



Haweswater Aqueduct Resilience Programme - Proposed Bowland Section

Environmental Statement

Volume 4

Chapter 9A: Terrestrial Ecology

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Proposed Bowland Section ES, Volume 4
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Contents

9. Ecology – 9A Terrestrial Ecology.....	1
9.1 Introduction	1
9.2 Scoping and Consultations.....	2
9.2.1 Scoping.....	2
9.2.2 Consultation.....	2
9.3 Key Legislation and Guidance	2
9.4 Assessment Methods and Assessment Criteria	6
9.4.1 Assessment Methods.....	6
9.4.2 Establishing the Baseline	6
9.4.3 Valuation of Ecological Features	9
9.4.4 Characterising Effects.....	11
9.4.5 Embedded Mitigation and Good Practice.....	12
9.4.6 Assumptions and Limitations	14
9.5 Baseline Conditions.....	14
9.5.1 Information Sources.....	14
9.5.2 Designated Sites.....	15
9.5.3 Habitats and Flora	22
9.5.4 Fauna.....	29
9.5.5 Identification and Valuation of Ecological Features	33
9.6 Assessment of likely significant effects.....	38
9.6.1 Enabling Works Phase	38
9.6.2 Construction Phase	54
9.6.3 Commissioning Phase	67
9.6.4 Operational Phase	68
9.7 Mitigation and Residual Effects.....	69
9.7.1 General Measures	69
9.7.2 Designated Sites and GWDTE	69
9.7.3 Habitats	70
9.7.4 Bats	71
9.7.5 Badgers.....	71
9.7.6 Other Mammals.....	72

9.9	Conclusion.....	90
9.9.1	Off-Site Highways Works and Proposed Ribble Crossing.....	90
9.10	Glossary and Key Terms	91

9. Ecology – 9A Terrestrial Ecology

9.1 Introduction

- 1) This chapter presents the approach and findings of the ecological impact assessment (EclA) of potential impacts on nature conservation assets arising from the Proposed Bowland Section on Ecology.
- 2) The chapter begins by reviewing the legislation and planning policies relevant to Ecology. The study area and methods for the assessment are then outlined. The nature, value and sensitivity of the existing baseline environment are then identified before an assessment is made of the potential effects on Ecology from the Proposed Bowland Section. Mitigation measures have been proposed to avoid, reduce or offset any potential effects and these embedded mitigation measures have been taken into account in the assessment, which are mentioned in Chapter 3: Scheme Description. Additional mitigation measures are further outlined in Section 9A.7.
- 3) This assessment covers the Proposed Bowland Section, located in north Lancashire between National Grid References SD689503 and SD637655. The study area for the Proposed Bowland Section is west of Newton-in-Bowland (southern extent) and south east of Wray (northern extent).
- 4) The Proposed Bowland Section broadly comprises launch at the Newton-in-Bowland compound, from which the tunnel boring machine (TBM) would drive via a portal approximately 16 km northwards below-ground and received via a 15 m deep shaft at the Lower Houses compound. Tunnel boring activities would be at depths of greater than 150 m depth for the majority of the section, increasing to 380 m below the surface when passing under White Hill in the Trough of Bowland. Tunnel boring would therefore not have potential to give rise to significant ecological effects upon important (terrestrial) ecological features. The study area is therefore focussed only on above-ground works for the purposes of this EclA for Terrestrial Ecology.
- 5) Above-ground works include a mix of temporary construction activities and permanent installations. Above-ground works consist of the following components:
 - The Newton-in-Bowland Compound would be the launch facility in the south, located approximately 440 m west of Newton-in-Bowland, comprising two compound areas separated by Newton Road. Site access would be via a temporary haul road approximately 1 km in length running from the B6478 just south of Newton-in-Bowland with a new temporary bridge crossing of the river to reach the compound area south of Newton Road
 - Satellite compound at Wray for managing timing of ongoing compound deliveries and dividing deliveries materials into smaller loads. This would be located within an arable field between Hornby and Wray, just to the north of the B6480 at central grid ref SD 590 679
 - The Lower Houses Compound would be the reception facility in the north, located approximately 4 km south east of Wray and 1.6 km northwest of Low Gill. The compound would include surplus materials storage (tunnel arisings) within its boundaries. Site access would be from Park House Lane in the north east with site traffic exiting by the unnamed road on the western edge of the compound. Abnormal loads and HGVs that can't use the north east entrance would both access and depart the site via the western access
 - Surplus materials treatments – Waddington Fell Quarry (Bowland and Marl Hill Sections)
 - Residents' parking area at Wray to avoid roadside parking by residents conflicting with construction access

