morphology: River width and depth	Not assessed**	he replacement of a section of open channel with a culvert will result in a change to the existing width and depth of the Unnamed Tributary of the Eamont 3.5. Following the completion of the culvert extension, the width and depth of the channel will be dictated by the geometry of the culvert barrel. Despite this, the existing river width and depth on the Unnamed Tributary of the Eamont 3.5 immediately downstream of the existing culvert outfall is homogeneous and lacks geomorphological	No

WFD Quality Element	Current Status	Potential Impact	Further assessment and/or mitigation required?
		diversity. The small size of the watercourse (approximate channel width of 1m) further limits the diversity in channel geometry. As such, the proposed works are unlikely to lead to a degradation of the river width and depth. Therefore, this quality element will not be considered as part of the impact assessment for the Eamont (Lower) water body.	
Morphology: Structure and substrate of the river bed	Not assessed**	The proposed works will involve the loss of a 50m length of open channel, which will result in a loss of river bed substrate. Moreover, there is the potential for river bed substrate change in the downstream reach of the Unnamed Tributary of the Eamont 3.5. Despite the loss of river bed substrate in the immediate vicinity of the culvert, the existing condition of the river bed is already degraded and lacks geomorphological diversity and character. Fine material and dense vegetation choke the river bed, resulting in homogeneous characteristics. As such, the proposed works are unlikely to lead to a degradation of the river structure and substrate of the river bed. Therefore, this quality element will not be considered as part of the impact assessment for the Eamont (Lower) water body	No
Morphology: Structure of the riparian zone	Not assessed**	The channel planform downstream of the existing structure is to be realigned approximately 10m to the west, and as such the culvert extension will need to dog leg to the west to ensure the culvert outfall is situated at the realigned channel. Despite the potential loss in riparian habitat and structure, the existing condition of the riparian zone on the Unnamed Tributary of the Eamont 3.5 is poor; the riverbanks lack riparian tree cover and are overgrown with grasses. As such, any modification to the riverbanks as a result of the channel realignment will not lead to a further degradation of the condition of the riverbanks. The proposed works are unlikely to lead to a degradation of the structure of the riparian zone. Therefore, this quality element will not be considered as part of the impact assessment for the Eamont (Lower) water body.	No

*Reproduced from Table 15 ‘Assessment of works at Watercourse Crossing Point 6 (Culvert 302) on the Unnamed Tributary of the Eamont 3.5 against the hydromorphological quality elements for the Eamont (Lower)

WFD water body catchment' of Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223).

** Assessed to reflect previous design but not assessed to reflect updated design.

Impact assessment

1.4.16 As per ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223), the Impact Assessment needs to consider if there is a pathway linking the pressure to the quality element. If there is no pathway there can be no impact on the quality element and there is no need for any further assessment of that quality element to be carried out. If there is a potential pathway the assessment must consider if the activity, and the pressure it creates, may cause deterioration of the quality element.

1.4.17 To effectively assess the potential impacts of the proposed works and decide upon suitable mitigation measures, a good understanding of the proposed scheme and design is required. At detailed design, should any revisions be made to the proposed works that could impact any of the WFD quality elements, the assessment must be checked and updated, as secured in the EMP (Application Document 2.7 Rev 4) D-RDWE-07.

1.4.18 Embedded design mitigation for all culverts, where appropriate, is as described in Table 3-2: 'Register of environmental actions and commitments' of the EMP (Application Document 2.7 Rev 4) reference D-RDWE-05, and comprises:

- Addition of flood alleviation culverts through the embankments to mitigate the disruption to river continuity for overland flow routes and in the channel
- Installation of green bank protection measures, such as scour protection to mitigate against the potential to changes of the geometry of the channel
- Further hydraulic modelling for realigned sections of channel, with geomorphological input to the detailed design (where applicable)
- Naturalisation of the culvert bed with appropriate riverbed substrate.
- Riparian planting to introduce natural source of woody material to the watercourse
- Measures to dissipate flow velocity at culvert outfalls, such as baffle structures inside the culvert or boulder pools at the entrance/exits of culverts
- Exploration of the potential to re-naturalise watercourses to
- increase sinuosity.

1.4.19 In addition, the following will be added to the next draft of the first iteration EMP:

- Where feasible during the detailed design, culvert structures will be tied in to the existing bed and bank elevations/profiles upstream and downstream of the culvert. Culvert embedment will be designed in line with CIRIA guidance (C786), in consultation with the Environment Agency.

1.4.20 These embedded mitigation measures are to apply to WCP 3 (Lightwater Culvert), WCP 4 (Culvert 301) and WCP 6 (Culvert 302).

1.4.21 The mitigation measures stipulated within the impact assessment are secured by the Project Design Principles (Application Document 5.11 Rev 4) and the EMP (Application Document 2.7 Rev 4), which are certified documents under DCO.

1.4.22 Design change DC-04 does not impact the effectiveness of, or prevent the Project from meeting, the mitigation requirements outlined within both the ES Chapter 14 Road Drainage and the Water Environment (Reference Document APP-057) and the EMP (Application Document 2.7 Rev 4).

Impact Assessment for the Eamont (Lower) water body

1.4.23 Table 1-1 provides an updated impact assessment to reflect the design changes for WCP 3 (Lightwater Culvert). The only change to design is the proposed location of the maintenance culvert on the Lightwater; underlined in Table 1-1.

1.4.24 Following assessment, required mitigation measures are largely unchanged from Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223). However, an additional mitigation measure has been added to the EMP, as outlined in paragraph 1.4.18. Mitigation measures are secured in the EMP (Application Document 2.7 Rev 4).

1.4.25 The only design change at WCP 4 (Culvert 301) is to the location of the structure within the Order Limits. Table 1-2 provides an updated impact assessment to reflect the design changes for WCP 4 (Culvert 301).

Table 1-1: Updated impact assessment for WCP 3 (Lightwater Culvert) and identification of mitigation measures*

WFD Quality Element	Pathway (direct / indirect / none)	Potential Impact/Mitigation Measures
Hydrology: Quantity and Dynamics of flow	Direct	**Permanent Impact:** Although there is an existing culvert (for the A66 road crossing) on the Lightwater, the proposed works will lead to further loss of open channel. The extension of the Lightwater culvert will alter the dynamics of flow (eg, flow velocity, water depth, wetted area) and result in loss of open channel. Downstream of the existing culvert, the channel exhibits relatively good flow diversity and morphological condition. This is significant given that the total length of the Lightwater that exhibits good morphological condition is limited. The addition of a maintenance culvert ~50m downstream of the existing Lightwater culvert outfall will lead to further disruption in the dynamics of flow. The proposed works represent a total loss of 13.73m of this existing morphological functioning on the Lightwater, but it is likely that the influence on flow dynamics will extend further downstream than the culvert extension footprint, as the channel adjusts to the modification. **Mitigation:** Embedded mitigation as per paragraph 1.4.18. To compensate for the loss of natural flow dynamics, diversity and loss of open channel on the Lightwater, riparian planting of tree cover is to be undertaken, and a buffer strip will be

WFD Quality Element	Pathway (direct / indirect / none)	Potential Impact/Mitigation Measures
		created in a currently degraded section of the watercourse. Where appropriate, and with consent from the regulator, the introduction of a dense riparian buffer strip along the riverbanks upstream of the structure will be instated; this will provide bank stability and a natural source of woody material to the watercourse. Naturally occurring woody material in the channel increases flow and sediment diversity, which encourages localised variation in flow velocities. This develops a natural pattern of river width and depth diversity over time, which contributes to naturally sinuous flow mechanics developing across a river reach. Where feasible, the natural introduction of woody material into the channel can be assisted by installing root wads or securing large wood at strategic locations along the Lightwater. Detailed designs are to be developed with geomorphology input and, as secured in the EMP, following consultation with the relevant catchment and risk management authorities. This would restore the potential loss of flow diversity as a result of the proposed culvert extension. The compensation will be applied over a length of river channel equivalent to twice that impacted by the proposed works.
Morphology: River width and depth	Direct	**Permanent Impact:** The replacement of a section of open channel with a culvert will result in a change to the existing width and depth of the Lightwater. Following the completion of the culvert extension and the installation of the maintenance culvert ~50m further downstream, the width and depth of the channel will be dictated by the geometry of the culvert barrel. The existing morphological characteristics on the Lightwater immediately downstream of the culvert are diverse in terms of river width and depth and exhibit relatively good morphological condition. This is significant given that the total length of the Lightwater that exhibits good morphological condition is limited. The proposed works represent a total loss of 13.73m of natural river width and depth on the Lightwater but it is likely the influence on the river width and depth will extend further downstream than the culvert extension footprint, as the channel adjusts to the modification. **Mitigation:** Embedded mitigation as per paragraph 1.4.18. To compensate for the loss of river width and depth on the Lightwater, riparian planting of tree cover will be undertaken, and a buffer strip will be created. The introduction of a dense riparian buffer strip along the riverbanks of both watercourses upstream of the structure will provide bank stability and potential recruitment of woody material to the channel. This aids the development of a more natural pattern of river width and depth over time. The natural introduction of woody

WFD Quality Element	Pathway (direct / indirect / none)	Potential Impact/Mitigation Measures
		material into the channel can be assisted by installing root wads or securing large wood at strategic locations along the Lightwater. The compensation will be applied over a length of river channel equivalent to twice that impacted by the proposed works. The exact location and design of the mitigation will be determined at the detailed design stage. Detailed designs are to be developed with geomorphology input and, as secured in the EMP, agreed following consultation with the relevant catchment and risk management authorities This will ensure no additional flood or erosion risk is introduced to the culvert.
Morphology: Structure and substrate of the river bed	Direct	**Permanent Impact:** The culvert extension and installation of the maintenance culvert ~50m further downstream will result in a loss of river bed substrate. The existing structure and substrate of the river bed on the Lightwater immediately downstream of the culvert is relatively diverse and exhibits good morphological condition. This is significant given that the total length of the Lightwater that exhibits good morphological condition is limited. In addition, the installation of a new maintenance culvert will lead to further loss of natural river bed substrate. The proposed works represent a total loss of 13.73m of natural river bed on the Lightwater but it is likely that the influence on the structure and substrate of the river bed will extend further downstream than the culvert extension footprint and maintenance culvert footprint as the channel adjusts to the modification. **Mitigation:** Embedded mitigation as per paragraph 1.4.18. To compensate for the loss of structure and substrate of the river bed on the Lightwater, riparian planting of tree cover will be undertaken, and a buffer strip will be created. The introduction of a dense riparian buffer strip along the riverbanks of both watercourses upstream of the structure will provide natural bank stability, and a potential source of woody material to the channel. The natural introduction of woody material into the channel can be assisted by installing root wads or securing large wood at strategic locations along the Lightwater. The compensation will be applied over a length of river channel equivalent to twice that impacted by the proposed works. The exact location and design of the mitigation will be determined at the detailed design stage. Detailed designs are to be developed with geomorphology input and, as secured in the EMP, agreed following consultation with the relevant catchment and risk management authorities. This will ensure no additional flood risk is introduced at the culvert.

WFD Quality Element	Pathway (direct / indirect / none)	Potential Impact/Mitigation Measures
Morphology: Structure of the riparian zone	Direct	**Permanent Impact:** The culvert extension and installation of the maintenance culvert will involve the replacement of the existing riparian zone with an embankment to support the existing A66. In addition, the replacement of a section of open channel with a culvert barrel will significantly reduce the connectivity of the watercourse to the riparian zone and surrounding floodplain. The existing structure of the riparian zone immediately downstream of the culvert is relatively good with a diversity of tree cover and understorey vegetation, and patches of wet woodland due to the good river-floodplain connectivity. This is significant given that the total length of the Lightwater that exhibits a good riparian zone is limited. The proposed works represent a total loss of 13.73m of riparian zone along the channel on both river-floodplain connectivity and the riparian zone. **Mitigation:** Embedded mitigation as per paragraph 1.4.18. To compensate for the loss of structure of the riparian zone on the Lightwater, riparian planting of tree cover will be undertaken, and a buffer strip will be created. On the Lightwater, the most suitable location for this is the river reach upstream (south) of the existing A66 culvert to Hallsteads Wood, 200m upstream. Establishing a buffer strip on the left and right bank floodplain will provide additional riparian habitat benefits and improve geomorphological function. Planting riparian woodland in this reach will compensate for the degradation of riparian habitat associated with the proposed culvert extension. Moreover, riparian planting in this reach will provide geomorphological benefits, such as bank stability and the potential improved floodplain connectivity. The compensation will be applied over a length of river channel equivalent to twice that impacted by the proposed works. The exact location and design of the mitigation will be determined at the detailed design stage. Detailed designs are to be developed with geomorphology input and, as secured in the EMP, agreed following consultation with the relevant catchment and risk management authorities. This will ensure no additional flood risk is introduced at the culvert.

*Adapted from Table 17 ‘Impacts and mitigation measures of Watercourse Crossing Point 3 (Lightwater Culvert)’ of Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223) and updated to reflect design changes.

1.4.26 The only design change at WCP 4 (Culvert 301) is to the location of the structure within the Order Limits. Table 1-2 provides an updated impact assessment to reflect the design changes for WCP 4 (Culvert 301).

1.4.27 Following assessment, required mitigation measures are largely unchanged from Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223). However, an additional mitigation measure has been added to the EMP, as outlined in paragraph 1.4.18. Mitigation measures are secured in the EMP (Application Document 2.7 Rev 4).