- 7) Requirements for parking facilities near Clitheroe, road widening, passing places and junction improvements along the route are described and assessed in Volume 5 (Off-Site Highways Works) of the Environmental Statement (LCC_RVBC-BO-ES-V5-P1 and P2) and summary findings are incorporated into the Conclusion (Section 9.9) of this document and Chapter 21 (Summary of Significant Effects).
- 8) Transport routes for the Lower Houses Compound for light vehicles and limited HGVs (32 T GVW, 8x4 tipper) would be from the A683 (between Cloughton and Hornby) along the B6480 towards Wray and onto Wennington, turning onto Eskew Lane just before Low Bentham and continuing onto Long Lane, then taking Spen Brow, joining Furnessford Road and continuing onto Park House Lane. After Long Lane this is a one-way system and vehicles would exit the Lower Houses Compound via the unnamed road in the west, upon reaching the outskirts of Wray the route turns east until it re-joins the main route at Long Lane. For abnormal loads and HGVs that cannot use the main route they would take the B6480 and travel through Wray along Main Street before heading south after crossing the River Roeburn and heading on the unnamed road to the Lower Houses Compound.
- 9) The study area for baseline field surveys encompassed varied buffers from Newton-in-Bowland and Lower Houses Compounds and their respective access routes according to the target feature (discussed further in Section 9A.4.2), while the study area for desk-based assessment encompassed a buffer of up to 5 km from these locations.

9.2 Scoping and Consultations

9.2.1 Scoping

- 10) An Ecology chapter was included within the EIA Scoping Report which was submitted to the relevant planning authorities for comment in October 2019. Scoping report responses were provided by each of the local authorities and these have been reviewed and incorporated into the assessment. An EIA Scoping Addendum was submitted to the relevant planning authorities in February 2021 to capture changes in the proposed development and EIA approach since October 2019. Scoping comments and responses are outlined in Appendix 4.1.

9.2.2 Consultation

- 11) During the course of this assessment, consultation has taken place with relevant statutory and non-statutory consultees, stakeholders and third parties, through both correspondence and face-to-face meetings. This has been summarised in Appendix 4.1.

9.3 Key Legislation and Guidance

- 12) Table 9A.1 introduces relevant Ecology legislation and key guidance of relevance to undertaking EclA.

Table 9A.1: Ecology Key Legislation and Guidance

Legislation / Guidance	Description
International Legislation	
Convention on Biological Diversity 1992 (CBD)	Established a global vision for biodiversity, including a set of strategic goals and targets to drive action. Government subsequently published The Natural Choice

Legislation / Guidance	Description
European Wildlife and Natural Habitats 1979	transposed in the UK into national law by means of the Wildlife and Countryside Act 1981 as amended.
Bonn Convention on the Conservation of Migratory Species of Wild Animals 1979	Pertains to migratory species and those that regularly cross the political boundaries of countries. Appendix I includes critically threatened species (those in danger of extinction). Appendix II lists migratory species whose conservation status is unfavourable and which would benefit from coordinated conservation measures. The obligations of the Convention are transposed in the UK into national law by means of the Wildlife and Countryside Act 1981 as amended, with the Countryside and Rights of Way Act 2000 strengthening the protection of certain species in England and Wales.
Conservation of Populations of European Bats 1991 (EUROBATS)	Legally binding agreement under the Bonn Convention, which came into force in the UK in 1994. It recognises that endangered migratory species can only be properly protected if activities are carried out over the entire migratory range of the species, and it aims to protect all species of bats identified in Europe through legislation, education, conservation measures and international co-operation.
Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971	Intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. The Convention has several mechanisms to help Contracting Parties designate their most significant wetlands as Ramsar Sites, and to take the steps necessary to manage them effectively, maintaining their ecological character.
Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora	Referenced by the Conservation of Habitats and Species Regulations 2017 (as amended). Provides definitions for factors such as the favourable conservation status of habitats and species. Sets out a framework at Annex III for site selection criteria to be applied for the designation of special areas of conservation, in addition to providing lists of natural habitat types (Annex I) and species (Annex II) for which the designation of special areas of conservation should be prioritised. Also lists species of animals (Annex IV(a)) and plants (Annex IV(b)) species which are in need of strict protection.
National Legislation	
<p>The Conservation of Habitats and Species Regulations 2017 (as amended)</p> <p>Including by:</p> <p>The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019</p>	<p>Provide for the identification, designation and protection of Natura 2000 (N2k) sites; for the purposes of these provisions, N2k sites include Special Areas of Conservation (SAC); Special Protection Areas (SPA) (and Ramsar sites). The Regulations also convey a statutory requirement for authorities to undertake a Habitats Regulations Assessment (HRA) of the potential impacts of plans and projects, including development proposals, on N2k sites and also convey strict levels of protection to certain species and their habitats or places of shelter. Derogations are afforded for such species through grant of licences, which must satisfy three tests relating to purpose and no satisfactory alternative for the proposed activity and maintaining favourable conservation status (FCS) of the affected species.</p>

Legislation / Guidance	Description
	be of principal importance in conserving biodiversity. It also amends and strengthens certain protections afforded by the WCA.
Natural Environment and Rural Communities Act 2006 (NERC)	Imposes a duty on all public bodies to have regard for biodiversity conservation when carrying out their functions. This extends the duty imposed upon Government and Ministers by CROW. Section 41 provides for the establishment of a list of habitat and species that are considered to be of ' <i>principal importance for the for the purpose of conserving biodiversity</i> ' for which biodiversity conservation should be prioritised. These are referred to hereafter as habitat of principal importance (HPI) and species of principal importance (SPI).
National Parks and Access to the Countryside Act 1949	<p>Enables the establishment and management of Nature Reserves:</p> <ul style="list-style-type: none"> ▪ for the purpose of research and study of flora and fauna or geological and physiographical features ▪ for the preservation of such special features. <p>National Nature Reserves (NNR) may be established and declared by the statutory nature conservation agencies and managed by them or an approved body. Local authorities may also establish nature reserves and declare them Local Nature Reserves (LNR), provided the relevant statutory nature conservation agency approves.</p>
Hedgerows Regulations 1997	Protects certain 'important' hedgerows from removal or damage without permission from the local planning authority. Works to important hedgerows are exempt under the Regulations if planning consent is granted which allows their removal.
Protection of Badgers Act 1992 (PBA)	This makes it an offence to wilfully kill, injure, take, possess or cruelly ill-treat a badger, or to attempt to do so; or to intentionally or recklessly interfere with a sett. Sett interference includes disturbing badgers whilst they are occupying a sett, as well as damaging or destroying a sett or obstructing access to it. A badger sett is defined in the legislation as 'any structure or place, which displays signs indicating current use by a badger' and includes above and below ground features.
Key EclIA Guidance	
CIEEM Guidelines for Preliminary Ecological Appraisal ¹	Provides a common framework for preliminary ecological assessment (PEA) to promote better communication, understanding and cooperation between stakeholders.
CIEEM Guidelines for Ecological Impact Assessment ²	Promotes good practice, a scientifically rigorous and transparent approach to ecological impact assessment (EclIA). Provides a common framework for EclIA to promote better communication and closer cooperation between ecologists undertaking EclIA and provides decision makers with relevant information about the likely ecological effects of a project.
Biodiversity: Code of	Provides standard recommendations on topics such as professional practices

Legislation / Guidance	Description
<p>Forest of Bowland Area of Outstanding Natural Beauty Management Plan 2019 – 2024⁴</p>	<p>The AONB sets out the challenges and objectives for management of the AONB. One of the three core Themes is 'An Outstanding Landscape of Natural and Cultural Heritage' and one of the four objectives for this Theme is <i>Habitats and Species: Conserve, enhance and restore the AONB's characteristic mosaic of habitats by improving their connectivity, extent and condition; whilst taking targeted action to conserve key species and improving understanding of the biodiversity of the AONB.</i></p>
<p>Lancashire Biodiversity Action Plan⁵</p>	<p>Describes Lancashire's biodiversity evidence base and explains the full range of information that should be considered in the planning process including statutory and non-statutory designations, priority habitats and Lancashire Biodiversity Action Plan (LBAP) Species and Habitat Statements, produced for habitats and species requiring priority active in Lancashire and for which targets are set for recovery.</p> <p>In addition to a variety of coastal, intertidal and urban habitats, LBAP habitats include:</p> <ul style="list-style-type: none"> ▪ arable farmland ▪ broad-leaved and mixed woodland ▪ calcareous grasslands ▪ limestone pavement ▪ moorland and fell ▪ mossland ▪ reedbed ▪ rivers and streams ▪ species-rich neutral grassland <p>Relevant LBAP species include:</p> <ul style="list-style-type: none"> ▪ bird's-eye primrose ▪ black poplar ▪ dwarf cornel ▪ flat sedge ▪ greater butterfly orchid ▪ lady's slipper orchid ▪ Lancaster whitebeam ▪ purple rampion fumitory ▪ bats (all species) ▪ farmland birds ▪ black-tailed godwit ▪ house sparrow ▪ lapwing ▪ reed bunting ▪ skylark ▪ song thrush ▪ twite ▪ brown hare ▪ red squirrel ▪ common frog ▪ great crested newt ▪ natterjack toad ▪ belted-beauty moth

Legislation / Guidance	Description
	<ul style="list-style-type: none"> ▪ shining guest ant ▪ southern wood ant ▪ wall mason bee

13) National and Local Planning Policies are covered in Chapter 5.