Table 1-2: Updated impact assessment for WCP 4 (Culvert 301) and identification of mitigation measures*

WFD Quality Element	Pathway (direct / indirect / none)	Potential Impact/Mitigation Measures
Hydrology: Quantity and Dynamics of flow	Direct	**Permanent Impact:** The proposed culvert gradient has the potential to increase flow velocity in the culvert barrel, at the culvert outfall, and in the channel immediately downstream. The increase in flow velocity downstream of the proposed culvert outfall has the potential to initiate geomorphological change in the channel and on the floodplain; an increase in flow velocity can change sediment transfer dynamics, and rates of erosion and deposition. Given the already active nature of the Unnamed Tributary of the Eamont 3.3 and the steep channel gradient, this has the potential to impact the dynamics of flow. **Mitigation:** Embedded mitigation as per paragraph 1.4.18. Specifically, this will involve: • Riparian tree planting and buffer strip creation • Creation of a pool at the culvert outlet to dissipate flows • A baffle installed both inside and downstream of the culvert, with the positions and specification confirmed at detailed design Detailed designs are to be developed with geomorphology input and, as secured in the EMP, agreed following consultation with the relevant catchment and risk management authorities. Hydraulic modelling will be needed to identify any change in flow velocity in the channel downstream of the culvert outlet as a result of the proposed works. Hydromorphic interpretation of modelling results will need be carried out to understand impacts on river process, such as erosion. If an increase in velocity that has the potential to increase erosion is identified, then measures to mitigate this impact will be required. Further details on the options are given below. The creation of a buffer strip and riparian planting will increase the structural integrity of the riverbanks compared to existing, which will increase resistance to riverbank erosion. The introduction of a dense riparian buffer strip along the river banks downstream of the structure will provide a natural source of woody material to the watercourse. Naturally occurring woody material in the channel increases flow and sediment diversity, which encourages localised variation in flow velocities. Creation of a pool using large, boulder sized material will dissipate flows discharging from the proposed culvert outlet.

WFD Quality Element	Pathway (direct / indirect / none)	Potential Impact/Mitigation Measures
		Adequate bank protection surrounding the pool will be required to prevent flows outflanking the pool and exacerbating bank erosion. As flows enter the pool, flow energy will be dissipated and flow velocities will be reduced, managing the potential for increased flow velocities as a result of the proposed culvert extension. This option is a more natural approach, as a pool is a naturally occurring feature in river systems of similar characteristics. As such, this option is more favourable. A baffle structure installed directly downstream of the culvert outfall may also help to dissipate flow energy. As the flows discharges out of the culvert barrel, the flow velocities will be reduced significantly as flow is dispersed around the baffle structure. The reduction in flow velocities will ensure that existing flow dynamics at the outfall of the existing culvert and in the channel are maintained. This option uses fewer natural techniques and is less favourable than the pool option outlined above.
Morphology: Structure and substrate of the river bed	Direct	**Permanent Impact:** The proposed gradient in the extended culvert barrel has the potential to increase flow velocity in the culvert barrel, at the culvert outfall, and in the channel downstream. Site observations identified that river bed erosion is prevalent in this downstream river reach, and as such it is likely that the proposed works will increase rates of river bed erosion. Further increase to flow velocity in the channel also has the potential to exacerbate bank erosion in the reach downstream of the culvert. The channel gradient sharply increases downstream of the culvert before entering the Eamont floodplain adjacent to the confluence. **Mitigation:** • Embedded mitigation as per paragraph 1.4.18. Specifically, this will involve: • Riparian tree planting and buffer strip creation • Creation of a pool at the culvert outlet to dissipate flows • A baffle installed downstream of the culvert Detailed designs are to be developed with geomorphology input and, as secured in the EMP, agreed following consultation with the relevant catchment and risk management authorities. Hydraulic modelling will need to be conducted to identify any change in flow velocity in the channel downstream of the culvert outlet as a result of the proposed works. Hydromorphic interpretation of modelling results will need be carried out to understand impacts on river process, such as erosion. If an increase in velocity that has the potential to increase erosion is identified, then measures to mitigate this impact will be required. Further details on the options are given below.

WFD Quality Element	Pathway (direct / indirect / none)	Potential Impact/Mitigation Measures
		The creation of a buffer strip and riparian planting will increase the structural integrity of the riverbanks compared to their existing integrity, which will increase resistance to riverbank erosion. The introduction of a dense riparian buffer strip along the riverbanks downstream of the structure will provide a natural source of woody material to the watercourse. Naturally occurring woody material in the channel increases flow and sediment diversity, which encourages localised variation in flow velocities. Creation of a pool using large, boulder sized material will dissipate flows discharging from the proposed culvert outlet. Adequate bank protection surrounding the pool will be required to prevent flows outflanking the pool and exacerbating bank erosion. As flows enter the pool, flow energy will be dissipated and flow velocities will be reduced, managing the potential for increased flow velocities as a result of the proposed culvert extension. This option is a more natural approach, as a pool is a naturally occurring feature in river systems of similar characteristics. As such, this option is more favourable. A concrete baffle structure installed directly downstream of the culvert outfall may also help to dissipate flow energy. As the flows discharges out of the culvert barrel, the flow velocities will be reduced significantly as flow is dispersed around the baffle structure. The reduction in flow velocities will ensure that existing flow dynamics at the outfall of the existing culvert and in the channel are maintained. This option uses fewer natural techniques and is less favourable than the pool option outlined above.

*Adapted from Table 18 'Impacts and mitigation measures of Watercourse Crossing Point 4 (Unnamed Tributary of the Eamont 3.3 (Culvert 301)) of Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223) and updated to reflect design changes.

1.4.28 Following on from the hydromorphology screening assessment, no further assessment is required for WCP 6 (Culvert 302).

Water body mitigation measures

1.4.29 As per ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223), the Eamont (Lower) is not classified as heavily modified or artificial. Accordingly, no hydromorphology mitigation measures have been identified for this water body, in the Solway Tweed RBMP (2021).

WFD hydromorphology assessment objectives

1.4.30 There have been no changes in the WFD hydromorphology assessment objectives since the submission of ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223).

1.4.31 Table 1-3 provides assessment of the Project, including the design changes, on water body mitigation for the Eamont (Lower), as identified in the Solway Tweed RBMP (2021).

Table 1-3: Hydromorphology assessment of proposed works against WFD objectives for the Solway Tweed River Basin Management Plan (2021).

WFD Hydromorphology Assessment Objectives	Hydromorphology assessment of works
Objective 1: The proposed works do not cause deterioration in the Status of the Hydromorphology quality elements of the water body	Provided the required mitigation measures detailed in Table 1-9 Impacts and mitigation measures for WCP 3 (Lightwater Culvert) and Table 1-10 Impacts and mitigation measures for WCP 4 (Culvert 301) are adhered to, the proposed works will not cause a deterioration in the status of the hydromorphology quality elements of the Eamont (Lower) water body.
Objective 2: The proposed works do not compromise the ability of the water body to achieve its WFD status objectives	Provided the required mitigation measures detailed in Table 1-9 Impacts and mitigation measures for WCP 3 (Lightwater Culvert) and Table 1-10 Impacts and mitigation measures for WCP 4 (Culvert 301) are adhered to, the proposed works do not compromise the ability of the Eamont (Lower) water body to achieve Good hydromorphology status.
Objective 3: The proposed works do not cause a permanent exclusion or compromised achievement of the WFD objectives in other bodies of water within the same RBD	Impacts arising from the proposals at the scheme will be direct and local to the fluvial environment on site. The impacts arising from the proposed works will not impact on areas elsewhere in the catchment and will not impact other WFD waterbodies within the RBMP.
Objective 4: The proposed works contribute to the delivery of the WFD objectives	Provided the required mitigation measures detailed in Table 1-9 Impacts and mitigation measures for WCP 3 (Lightwater Culvert) and Table 1-10 Impacts and mitigation measures for WCP 4 (Culvert 301) are adhered to, the proposed works will contribute to the delivery of the WFD objectives by ensuring no detrimental impact to the water body at the water body scale, and by providing localised hydromorphological enhancements (where possible).

*Adapted from Table 21 'Hydromorphology assessment of proposed works against WFD objectives for the Solway Tweed River Basin Management Plan 2021' of Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223) and updated to reflect design changes.

1.5 Summary

1.5.1 The WFD scoping (Stage 2) stage identified that the changed design for the works at WCP 3 (Lightwater Culvert) and WCP 4 (Culvert 301) will have a detrimental impact to the Eamont (Lower) water body, without appropriate mitigation.

1.5.2 As per ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223), no detrimental impacts have been identified on the Eamont (Lower) water body, arising from WCP 6 (Culvert 302). The only design change at WCP 6 (Culvert 302) is to the location of the structure within the Order Limits. Accordingly, the detailed assessment of this asset

has not been revised. This assessment remains unchanged following the design change update.

1.5.3 As identified in ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223), design changes for WCP 3 (Lightwater Culvert) and WCP 4 (Culvert 301) are likely to directly impact the following hydromorphology quality elements for the Eamont (Lower), without mitigation:

- Hydrology: Quantity and Dynamics of flow
- Morphology: River width and depth
- Morphology: Structure and substrate of the river bed
- Morphology: Structure of the riparian zone.

1.5.4 Following assessment of the design changes to WCP 3 (Lightwater Culvert), required mitigation measures are largely unchanged from Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223), with the addition of an additional mitigation measure that applies to the design of all culverts. Mitigation measures are secured in the EMP (Application Document 2.7 Rev 4) and include:

- Hydraulic modelling to understand the impact on quantity and dynamics of flow
- Riparian tree planting and buffer strip creation
- Creation of a pool at the culvert outlet to dissipate flows
- A baffle installed downstream of the culvert.

1.5.5 Following assessment of the design changes to WCP 4 (Culvert 301), required mitigation measures are unchanged from ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223), though the wording has been amended, where appropriate. Mitigation measures are secured in the EMP (Application Document 2.7 Rev 4) and include:

- Riparian tree planting and buffer strip creation.

1.5.6 As per ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223), this assessment has been made based on a precautionary worst-case scenario. As such, the mitigation identified in this assessment as being required to mitigate the likely significant effects reported are based on this worst-case scenario. It may be the case that as detailed design of the Project evolves, it becomes apparent that a lesser form of mitigation is required to achieve the same outcome.

1.5.7 As such, the EMP (Application Document 2.7 Rev 4) secures the ‘maximum’ extent of mitigation required (as identified in this assessment) but also, where appropriate, includes mechanisms (eg by way of further surveys or modelling) to establish, pre-construction and during detailed design, whether the identified mitigation can be refined such that a lesser extent is required to achieve the outcome reported in this assessment. The fundamental point is that the mitigation identified in this assessment is secured by the EMP (Application Document 2.7 Rev 4), where required to achieve the outcome reported in this assessment.

1.6 Conclusion

1.6.1 This document provides an update to Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223) of the Environmental Statement for the A66 Northern Trans-Pennine Project Development Consent Order (DCO) submission (June 2022). Specifically, it provides updated assessment following the design changes to the Penrith to Temple Sowerby scheme (change reference DC-03-02a) pertaining to WCP 3 (Lightwater Culvert), WCP 4 (Culvert 301) and WCP 6 (Culvert 302).

1.6.2 Whilst the assessment has been updated to reflect design changes to WCP 3 (Lightwater Culvert), WCP 4 (Culvert 301) and WCP 6 (Culvert 302), the overall conclusions remain unchanged from ES Appendix 14.4 Hydromorphology Assessment (Reference Document APP-223), with the implementation of secured mitigation.

1.6.3 Based on the findings of this updated assessment it can be concluded that, accounting for the design changes to WCP 3 (Lightwater Culvert), WCP 4 (Culvert 301) and WCP 6 (Culvert 302) the scheme would remain WFD compliant.

References

Environment Agency (2023) Catchment Data Explorer (2023). Available at: https://environment.data.gov.uk/catchment-planning.

Annex A Location and existing context figures for Watercourse Crossing Points

WCP 3 (Lightwater Culvert)

Photo Location 1: Right bank facing downstream

Photo Location 2: Right bank facing left bank

Photo Location 3: Culvert facing downstream

Photo Location 4: Left bank facing upstream

Photo Location 5: Left bank facing downstream

Photo Location 6: Floodplain facing upstream

WCP 3 (Lightwater Culvert) and WCP 4 (Culvert 301)

Plate A-24:WCP3 and WCP78 (Lightwater Culvert) (Lightwater) site photograph locations

Photo Location 1: Left bank facing upstream

Photo Location 2: Left bank facing upstream

Photo Location 3: Right bank facing left bank

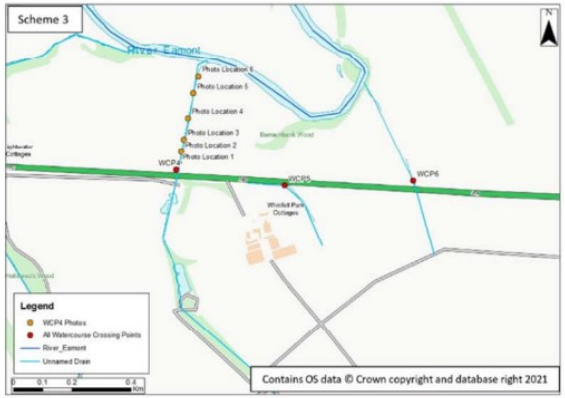

Photo Location 4: Left floodplain

Photo Location 5: Left bank facing downstream

Photo Location 6: Right bank facing culvert downstream

WCP 4 (Culvert 301)

Plate A-25: WCP4 (Culvert 301) (Unnamed Tributary of the Eamont 3.3) site photograph locations

Photo Location 1: Left bank facing right bank

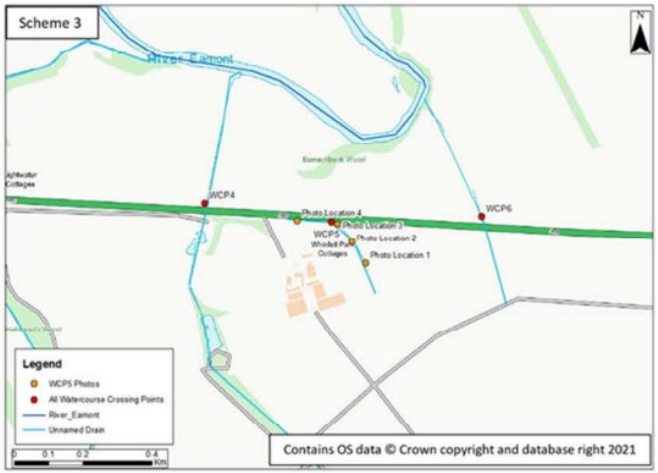

Photo Location 2: Left bank facing upstream

Photo Location 3: Left bank facing upstream

Photo Location 4: Left bank facing culvert at A66

Plate A-26: WCP5 (Unnamed Culvert - Whinfell) (Unnamed Tributary of the Eamont 3.4) site photograph locations