9.4 Assessment Methods and Assessment Criteria

9.4.1 Assessment Methods

14) Reference has been made to national and local policy documents, relevant British Standards, national guidance (set out in Table 9A.1) and other relevant information in determining the assessment methodology and criteria to be used.

15) The assessment was undertaken in accordance with the following assessment method below:

- Describe the baseline conditions relevant to terrestrial ecology and identify important ecological features
- Identify the important ecological (terrestrial) features which may potentially be affected by the construction or operation of the Proposed Bowland Section, these including:
 - habitats or species afforded protection under international or national legislation
 - habitats of principal importance (HPI) or species of principal importance (SPI) for nature conservation as determined under Section 41 of the NERC Act
 - other habitats or species identified as being of regional or local conservation concern (e.g. those for which Biodiversity Action Plans (BAP) have been delivered or which appear on 'Red lists' or other lists identifying conservation concern)
- Evaluate important ecological features in accordance with *Guidelines for EclA*⁶ (2018)
- Identify and characterise potential effects during construction and operational phases (in respect of biophysical changes and taking account of relevant aspects of ecosystem structure or function)
- Incorporate measures to avoid or reduce these effects
- Assess the significance of residual effects after mitigation
- Identify appropriate compensation measures to offset significant residual effects
- Identify opportunities for ecological enhancement.

16) The method was agreed with relevant stakeholders as outlined above in Section 9A.2.2.

9.4.2 Establishing the Baseline

17) Table 9A.2 summarises the desk and field based surveys completed to establish and describe the baseline for terrestrial ecology at the Proposed Bowland Section. The table provides references to the relevant

Table 9A.2: Baseline Surveys

Survey	Summary and Timing	Standard	Appendix	Figure
Desk-based Assessment (DBA)	<p>Search of Natural England data inventories via MAGIC⁷ for the following:</p> <ul style="list-style-type: none"> ▪ Statutory designations within 5 km ▪ Priority habitats within 1 km ▪ Ancient woodlands within 1 km <p>Data request to Lancashire Ecological Records Network (LERN) for the following:</p> <ul style="list-style-type: none"> ▪ Non-statutory designations within 2 km ▪ Pre-existing records for protected species, SPI and other notable species <p>Review Lancashire Biodiversity Action Plan⁸ identify habitats and species of conservation priority in Lancashire.</p> <p>Assessment of potentially sensitive features (designated sites or habitats) up to 5 km for internationally designated site and up to 200 m from compound boundaries to identify potential features that may be affected by air quality changes resulting from compound generator use.</p> <p>August 2018, August 2019, May to June 2020</p>	CIEEM Guidelines for Preliminary Ecological Appraisal ⁹	Appendix 9A.1	Figures 9A.1 to 9A.3
Extended Phase 1 habitats	<p>Field survey within extent of the Proposed Bowland Section and, where accessible, land up to 200 m. Supplemented by review of DBA, Ordnance Survey maps and aerial photography. Target notes recorded for each habitat feature of note.</p> <p>April 2019 to June 2020</p>	Handbook for Phase I Habitat Survey ¹⁰	Appendix 9A.2	Figure 9A.4
Hedgerows	<p>Botanical survey within extent of the Proposed Bowland Section and, where accessible, land up to 200m.</p> <p>April 2019 to June 2020</p>	Hedgerow Survey Handbook ¹¹ Hedgerow Regulations 1997	Appendix 9A.3	Figure 9A.5
National Vegetation	<p>Botanical survey of target vegetation communities, applying MAVIS¹² to quadrat</p>	NVC Users' Handbook ¹³	Appendix 9A.4	Figure 9A.6