WCP 6 (Culvert 302)

Photo Location 1: Left bank facing Watercourse

Photo Location 2: Left bank facing downstream

Photo Location 3: Left bank facing upstream

Photo Location 5: Left bank facing upstream

Photo Location 6: Left bank facing upstream

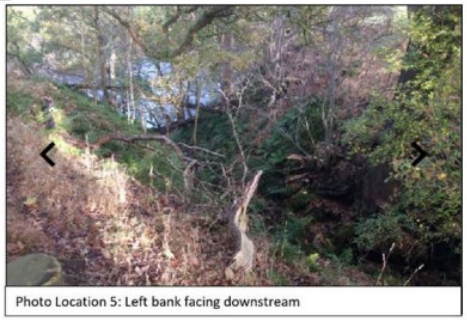

Photo Location 5: Left bank facing downstream

Plate A-27: WCP6 (Culvert 302) (Unnamed Tributary of the Eamont 3.5) site photograph locations

A66 Northern Trans-Pennine Project
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8.3 Change Application - Appendix 3: Flood Risk Assessment (Clean)

Volume II

Planning Act 2008

Infrastructure Planning (Examination Procedure) Rules 2010

Volume 8

24 March 2023

1 Flood Risk Assessment and Outline Drainage Strategy Addendum

1.1 Introduction

1.1.1 Appendix 14.2: Flood Risk Assessment and Outline Drainage Strategy (APP-221) was prepared to support the Environmental Statement (ES) Chapter 14 Road Drainage and the Water Environment (APP-057). The report describes the baseline environment, the existing flood risk and drainage arrangements on a scheme-by-scheme basis and the proposed drainage design principles and parameters for the Project.

1.1.2 The Flood Risk Assessment (FRA) sections of Appendix 14.2: Flood Risk Assessment and Outline Drainage Strategy (APP-221) are required to identify the sources of flood risk to and from the Project. An FRA is required in England for:

- Any development or change of use in Flood Zones 2 or 3, as identified from the Environment Agency's flood maps
- Any development more than 1 hectare (ha) in size in Flood Zone 1
- Any development in Flood Zone 1 which may be susceptible to flooding from sources other than rivers and the sea or subject to critical drainage problems.

1.1.3 A review of the Environment Agency flood maps indicates that the majority of schemes within the Project are within Flood Zone 1; however, as some areas of schemes are within Flood Zones 2 or 3 and the overall Project is greater than 1ha and therefore an FRA is required.

1.2 Purpose

1.2.1 This report is an addendum to Appendix 14.2: Flood Risk Assessment and Outline Drainage Strategy (APP-221). It provides an update to all relevant sections of the Flood Risk Assessment and Outline Drainage Strategy where necessary to encapsulate the design change DC-04. It is not anticipated that any other design change has the potential to introduce new or greater likely significant effects and so they have not been assessed within this addendum.

1.2.2 The purpose of this report is to present the Flood Risk Assessment for design change DC-04, and to inform the conclusions of the ES Addendum regarding the water environment and drainage design.

1.2.3 The report is supported by Annex A: Hydraulic modelling report.

1.3 Legislation and policy framework

1.3.1 There are no changes to the legislation, policy, and guidance presented in the ES Appendix 14.2: Flood Risk Assessment and Outline Drainage Strategy (APP-221).

1.4 Consultation

1.4.1 The design changes have gone through additional consultation, a process that is detailed in Proposed Changes Application 03 Consultation Statement. However, no specific comments have been received around flood risk or drainage design from the Statutory Environmental Bodies (SEBs).

1.5 Outline drainage strategy

1.5.1 The design changes are described in Proposed Changes Application Section 3. An updated Project description is provided in Environmental Statement Addendum Volume III: Updated Project Description.

1.5.2 There are no changes to the DCO drainage design required to support design change DC-04 as described in Section 3 of the Proposed Changes Application. As such, all sections of Appendix 14.2: Flood Risk Assessment and Outline Drainage Strategy (APP-221) that report or assess the outline drainage strategy are unchanged and not included in this addendum.

1.6 Flood risk

Assumptions and limitations

1.6.1 The design change DC-04 is detailed in Section 3 of the Proposed Changes Application and has been assessed as per the description of the change. In summary, the change consists of the separation and relocation of the shared public right of way and private access track provision north of the dual carriageway which crosses several watercourses.

1.6.2 The culvert crossing of the Light Water referred to as Lightwater Maintenance Lane Culvert is to be relocated approximately 50m south of the modelled location presented in Appendix 14.2: Flood Risk Assessment and Outline Drainage Strategy (APP-221).

1.6.3 The watercourse crossing of Unnamed Tributary of River Eamont 3.3 and Unnamed Tributary of River Eamont 3.5 are modelled and assessed within ES Appendix 14.2: Flood Risk Assessment and Outline Drainage Strategy (APP-221). The hydraulic modelling undertaken to inform the assessment ES Appendix 14.2: Flood Risk Assessment and Outline Drainage Strategy (APP-221) presents no increase in flood depth or extent at these crossings. Due to the magnitude of design change DC-04 (which includes the minor change in location of the watercourse crossings of Unnamed Tributary of River Eamont 3.3 and Unnamed Tributary of River Eamont 3.5 further away from the A66 main alignment) it is considered that the hydraulic modelling results presented in Appendix 14.2: Flood Risk Assessment and Outline Drainage Strategy (APP-221) remain representative. Therefore, these minor design changes have not been assessed in this addendum.

1.6.4 As required, further hydraulic modelling will inform the detailed design and is secured within the first iteration Environmental Management Plan (Application Document 2.7 Rev 4), REAC table reference D-RDWE-02.

Surveys

1.6.5 Further flood risk surveys to support the assessment of DC-04 have not been completed due to the design changes being within DCO survey areas, and therefore this addendum and its supporting assessments are reliant upon the DCO survey information. The survey information presented in ES Appendix 14.2: Flood Risk Assessment and Outline Drainage Strategy (APP-221) is considered to remain valid as there is no anticipated change to the baseline conditions.

Baseline conditions

1.6.6 There are no changes to the baseline conditions that are presented in ES Appendix 14.2: Flood Risk Assessment and Outline Drainage Strategy (APP-221). Design change DC-04 is located within the Penrith to Temple Sowerby scheme, which is presented in Section 14.2.3 of Appendix 14.2: Flood Risk Assessment and Outline Drainage Strategy (APP-221).

Construction assessment

1.6.7 The first iteration Environmental Management Plan (EMP) (Application Document 2.7 Rev 4) includes details of measures to protect the water environment during construction of the scheme and so construction issues, as was the approach in Appendix 14.2: Flood Risk Assessment and Outline Drainage Strategy (APP-221), are not considered in this report.

1.6.8 D-RDWE-01 in the REAC table of the EMP (Application Document 2.7 Rev 4) secures commitment to producing a Ground and Surface Water Management Plan (GSWMP) for the Project. The GSWMP will include, as a minimum, the following commitments during the construction of the Project (to the extent applicable to the relevant part of the Project):

- A surface water management system using measures such as temporary silt fencing, cut off ditches, settlement ponds and bunds shall be set up prior to relevant works commencing to capture all runoff and prevent ingress of sediments and contaminants into existing drainage ditches where necessary. This shall be managed in accordance with CIRIA Guidelines and the Environment Agency's approach to groundwater protection and groundwater protection guidelines
- Where operational phase drainage is to be constructed early and used to manage construction phase run off, appropriate storage and sediment control measures shall be implemented to ensure it is fit for purpose and can effectively manage the expected sediment load
- Areas of exposed soil and/or arisings deemed at risk of erosion during heavy rainfall or flood inundation shall be protected using either temporary measures (eg sheeting) or semi-permanent measures (for example coir matting) until vegetation is able to establish on these surfaces
- Works within channel that require temporary diversion of water flow will be appropriately timed and staggered, to reduce impacts to surface and groundwater flows (aiming to maintain flow as close to the original regime as possible during diversion or pumping)
- Water abstracted through dewatering shall be discharged to the same groundwater catchment and downgradient of the dewatered element or discharged to groundwater dependant waterbodies (including surface waters) where doing so supports the mitigation for the loss of water supply to that feature
- Monitoring of site's water management and discharge by suitably qualified EM and contractor (as per EMP ((Application Document 2.7 Rev 4) Table 2-2: Roles and responsibilities during construction).

1.6.9 Design change DC-04 does not impact the effectiveness of, or prevent the project from meeting, the mitigation requirements outlined within both the

ES Chapter 14 Road Drainage and the Water Environment (APP-057) and the EMP (Application Document 2.7 Rev 4).

Operation assessment

1.6.10 The flood risk assessment presented for Penrith to Temple Sowerby remains valid and representative for all design elements with the exception of those impacted by DC-04, specifically the movement of the Light Water maintenance culvert approximately 50m south.

1.6.11 The Environment Agency flood mapping indicates that the scheme is in Flood Zone 1 and at low risk of flooding. The hydraulic modelling presented in Annex A: Hydraulic modelling report presents the flood risk change from baseline to operation, and from the DCO design to the design change DC-04 design. The hydraulic modelling report presented in Annex A: Hydraulic modelling report concludes a very minor change when design change DC-04 is compared with the original DCO model. Flood flows for the change during a 1% AEP event with 94% allowance for climate change show a reduction when compared to the DCO model in downstream flows of 0.05 cumecs at both the crossing culvert and downstream of it. When the design change is compared to the baseline a small increase in flows is observed in the model results, however this is less than the previous DCO design.

1.6.12 The modelling shows there is a minor impact on flood depths within the Order Limits on the downstream side of the crossing by moving the access road and culvert compared to the DCO design, however there is negligible change in flood extent. There is no impact to third party land (outside of the Order Limits).

1.6.13 Further hydraulic modelling, as secured by D-RDWE-02 of the EMP (Application Document 2.7 Rev 4), may result in additional floodplain volume needing to be incorporated within the Order Limits and/or refinement to culvert design. This is considered appropriate to mitigate the minor impact on flood depths as a result of design change DC-04.

1.6.14 The hydraulic modelling presented in Annex A of this report outlines an increase in flood depths within an area south of the A66 main alignment. This area of flood risk has already been assessed within ES Appendix 14.2: Flood Risk Assessment and Outline Drainage Strategy (APP-221), and mitigation outlined to compensate for flow backing up on the south side of the A66 main alignment, within the Order Limits. This mitigation is secured in the EMP (Application Document 2.7 Rev 4) and will mitigate the minor increase in flood depth reported for this area in Annex A: Hydraulic modelling report.

1.6.15 The EMP (Application Document 2.7 Rev 4) secures the commitment to further hydraulic modelling to inform the detailed design process. No additional mitigation as a result of DC-04 is required.

1.7 Conclusions

1.7.1 Design change DC-04 is not anticipated to result in a change to the likely significant effects reported in ES Chapter 14 Road Drainage and the Water Environment (APP-057) and ES Appendix 14.6 Hydrogeological Impact Assessment (APP-225).

Annex A: Hydraulic modelling report

TECHNICAL NOTE

JBA Project Code	2020s1208
Contract	A66 NTP Flood Modelling
Client	Amey
Day, Date and Time	20th March 2023
Author	John Wilcock
Reviewer / Sign-off	Rebecca Stroud
Subject	Scheme 3 - Lightwater modelling with proposed design change

1 Introduction

1.1 Background and purpose of the work

The A66 Scheme 3 design has a proposed design change over the DCO submission. Designs at this stage are still preliminary, however an initial assessment is required to determine the viability of the change prior to its adoption. This note details the changes made to the model to represent the proposed design change and discusses the differences in depth and flow that result from the alterations.

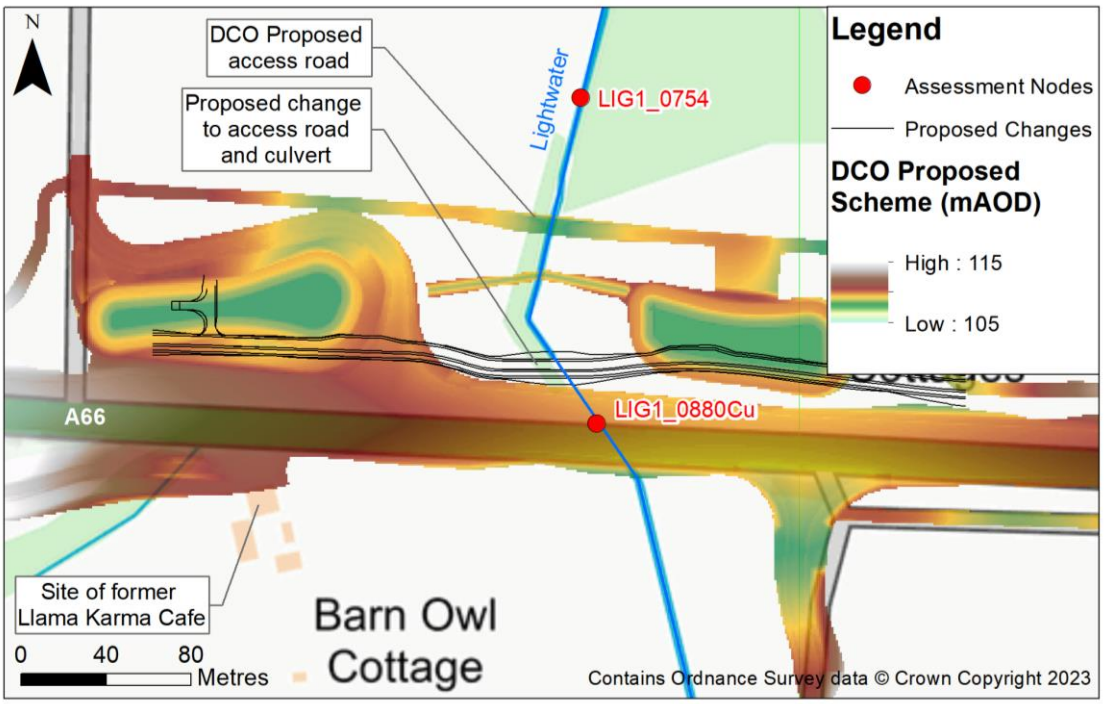
1.2 Proposed design change

The original DCO design along with the proposed change is shown in Figure 1-1 whereby the access road running north of the balancing ponds is to be moved to the south, close to the main carriageway, based on drawing HE615323-JAC-HGN-03A_AL_SCHEM-MR-CX-000002. This change will result in two key updates to the flood model in the area:

- Moving the culvert under the access track to its new location, 55m south of the original DCO submission.
- A new ground model of the access track to model any floodplain flows.

Other aspects of the Scheme 3 design have changed in the area such as balancing pond locations, however these are all outside of the floodplain in both the baseline and post development scenarios.

Figure 1-1: Baseline and proposed change at Lightwater



2 Software versions

The following versions of software were used for this assessment. The baseline and original post development models were re-run in order to ensure results are consistent across software versions.

- 1D Flood Modeller: 5.1
- 2D TUFLOW Build: 2020-10-AD-iDP-w64

3 Scenarios and geometry updates

The model has been run for three scenarios using the 1% AEP (Annual Exceedance Probability) flows with 94% allowance for climate change. The scheme design and associated model geometry changes are summarised below.

Table 3-1: Summary of model runs and geometry updates

Model Run	Comment	Key geometry changes from baseline	Key changes to model files
Baseline	Current representation		
C0	DCO submission	Elevations for new road alignment and culvert for balancing pond access track	File model_000005.asc used to describe proposed A66 and access track. 10m long, 3.658m x 2.362m box Culvert LIG1_0796C2 added to the 1D model under access track
C1	Proposed changes to access road, moving it 55m south.	Moving the culvert and access track 55m to match proposals in HE615323-JAC-HGN-03A_AL_SCHEM-MR-CX-000002	File 2020s1208_surface_v2.asc added to model to override DCO (C0) ground elevations 1D Culvert LIG1_0796C2 moved south and 2D model changed to suit

4 Results

4.1 Pass forward flows

Peak flows are reported, in Table 4-1, for two locations along the Lightwater, located at the A66 crossing culvert (LIG1_0880Cu) and downstream of both the A66 and access track crossing (LIG1_0754).

These locations are shown in the overview map (Figure 1-1), and depth maps in Figure 4-3 and Figure 4-4. To summarise:

- Peak flows in the proposed change (C1) scenario show a minor increase over the baseline situation as was the case with the original DCO scheme design (C0).
- Peak flows in the proposed change (C1) scenario show a minor reduction when compared to the original DCO scheme design (C0).

Table 4-1: Peak flows at key locations on the Lightwater

Model Run	Q A66 Culvert (m^3/s) Node: LIG1_0880Cu	Q downstream of Balancing pond access track (m^3/s) Node: LIG1_0754
Baseline	6.029	6.996
C0	6.267	7.122
C1	6.214	7.073

4.2 Depth differences

The following map (Figure 4-1) shows the differences in depth of flooding between the new proposed design change (C1) and the baseline.

The results of the proposed change (C1) compared to baseline show there is a significant reduction in flood depths upstream of the A66 (south) in the vicinity of the watercourse and increases in flood depths to the west of Barn Owl Cottages where the floodplain is constrained by the DCO design.

The proposals show a moderate increase flood risk to the site of the former Llama Karma Kafe (Figure 1-1). The modelling undertaken on the previous designs showed this impact is largely restricted to higher magnitude events and climate change projections, however mitigation may be required in this area. Larger increases in flood depth to the east are a result of ground level changes in the original DCO modelling.

Downstream (north) of the A66 there are some small localised in-channel increases where channel reprofiling creates higher depths, downstream of the proposed culvert there is negligible difference to flood depths with decreases less than 10mm across the modelled domain.

Figure 4-1: C1 minus baseline

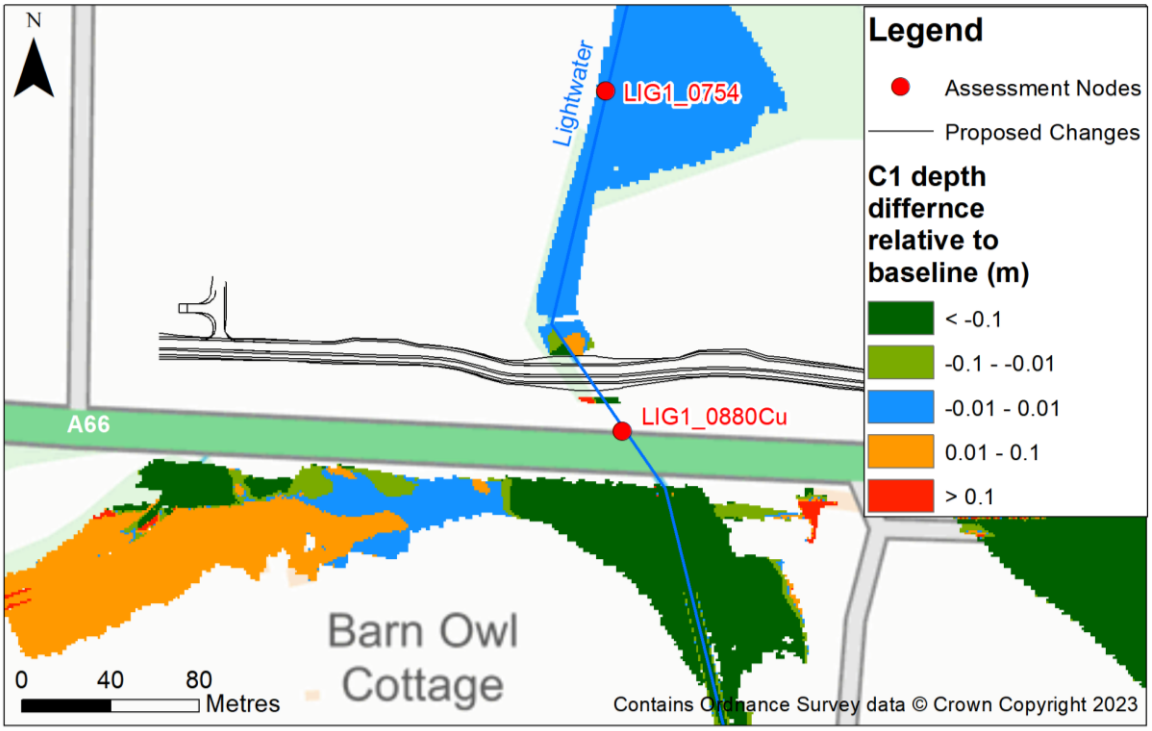
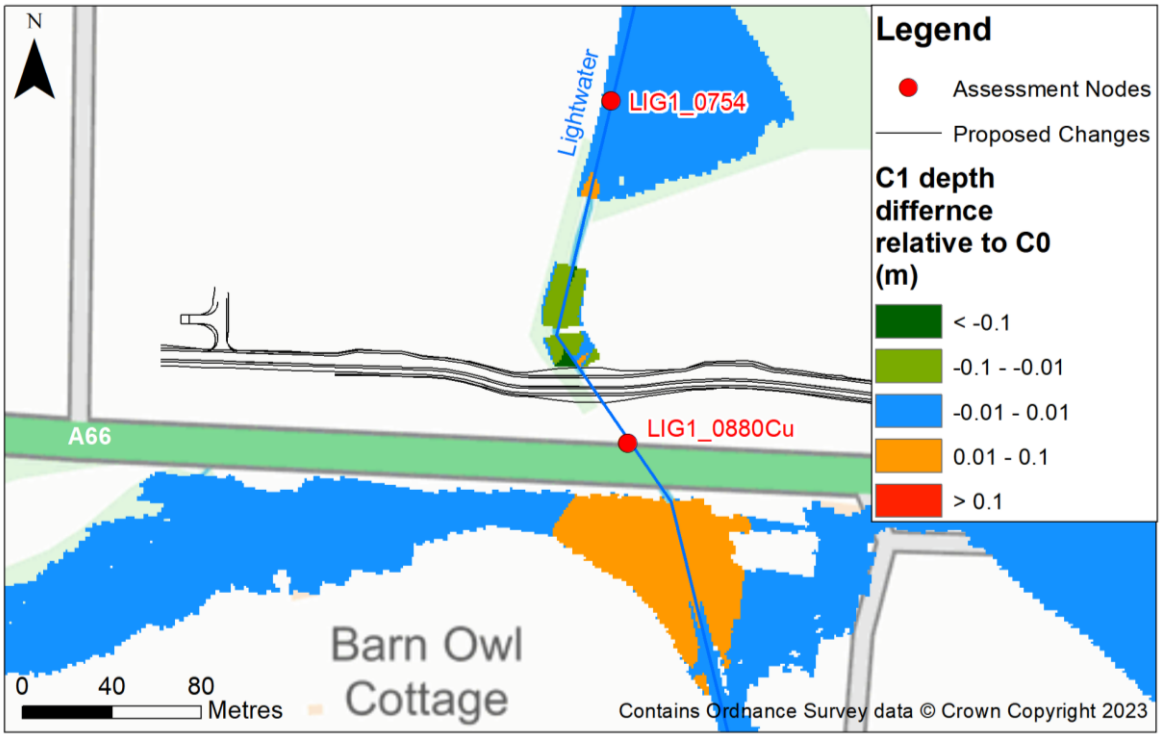


Figure 4-2 shows the differences in the depth of flooding between the new proposed design change (C1) and the DCO design (C0). The results of the proposed change (C1) appear similar to the DCO proposals (C0) when compared to baseline in terms of trends and magnitude of flooding.

The new proposed design change increases flood depths upstream of the A66 by approximately 34mm immediately upstream of the culverts, this is due to the proximity of the moved access track culvert. This increase is relatively minor and could be mitigated with land re-profiling to provide approximately an additional 100m^3 of floodplain volume during the detailed design stage or improved culvert conveyance with more efficient inlet and outlet structures.

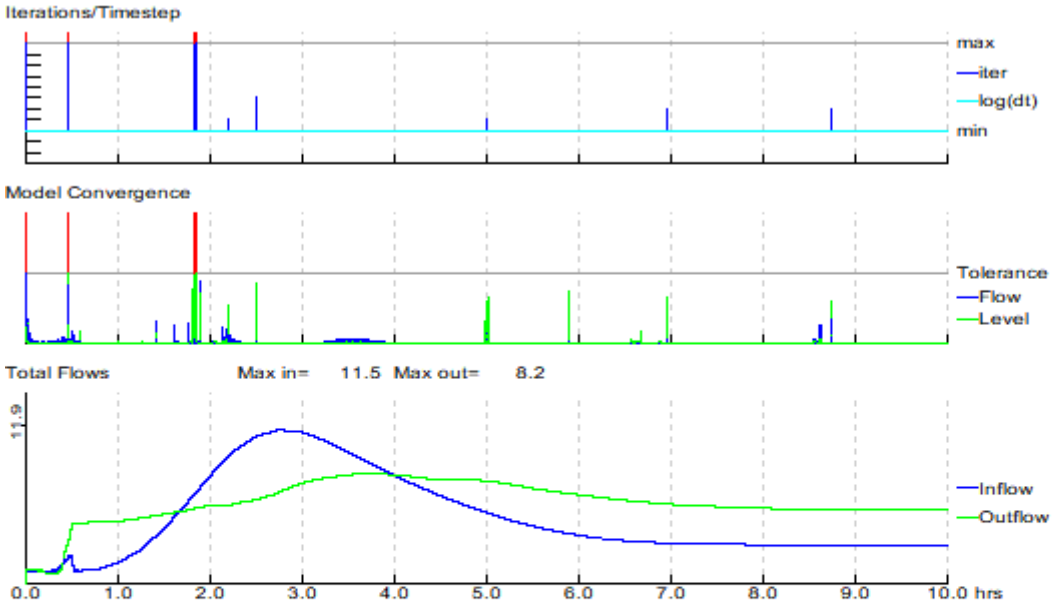
Figure 4-2: C1 minus C0



5 Stability and mass balance

1D model stability is acceptable with only a few instances of poor convergence during the model run. See below for C1 convergence plot.

Figure 5-1: 1D model stability for simulation C1

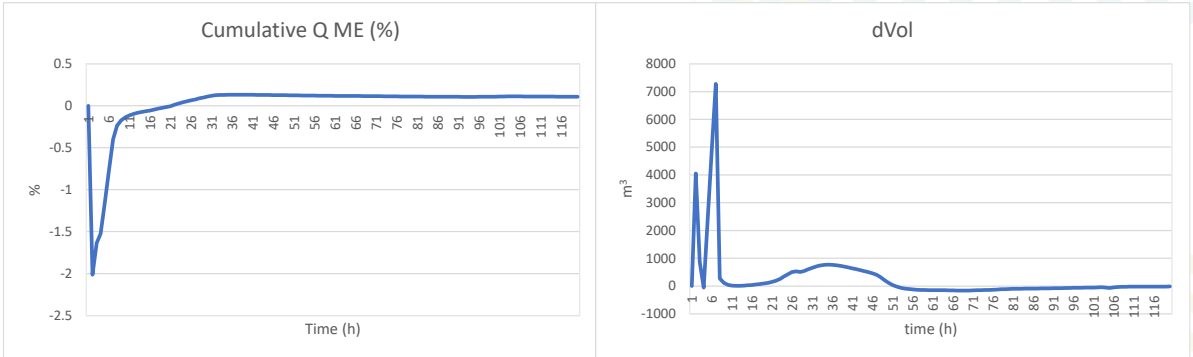


Datafile: ...\SCHEME3_LIG_UNN301_004_PD002_C1.DAT
Results: ...SCHEME3_LIGH_UNN301_Q100CC94_004_PD005_C1.zzl
Ran at 14:32:48 on 10/03/2023
Ended at 15:15:13 on 10/03/2023
Start Time: 0.000 hrs
End Time: 10.000 hrs
Timestep: 0.5 secs

Current Model Time: 10.00 hrs
Percent Complete: 100 %

2D mass balance is largely within tolerances of +/-1%. A spike to 2% is visible at the start of the simulation, however this quickly drops down. dVol shows a double peak early in the model run, which is expected as a result of the upstream inflows and short duration of the event.

Figure 5-2: Mass balance and dVol for simulation C1



6 Summary

The existing 1D-2D model has been updated with the new proposed design change to understand the impact of flows and depth of flooding surrounding the A66 crossing of the Lightwater.

Flood flows for the proposed change (C1) during a 1% AEP event with 94% allowance for climate change show very minor change when compared with the original DCO model. These show a reduction in downstream flows of 0.05 cumecs at both the crossing culvert and downstream of it. When the proposed design change (C1) is compared to the baseline a small increase in flows is observed in the model results, however this is less than the previous DCO design (C0).

The modelling shows there is a minor impact on flood depths by moving the access road and culvert on the downstream side of the crossing compared to the DCO design, however there is negligible change in flood extent. This could be mitigated by providing additional floodplain volume using land re-profiling at the detailed design stage or improved culvert conveyance with more efficient inlet and outlet structures.

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8.3 Change Application – Appendix 4: Ground Water Dependant Terrestrial Ecosystem Assessment (Clean)

Planning Act 2008

Infrastructure Planning (Examination Procedure) Rules 2010

Volume 8

24 March 2023

1 Ground Water Dependant Terrestrial Ecosystem Assessment

1.1 Introduction

1.1.1 A groundwater dependant terrestrial ecosystem (GWDTE) is defined as within the UKTAG report (UK Technical Advisory Group, 2004)1:

"A terrestrial ecosystem of importance at Member State level that is directly dependent on the water level in or flow of water from a groundwater body (that is, in or from the saturated zone). Such an ecosystem may also be dependent on the concentrations of substances (and potential pollutants) within that groundwater body, but there must be a direct hydraulic connection with the groundwater body."

1.1.2 GWDTE are protected under the Water Framework Directive (WFD) and are potentially sensitive receptors to the impacts of development. This document describes the assessment of risk to GWDTEs resulting from the construction and operation of the Project, updating as necessary any changes due to design change DC-24.

Purpose

1.1.3 This report is an addendum to ES Appendix 14.7 Ground Water Dependant Terrestrial Ecosystem Assessment (APP-226). The purpose of this report is to provide an update to all relevant sections of the appendix document where necessary to encapsulate design change DC-24.

1.1.4 This report informs the conclusions of the ES Addendum regarding the water environment.

1.1.5 The GWDTE assessment presents the baseline conditions of potential features and assesses potential impacts to potential GWDTEs from the Project.

1.1.6 The report is supported by ES Figure 14.12: Potential Groundwater Dependent Terrestrial Ecosystems (GWDTE) (APP-143).

1.1.7 An updated Figure 14.12: Potential Groundwater Dependent Terrestrial Ecosystems (GWDTE) have also been provided (Figure 7 of ES Addendum Volume II, CR1-017).

1.2 Assessment methodology

1.2.1 There are no changes to the methodology presented in ES Appendix 14.7 Ground Water Dependant Terrestrial Ecosystem Assessment (APP-226). Methods follow the guidance set out within DMRB LA 113 Road Drainage and the Water Environment.

1.2.2 The methodology has a stepped, risk-based approach which depends upon establishing linkages between potential impacts from the road development on the hydrological and hydrogeological regime and a GWDTE:

- Step 1 - Identify potential linkages
- Step 2 - Assess GWDTE importance (if required)
- Step 3 - Assess potential impacts (if required).
- Step 4 - Establish risk to GWDTE - importance (step 2) is combined with magnitude of potential impact (step 3)
- Step 5 - Assessment outcomes and actions.

1.3 Assumptions and limitations

1.3.1 There are no changes to the assumptions and limitations presented in ES Appendix 14.7 Ground Water Dependant Terrestrial Ecosystem Assessment (APP-226). For reference, the assumptions and limitations of the assessment are presented in Section 17.7.2.8 to Section 14.7.2.15 of ES Appendix 14.7 Ground Water Dependant Terrestrial Ecosystem Assessment (APP-226).

1.3.2 Design change DC-24 introduces a new section of cutting that has not been previously assessed within in ES Appendix 14.6 Hydrogeological Impact Assessment (APP-225). Appendix 5 Hydrogeological Impact Assessment Addendum assesses the cutting and provides an updated zone of influence that has been used to inform the GWDTE Assessment Addendum.

1.3.3 The new section of cutting introduced by design change DC-24 has the potential to be, at a maximum, 6m deep. Due to an evolving design, specific depths along the cutting length were not available, so a conservative assumption has been made that the cutting will be 6m deep on both sides of the alignment for the full length of the cutting. The cutting is located on the de-trunked existing A66 the locations of which is assumed to correspond to the A66 mainline equivalent chainage 45+130 to 45+950.

1.4 Study area

1.4.1 There are no changes to the study area that is presented in ES Appendix 14.7 Ground Water Dependant Terrestrial Ecosystem Assessment (APP-226).

1.5 Baseline conditions

1.5.1 There are no changes to the baseline conditions that are presented in ES Appendix 14.7 Ground Water Dependant Terrestrial Ecosystem Assessment (APP-226).

1.6 Assessment

Step 1 and 2 - Identify potential linkages and GWDTE importance

1.6.1 The hydrogeological conceptual model presented in ES Appendix 14.6: Hydrogeological Impact Assessment (APP-225) identifies where areas of groundwater drawdown may occur due to the Project. Appendix 5 Hydrogeological Impact Assessment Addendum presents an updated zone

of influence for potential groundwater drawdown due to design change DC-24.

1.6.2 The updated zone of influence does not extend to any of the protected sites presented in Table 1 of ES Appendix 14.7 Ground Water Dependant Terrestrial Ecosystem Assessment (APP-226). Therefore, there are no linkages and no effects on protected sites. Magnitude is considered negligible and overall risk is negligible, no further assessment is required.

1.6.3 UKTAG guidance (2004) recognises that most:

"water dependent terrestrial ecosystems lie along a continuum between always only groundwater dependent and always only surface water dependent […]. The source of water supply for some wetlands does not appear to be critical, therefore the task of identifying dependence upon groundwater is sometimes complex".

1.6.4 The updated zone of influence does not extend to any habitats with the potential to support GWDTE that have not previously been identified in Table 2: Phase 1 habitats with the potential to support GWDTE of ES Appendix 14.7 Ground Water Dependant Terrestrial Ecosystem Assessment (APP-226). Therefore, there are no linkages and no effects on further habitats that may support GWDTEs. Magnitude is considered negligible and overall risk is negligible, no further assessment is required.

1.7 Mitigation

1.7.1 The design change would not impact the effectiveness of, or prevent the Project from meeting, the mitigation requirements outlined within the Environmental Statement (APP-057), the Environmental Management Plan (Application Document 2.7 Rev 4) and the Project Design Principles (PDP) ((Application Document 5.11 Rev 4).

1.8 Conclusion

1.8.1 The design change DC-24 is not anticipated to result in a change to the likely significant effects reported in ES Chapter 14 Road Drainage and the Water Environment (APP-057) and ES Appendix 14.7 Ground Water Dependant Terrestrial Ecosystem Assessment (APP-226).

1.9 Glossary

1.9.1 See Application Glossary (APP-005).

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8.3 Change Application – Appendix 5: Hydrogeological Impact Assessment Addendum (Clean)

Planning Act 2008

Infrastructure Planning (Examination Procedure) Rules 2010

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1 Hydrogeological Impact Assessment

1.1 Introduction

1.1.1 The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (WFD Regulations) are described in Chapter 14: Road Drainage and the Water Environment of the Environmental Statement (ES) (APP-057).

1.1.2 The key objectives of the WFD Regulations, specifically in relation to groundwater, are to:

- Protect, enhance and restore all groundwater bodies
- Achieve good chemical and quantitative status of groundwater
- Prevent pollution and deterioration of groundwater
- Ensure a balance between groundwater abstraction and recharge.

Purpose

1.1.3 This report is an addendum to ES Appendix 14.6 Hydrogeological Impact Assessment (APP-225). It provides an update to all relevant sections of the appendix document where necessary to encapsulate design change DC-24.

1.1.4 The purpose of this report is to present the hydrogeological impact assessment (HIA) for the Project, updating as necessary any changes due to design change DC-24, and to inform the conclusions of the ES Addendum regarding the water environment.

1.1.5 The HIA presents the baseline conditions of groundwater features and assesses potential impacts to groundwater flows, levels and quality from the Project.

1.1.6 The report is supported by a number of figures contained within Environmental Statement Volume 2. These include ES Figure 14.1: Surface Water Features (APP-126) to ES Figure 14.12: Potential Groundwater Dependent Terrestrial Ecosystems (GWDTE) (APP-143), ES Figure 14.6.1: Hydrogeological Conceptual Model Locations (APP-132) and ES Figure 14.6.2: Cutting Assessment Zone of Influence (APP-133).

1.1.7 Figure 7 provides an updated Cutting Assessment Zone of Influence and Potential Groundwater Dependent Terrestrial Ecosystems (GWDTE) have also been provided which update the figures to reflect changes in relation to design change DC-24.

1.2 Assessment methodology

1.2.1 There are no changes to the methodology presented in ES Appendix 14.6 Hydrogeological Impact Assessment (APP-225). Methods follow the guidance set out within DMRB LA 113 Road Drainage and the Water Environment and Environment Agency guidance for dewatering abstractions (SC040020/SR1) (Environment Agency, 2007a) and groundwater abstractions (SC040020/SR2) (Environment Agency, 2007b).

1.3 Assumptions and limitations

1.3.1 There are no changes to the assumptions and limitations presented in ES Appendix 14.6 Hydrogeological Impact Assessment (APP-225). For reference, the assumptions and limitations of the assessment are presented in Section 14.6.8.

1.3.2 As described in ES Appendix 14.6 Hydrogeological Impact Assessment (APP-225) the assessment of cuttings was undertaken using high groundwater levels, maximum cutting depths and high permeability values and as such is considered conservative. Seepage rates into cuttings and excavations are likely to be significantly less than calculated, as per professional judgement described in ES Appendix 14.6 Hydrogeological Impact Assessment (APP-225).

1.3.3 Design change DC-24 introduces a new section of cutting that has not been previously assessed within in ES Appendix 14.6 Hydrogeological Impact Assessment (Document Reference APP-225). Details of the change are presented in Section 3 of the Proposed Change Application. The new section of cutting introduced by design change DC-24 has the potential to be, at a maximum, 6m deep. This is outside the LoDs assessed in ES Chapter 14 Road Drainage and the Water Environment (APP-057). Due to an evolving design, specific depths along the cutting length were not available, so, for the purpose of the HIA, a conservative assumption has been made that the cutting will be 6m deep on both sides of the alignment for the full length of the cutting. The cutting is located on the de-trunked existing A66 the locations of which is assumed to correspond to the A66 mainline equivalent chainage 45+130 to 45+950.

1.4 Study area

1.4.1 There are no changes to the study area that is presented in ES Chapter 14 Road Drainage and the Water Environment (APP-057).

1.5 Baseline conditions

1.5.1 There are no changes to the baseline conditions that are presented in ES Appendix 14.6 Hydrogeological Impact Assessment (APP-225).

1.6 Potential impacts to groundwater related features

Methodology

1.6.1 There are no changes to the methodology for identifying potential impacts that are presented in ES Appendix 14.6 Hydrogeological Impact Assessment (APP-225).

Detailed assessment

1.6.2 A detailed assessment has been undertaken to assess the potential quantitative impacts from cuttings greater than 1.0m deep along the DC-24 affected alignment (A66 mainline equivalent chainage 45+130 to 45+950) in accordance with the methodology presented in ES Appendix 14.6 Hydrogeological Impact Assessment (APP-225). As per reported in ES Appendix 14.6 Hydrogeological Impact Assessment (APP-225), professional

opinion considers that the impacts from cuttings shallower than 1.0m deep would be minimal, and as such detailed assessment is unnecessary.

1.6.3 A cuttings assessment has been completed for the cutting associated with DC-24. Receptors located within the zone of influence of cuttings are susceptible to potential impacts, which need to be individually considered.

Appleby to Brough

1.6.4 Design change DC-24 is located within the Appleby to Brough scheme.

1.6.5 The geology encountered during construction in the Appleby to Brough area is anticipated to consist primarily of Glacial Till (both cohesive and granular). Fluvioglacial deposits are anticipated to be encountered when in proximity to local water courses. Bedrock comprising the Penrith Sandstone is likely to be intercepted in discrete areas in the west of the scheme during construction (not during construction of DC-24). This is regularly overlain by a sand bed considered to most likely be weathered bedrock. The Stainmore Formation at the eastern extreme of the scheme is not anticipated to be encountered during construction works.

1.6.6 The cutting associated with design change DC-24 will alter is reported in ES Appendix 14.6 Hydrogeological Impact Assessment (APP-225) as 'New local road used to merge with existing A66 (Ch 45230 to 46040)' in Table 55: Appleby to Brough Inflow Assessment.

1.6.7 For ease of reader reference, the relevant row of Table 55 of ES Appendix 14.6 Hydrogeological Impact Assessment (APP-225) is replicated in Table 1.1.

Table 1.1: Relevant row of Table 55 of ES Appendix 14.6 Hydrogeological Impact Assessment (APP-225)

Cutting	Anticipated Ground Conditions	Length of Cutting (m)	Drawdown required (m)	Hydraulic Conductivity (m/s)	Zone of Influence (m)	Maximum Inflow (m3/d)	
						One-sided	Two-sided
New local road used to merge with existing A66 (Ch 45230 to 46040)	Glacial Till	810	2.703 (includes 1m for drainage infrastructure)	1 x 10-4	54.06	860.7	-

1.6.8 Table 1.2 presents the conservatively assessed revised cutting results for design change DC-24.

Table 1.2: DC-24 Inflow Assessment

Cutting	Anticipated Ground Conditions	Length of Cutting (m)	Drawdown required (m)	Hydraulic Conductivity (m/s)	Zone of Influence (m)	Maximum Inflow (m3/d)	
						One-sided	Two-sided
New local road used to merge with existing A66 (Ch 45130 to 45950)	Glacial Till	820	7.0 (6.0m cutting plus 1m included for drainage infrastructure)	1 x 10-4	140	-	4513

1.7 Assessment Interpretation

1.7.1 The interpretation of the assessment for Appleby to Brough scheme presented in ES Appendix 14.6 Hydrogeological Impact Assessment (APP-225) is not anticipated to change due to design change DC-24.

1.7.2 The revised zone of influence extends the zone of influence presented in ES Appendix 14.6 Hydrogeological Impact Assessment (Document Reference APP-225) by an area to the south of the underpass and an area north-west of the assessed cutting.

1.7.3 Extension of the ZoI associated with the DC-24 assessment are not anticipated to impact any new receptors as the extended area of ZoI do not intersect any receptors identified from site surveys and baseline information as reported in ES Chapter 14 Road Drainage and the Water Environment (APP-057). The DC-24 ZoI overlaps with the DCO ZoI area assessed within ES Appendix 14.6 Hydrogeological Impact Assessment (APP-225). These areas have been assessed and any residual effects mitigated. The cutting associated with design change DC-24 is not anticipated to cause a change in impact to receptors identified within ES Appendix 14.6 Hydrogeological Impact Assessment (APP-225).

1.8 Mitigation

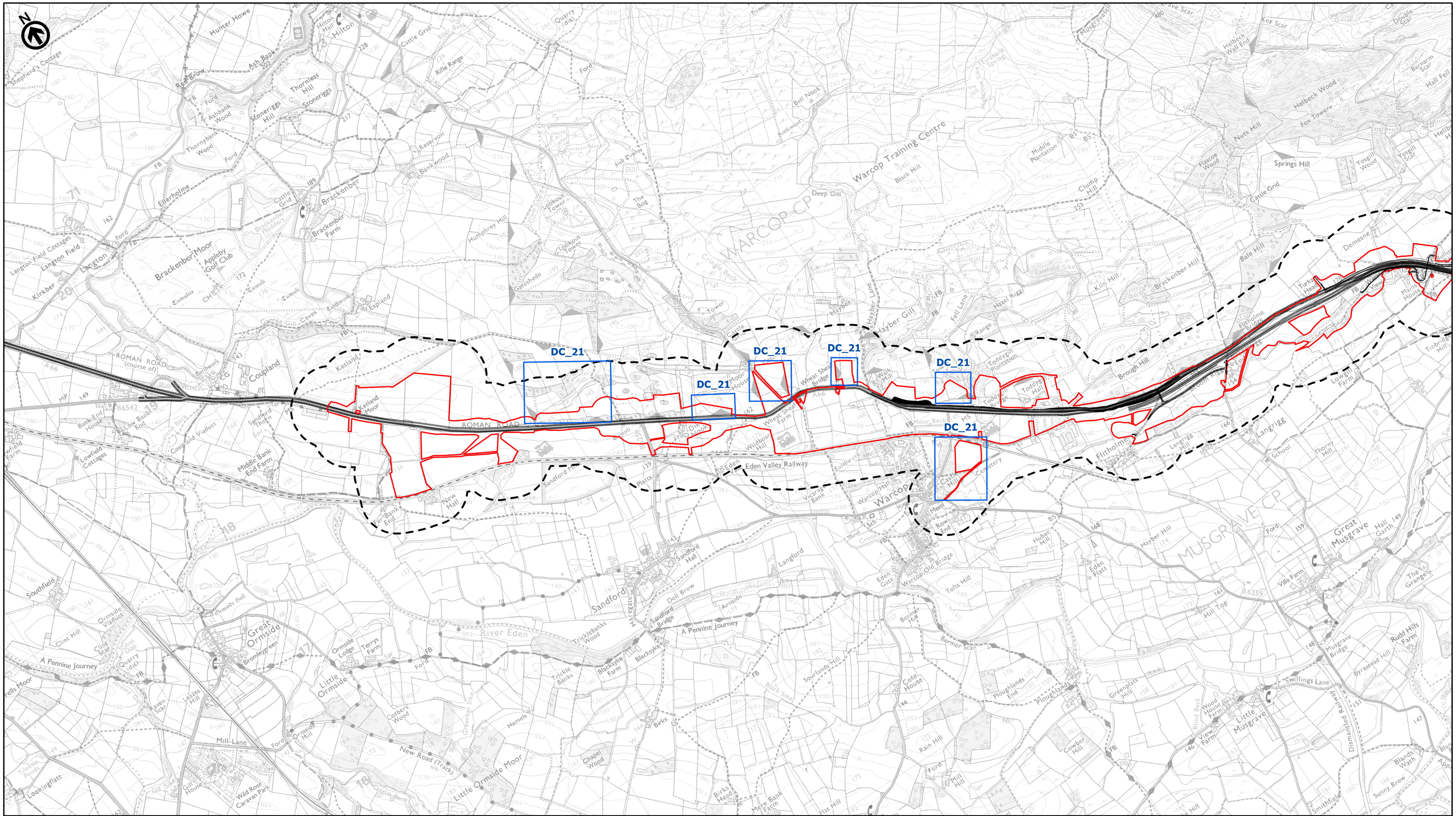
1.8.1 The design change would not impact the effectiveness of, or prevent the Project from meeting, the mitigation requirements outlined within the Environmental Statement (APP-057), the Environmental Management Plan (Application Document 2.7 Rev 4) and the Project Design Principles (PDP) (Application Document 5.11 Rev 4).

1.9 Conclusion

1.9.1 Design change DC-24 is not anticipated to result in a change to the likely significant effects reported in ES Chapter 14 Road Drainage and the Water Environment (APP-057) and ES Appendix 14.6 Hydrogeological Impact Assessment (APP-225).

1.10 Glossary

1.10.1 See Application Glossary (APP-005).

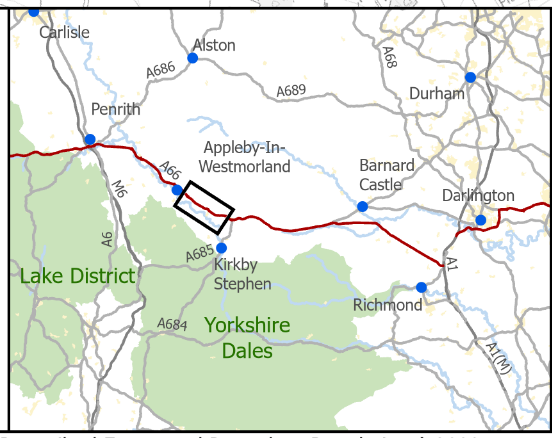


Route Alignment

Existing A66

Proposed Order Limits

Study Area 250m



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Revision	First Issue				
P02	CESL	PKEL	CMCG	AMIT	KWHA
	14/03/23	14/03/23	14/03/23	14/03/23	14/03/23
Revision	Created	Checked	Reviewed	Approved	Authorised

Kilometres
0 1 2

Scale @ A3: 1:25,000 | Project Ref No HE565627 | Stage: Stage 3

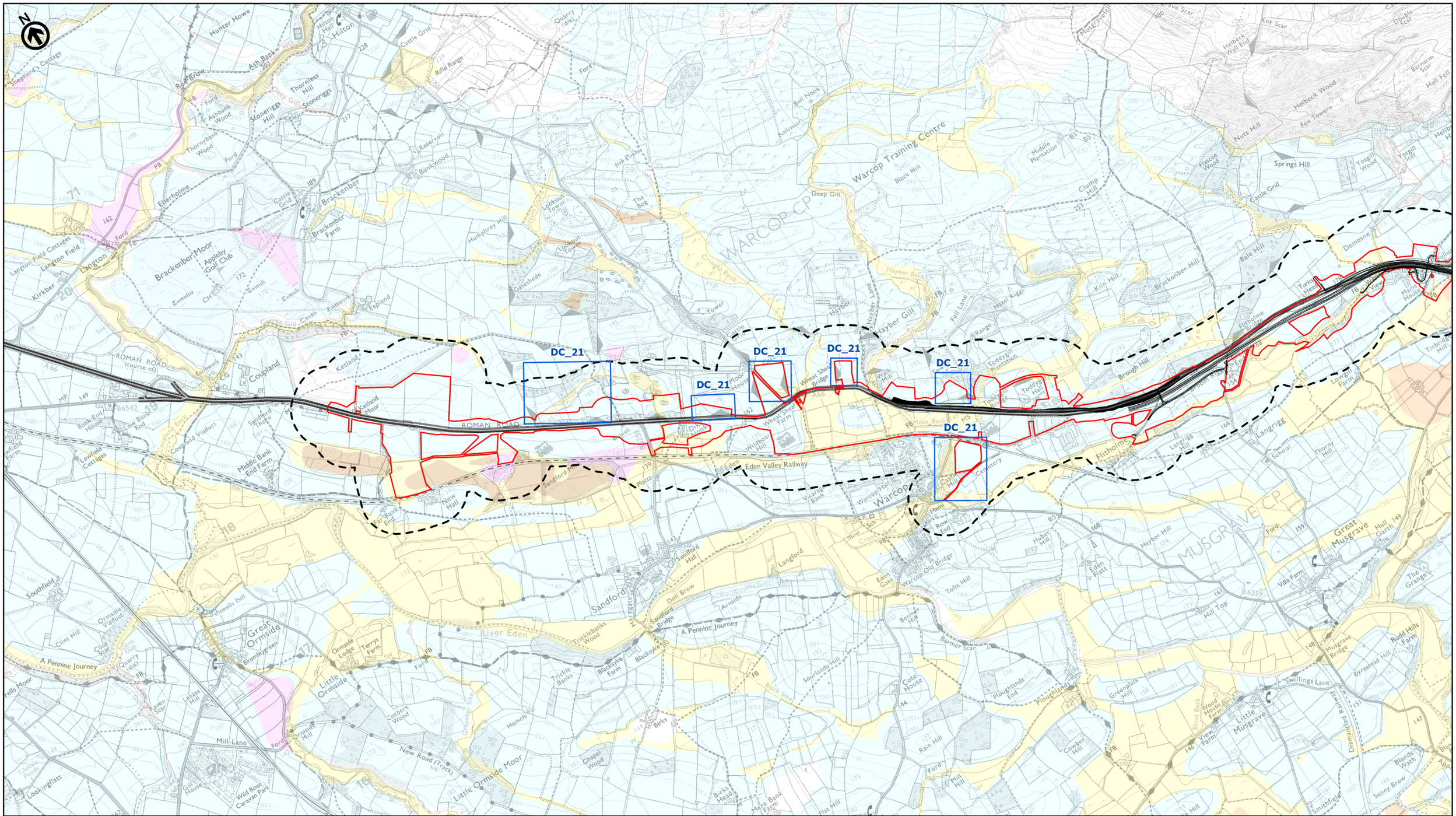
Project Name
A66 Northern Trans-Pennine Project

Map Title
Figure 1
Geology and Soils Study Area
Scheme: 06, Appleby to Brough
Sheet 1 of 1

Map Number
| Project | Originator | Volume |
HE565627 - AMY - EGT -
S00 - MP - LG - 005095
| Location | Type | Role | Number |

Suitability	Suitability Description	Revision
S4	FIT FOR STAGE APPROVAL	P02

This Environmental Statement Figure meets the requirements of Regulation 5(2)(l)(i) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure Regulations) 2009.



Route Alignment
Existing A66
Proposed Order Limits
Study Area 250m

1:50k Artificial ground
Disturbed Ground
Infilled Ground
Made Ground

1:50k Superficial Deposits
Alluvium
Glacial Till
Glaciofluvial Deposits
Hummocky Glacial Deposits
Peat
River Terrace Deposits

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Revision	First Issue				
	CESL	PKEL	CMCG	AMIT	KWHA
P02	14/03/23	14/03/23	14/03/23	14/03/23	14/03/23
Revision	Created	Checked	Reviewed	Approved	Authorised

Kilometres
0 1 2

Scale @ A3: 1:25,000 | Project Ref No HE565627 | Stage: Stage 3

Project Name
A66 Northern Trans-Pennine Project

Map Title
Figure 2
Published Geology - Superficial Geology
Scheme: 06, Appleby to Brough
Sheet 1 of 1

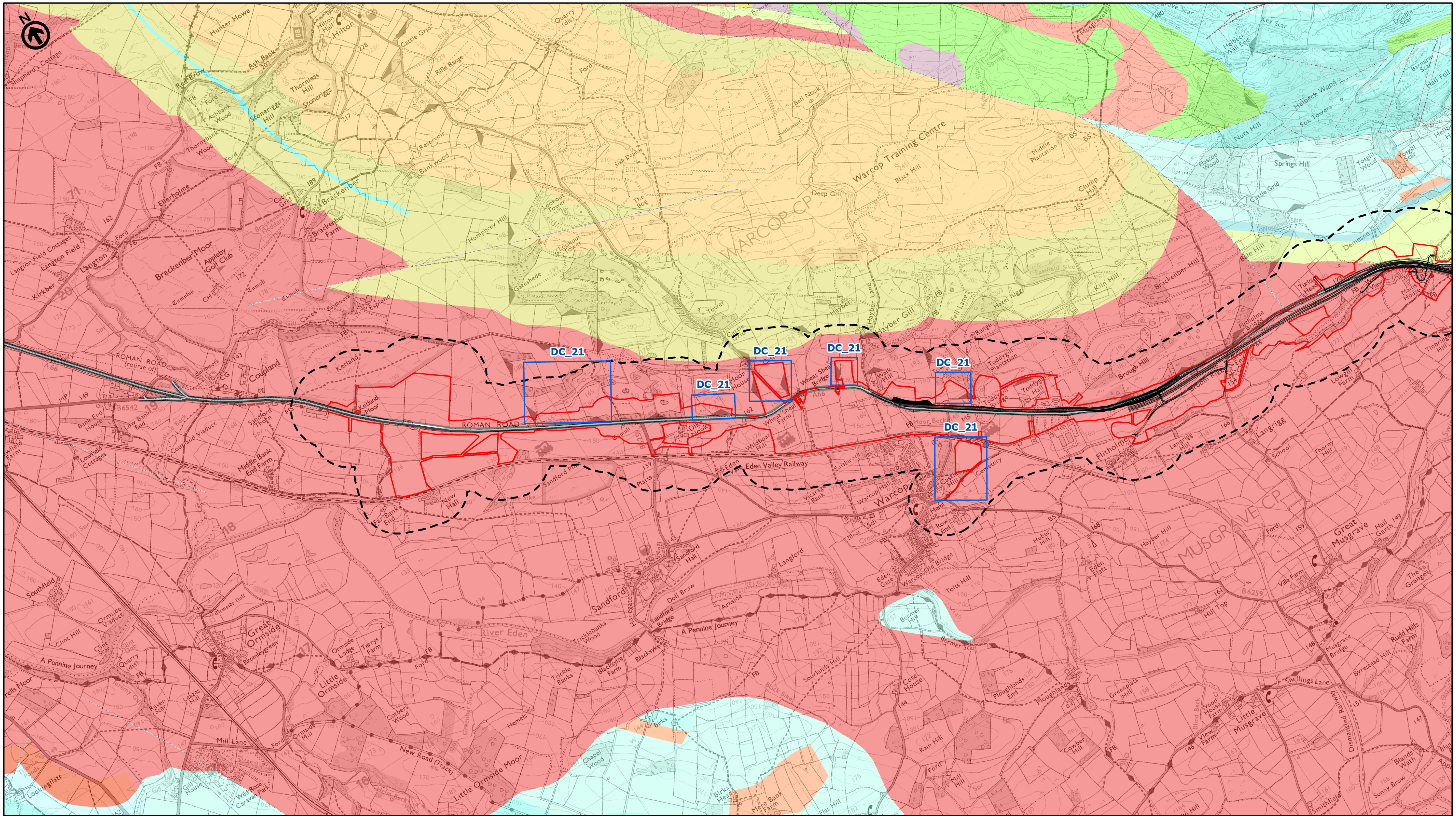
Map Number

Project	Originator	Volume	Location	Type	Role	Number
HE565627	AMY	EGT	S00	MP	LG	005115

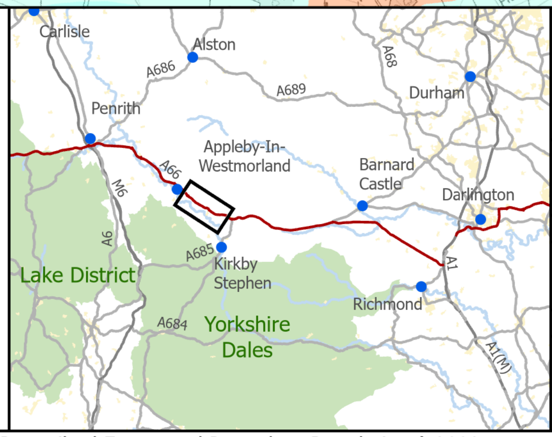
Suitability	Suitability Description	Revision
S4	FIT FOR STAGE APPROVAL	P02

This Environmental Statement Figure meets the requirements of Regulation 5(2)(l)(i) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure Regulations) 2009.

PINS Reference Number: TR010062/APP/3.3



Route Alignment	Brockram Breccia
Existing A66	Crag Limestone
Proposed Order Limits	Eden Shales
Study Area 250m	Evaporite - Gypsum
BGS 1:50k Linear Features	Four Fathom Limestone
Mineral Vein	Great Limestone Member
Glacial Meltwater Channel	Little Limestone
Fault Unspecified	Penrith Sandstone
BGS 1:50k Bedrock	St Bees Sandstone Member
Alston Formation - Mudstone Sandstone and Siltstone	Stainmore Formation - Mudstone, Siltstone and Sandstone
Alston Formation - Sandstone	Three Yard Limestone
Belah Dolomite	



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Revision	First Issue				
P02	CESL	CHAL	CMCG	AMIT	KWHA
	14/03/23	14/03/23	14/03/23	14/03/23	14/03/23
Revision	Created	Checked	Reviewed	Approved	Authorised

Kilometres
0 1 2

Scale @ A3: 1:25,000 | Project Ref No HE565627 | Stage: Stage 3

Project Name
A66 Northern Trans-Pennine Project

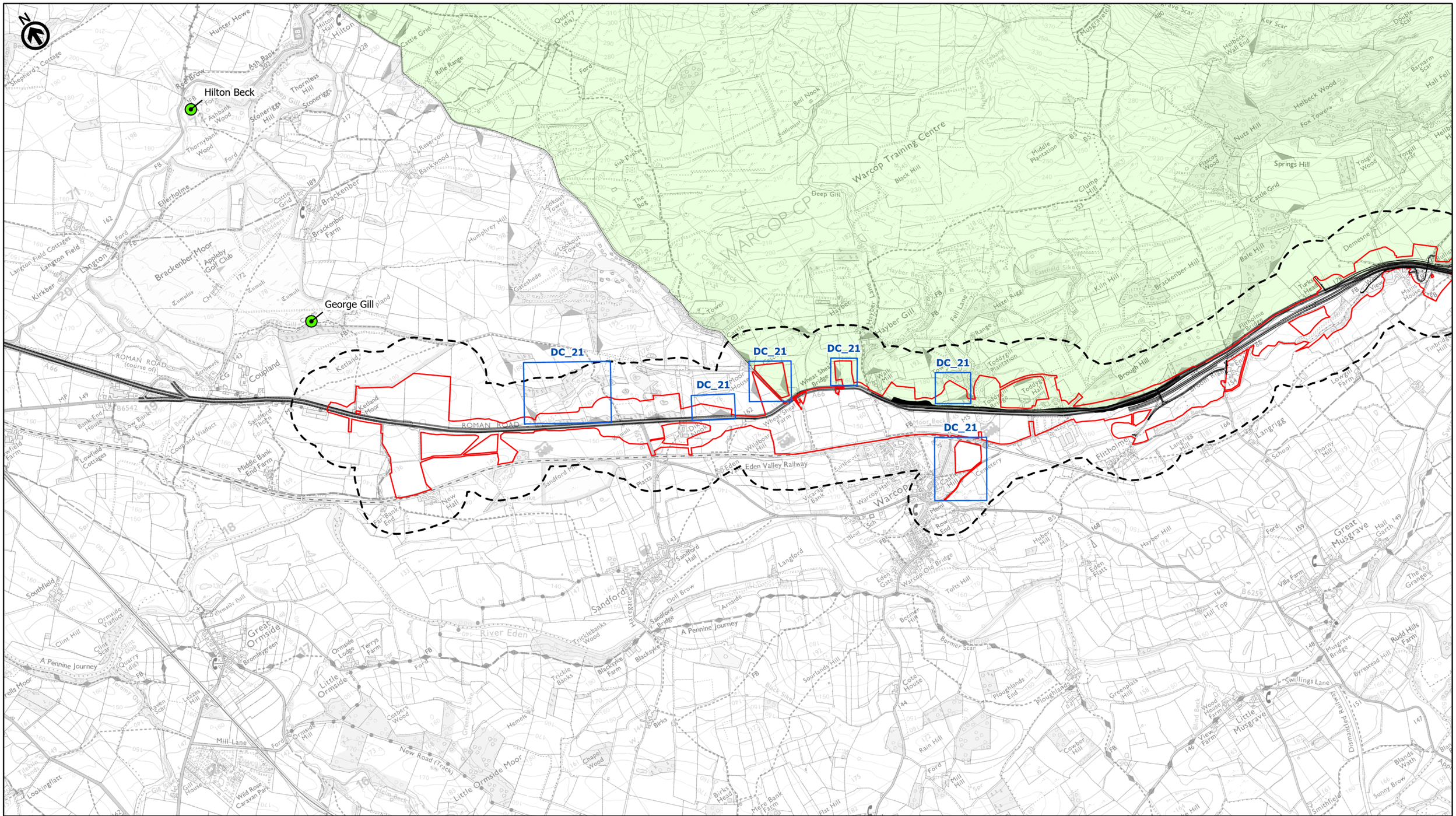
Map Title
Figure 3
Published Geology - Bedrock Geology
Scheme: 06, Appleby to Brough
Sheet 1 of 1

Map Number
Project	Originator	Volume	Location	Type	Role	Number
HE565627	AMY	EGT	S00	MP	LG	005105

Suitability	Suitability Description	Revision
S4	FIT FOR STAGE APPROVAL	P02

This Environmental Statement Figure meets the requirements of Regulation 5(2)(l)(i) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure Regulations) 2009.

PINS Reference Number: TR010062/APP/3.3



- Route Alignment
- Existing A66
- Proposed Order Limits
- Study Area 250m
- Geodiversity Sites
- UNESCO Global Geopark

Kilometres: 0 1 2

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Revision	Created	Checked	Reviewed	Approved	Authorised
P02	First Issue				
	CESL	PKEL	CMCG	AMIT	KWHA
	14/03/23	14/03/23	14/03/23	14/03/23	14/03/23

Scale @ A3: 1:25,000 | Project Ref No HE565627 | Stage: Stage 3

Project Name
A66 Northern Trans-Pennine Project

Map Title
Figure 4
Geodiversity
Scheme: 06, Appleby to Brough
Sheet 1 of 1

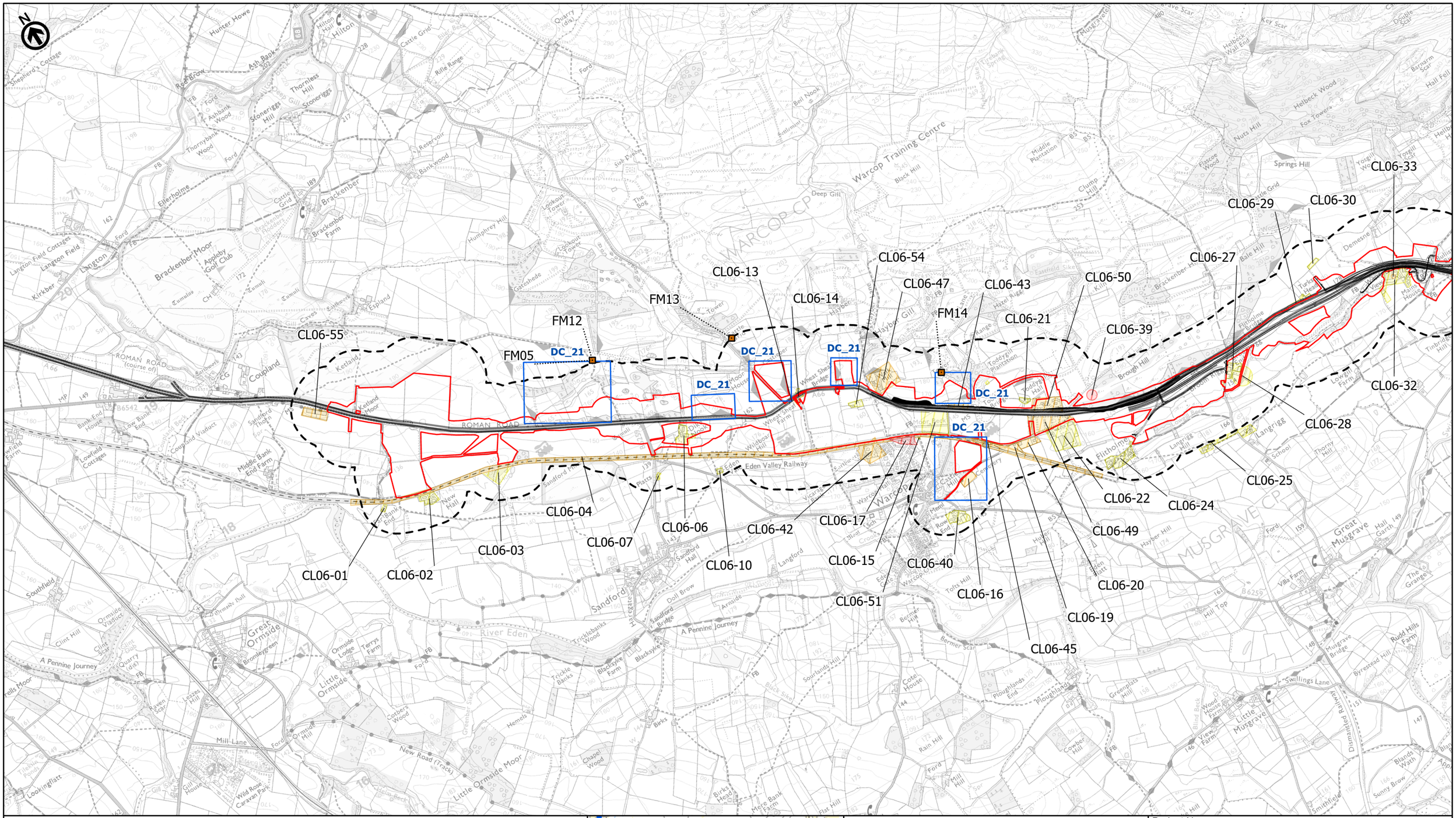
Map Number

Project	Originator	Volume	Location	Type	Role	Number
HE565627	AMY	EGT	S00	MP	LG	005125

Suitability	Suitability Description	Revision
S04	FIT FOR STAGE APPROVAL	P02

This Environmental Statement Figure meets the requirements of Regulation 5(2)(l)(i) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure Regulations) 2009.

PINS Reference Number: TR010062/APP/3.3

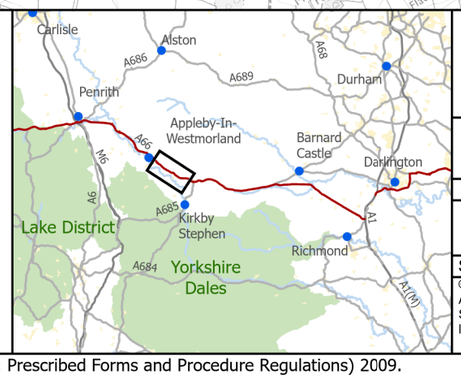


- Route Alignment
- Existing A66
- Study Area 250m
- Proposed Order Limits
- Foot And Mouth Burial Sites

Potential Contaminated Sources

- Low
- Moderate Low
- Moderate High

CL09-12 - Site No.
└ Scheme No.



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Revision	Created	Checked	Reviewed	Approved	Authorised
P02	CESL	PKEL	CMCG	AMIT	KWHA
	First Issue				
	14/03/23	14/03/23	14/03/23	14/03/23	14/03/23

Kilometres
0 1 2

Scale @ A3: 1:25,000 | Project Ref No HE565627 | Stage: Stage 3

Project Name
A66 Northern Trans-Pennine Project

Map Title
Figure 5
Potential Contamination Sources
Scheme: 06, Appleby to Brough
Sheet 1 of 1

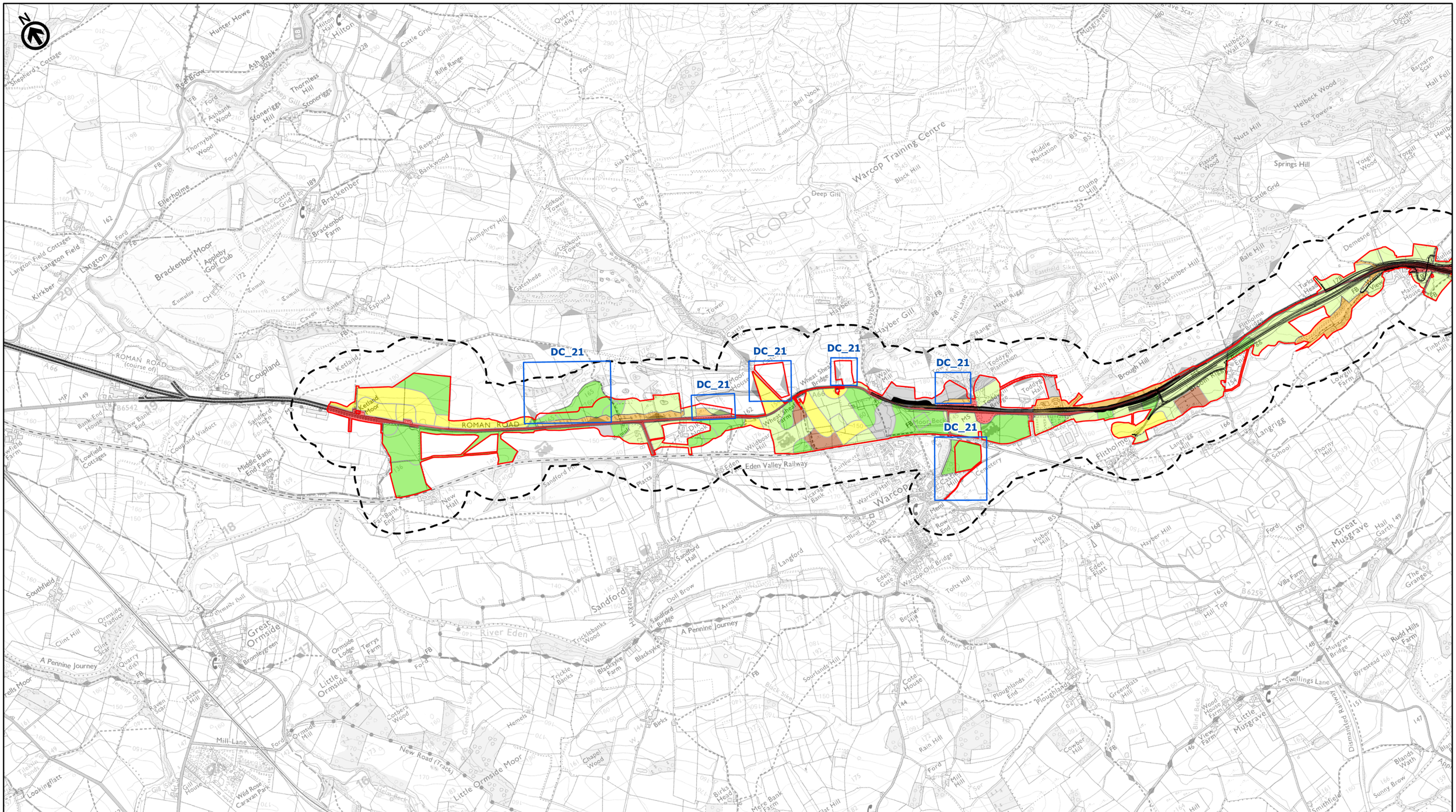
Map Number

Project	Originator	Volume	Location	Type	Role	Number
HE565627	AMY	EGT	S00	MP	LG	005135

Suitability	Suitability Description	Revision
S4	FIT FOR STAGE APPROVAL	P02

This Environmental Statement Figure meets the requirements of Regulation 5(2)(l)(i) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure Regulations) 2009.

PINS Reference Number: TR010062/APP/3.3



Route Alignment
Existing A66
Study Area 250m
Proposed Order Limits

Agricultural Land Classification Factual Soil Survey
- Grade 2
- Grade 3a
- Grade 3b
- Grade 4
- Grade 5
- Non Agricultural
- Not Surveyed
- Urban
- Not Coded

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Revision	Created	Checked	Reviewed	Approved	Authorised
P02	First Issue				
	CESL	PKEL	CMCG	AMIT	KWHA
	14/03/23	14/03/23	14/03/23	14/03/23	14/03/23

Kilometres
0 1 2

Scale @ A3: 1:25,000 | Project Ref No HE565627 | Stage: Stage 3

Project Name
A66 Northern Trans-Pennine Project

Map Title
Figure 6
Agricultural Land Classification
Scheme: 06, Appleby to Brough
Sheet 1 of 1

Map Number

Project	Originator	Volume	Location	Type	Role	Number
HE565627	AMY	EGT	S00	MP	LG	005145

Suitability	Suitability Description	Revision
S4	FIT FOR STAGE APPROVAL	P02

This Environmental Statement Figure meets the requirements of Regulation 5(2)(l)(i) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure Regulations) 2009.

PINS Reference Number: TR010062/APP/3.3

N

Eastfield Sike

Toddygill Hall

Brough Hill

Warcrop Training Centre

Eastfield Farm

Meadow Bank View

A66

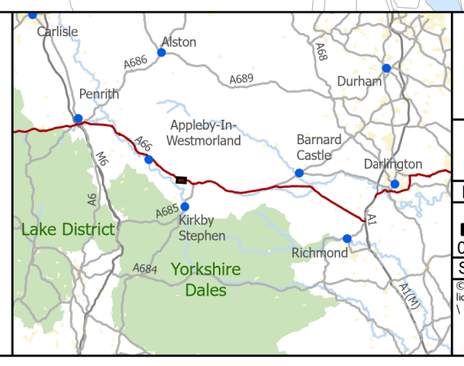
Low Broomrigg

Lowgill Beck

Flitholme

Langrigg Hill

- Route Alignment
- DC-24 Alignment
- Existing A66
- Proposed Order Limits
- DC-24 Cuttings zone of influence
- Cuttings zone of influence



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Revision	Created	Checked	Reviewed	Approved	Authorised
P01	PKEL	CESL	BWIL	AWAR	KWHA
First Issue	08/03/23	08/03/23	08/03/23	08/03/23	08/03/23

Metres
0 100 200 300 400

Scale @ A3: 1:5,000 | Project Ref No HE565627 | Stage: Stage 3

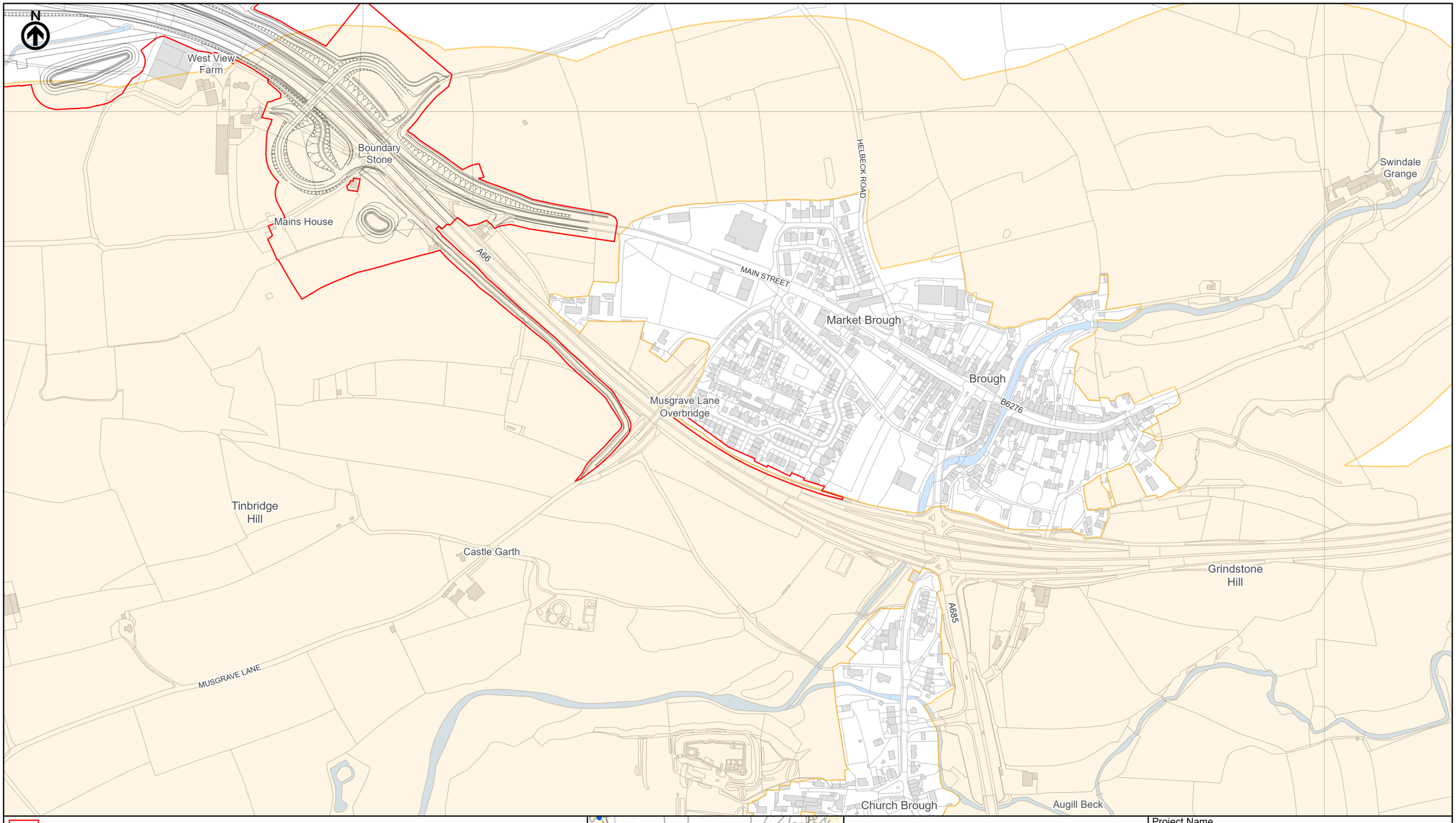
Project Name
A66 Northern Trans-Pennine Project

Map Title
Figure 7
Cutting Assessment Zone of Influence: DC-24
Scheme: 06, Appleby to Brough
Sheet 1 of 1

Map Number

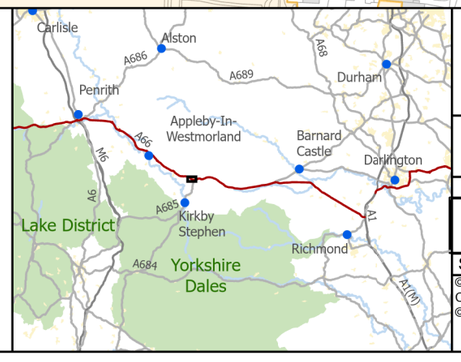
Project	Originator	Volume	Location	Type	Role	Number
HE565627 -	AMY -	EWE -	S06 -	MP -	LD -	11120

Suitability	Suitability Description	Revision
S4	FIT FOR STAGE APPROVAL	P01



Proposed Order Limits

Cumbria C.C. Mineral Consultation Areas



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Revision	Created	Checked	Reviewed	Approved	Authorised
P02	PKEL 02/03/23	CESL 02/03/23	BHUD 02/03/23	AMIT 02/03/23	KWHA 02/03/23

First Issue

Metres: 0 125 250

Scale @ A3: 1:5,000 | Project Ref No HE565627 | Stage: Stage 3

Project Name
A66 Northern Trans-Pennine Project

Map Title
Figure 8
Mineral Safeguarding Areas: DC-27
Scheme: 06, Appleby to Brough
Sheet 1 of 1

Map Number

Project	Originator	Volume	Location	Type	Role	Number
HE565627	AMY	EGN	S00	MP	LM	200150

Suitability	Suitability Description	Revision
S4	FIT FOR STAGE APPROVAL	P02