Survey	Summary and Timing	Standard	Appendix	Figure
	Fen meadow (Area 1) – September 2019	Rodwell 1991 <i>et. seq</i> ^{14, 15, 16, 17}		
Groundwater Dependant Terrestrial Ecosystems (GWDTE)	Analysis of habitat and botanical / wetland community data alongside hydrological data to identify potential GWDTE located within 200 m from compounds, 250 m from access roads and 500 m from shafts. 30 th April to 6 th May 2020	Handbook for Phase I Habitat Survey ¹⁸ Rodwell (1991) ¹⁹ SNIFFER WFD95 Wetland Typology (2009) ²⁰ UKTAG guidance ²¹	Appendix 9A.5	Figure 9A.7
Badgers	Badger setts, signs and suitable habitats were recorded during the Phase 1 habitat survey along with incidental sightings during other Phase 2 survey visits. April 2019 to May 2020	Harris <i>et. al</i> (1989) ²²	Appendix 9A.6	Figure 9A.8
Ground-based assessment (GBA) of bat roosts in trees	Ground based assessment of trees (individual, hedgerow and woodland edge trees) within the Proposed Bowland Section and adjacent land where accessible for roost suitability. April 2019 to May 2020	Bat Surveys for professional Ecologists: Good Practice Guidelines ²³	Appendix 9A.7	Figure 9A.9
Bat activity	Combination of manual walked transects and remote monitoring surveys completed within the Proposed Bowland Section and, where accessible, land up to 200m. One transect route covered land in/around the Newton-in-Bowland Compound, supplemented by two static monitoring points within the compound and one static monitoring point within 200 m. One transect route covered land in/around the Lower Houses Compound, supplemented by one static monitoring point within the compound and one static monitoring point within 200 m.	Bat Surveys for professional Ecologists: Good Practice Guidelines ²⁴	Appendix 9A.8	Figure 9A.10

Survey	Summary and Timing	Standard	Appendix	Figure
	<p>Transect surveys – Newton-in-Bowland Compound: April 2020 (x2), May 2020 (x2), June 2020 (x2), July 2020 (x2); Lower Houses Compound: April 2020 (x1), May 2020 (x1), June 2020 (x1), July 2020 (x1).</p> <p>Static surveys (minimum 5 nights per survey) – Newton-in-Bowland Compound: - April 2020 (x2), May 2020 (x2), June 2020 (x2), July 2020 (x2); Lower Houses Compound: April 2020 (x1), May 2020 (x1), June 2020 (x1), July 2020 (x1).</p>			
Breeding birds	<p>Three daytime (early mornings) walkovers encompassing the Proposed Bowland Section. Transect routes were pre-determined to sample all key habitats. Bird species seen or heard and activity patterns were mapped using standard symbology.</p> <p>Three survey visits – April, May and June 2019</p>	<p>Bird Census Techniques²⁵ Gilbert <i>et. al</i> (1998)²⁶ Birds of Conservation Concern 4²⁷</p>	Appendix 9A.9	Figures 9A.11 to 9A.13
Wintering birds	<p>Seven daytime walkovers encompassing the Proposed Bowland Section. Transect routes were pre-determined to sample all key habitats. Bird species seen or heard and activity patterns were mapped using standard symbology.</p> <p>September, October, November, December 2019 and January, February, March 2020</p>	<p>Bird Census Techniques²⁸ BTO EWBS Method²⁹ Fuller, R.J. (1980)³⁰ Birds of Conservation Concern 4³¹</p>	Appendix 9A.10	Figures 9A.14 to 9A.21
Great crested newts	<p>eDNA samples from all ponds up to 250 m from the Proposed Bowland Section Newton-in-Bowland and Lower Houses Compounds.</p> <p>June 2019</p>	Great Crested Newt Mitigation Guidelines ³²	Appendix 9A.11	Figure 9A.22

9.4.3 Valuation of Ecological Features

18) Ecological features are valued based on a geographical scale following *Guidelines for EcIA*³³. Values are assigned according to the inherent conservation value of the flora, fauna or habitats in terms of the

conservation value of genetic resources. Values do not take account of the amenity or economic importance of the ecological resources. Further, legal protection is considered separately to the conservation value; not all legally protected species show the same rarity or range, for example. The geographical frame of reference applied for the valuation of ecological features is summarised in Table 9A.3.

Table 9A.3: Evaluation of Ecological Features

Ecological Value	Typical Criteria
International	<p>Designated or proposed/candidate N2k sites (SAC, SPA and Ramsar sites) and their qualifying features, some of which may depend on land outside the designation boundaries.</p> <p>Under NPPF, land that is set aside as compensation for adverse effects of development on N2k sites should also be regarded as of international value.</p> <p>Species populations or habitat areas of international importance due to relative size, rarity or quality of the ecological feature.</p>
National	<p>Designated or proposed SSSI, NNR, Marine Conservation Zones ('MCZ') and their qualifying features, some of which may depend on land outside the designation boundaries.</p> <p>A viable area of ancient semi-natural woodland (ASNW) or BAP habitat which meets SSSI selection thresholds or other nationally significant criteria.</p> <p>Species populations of national importance due to relative size, rarity or quality (including, but not exclusively, species listed on Schedules 5 or 8 of the W&C Act 1981 or occurring on UK Red Data lists).</p>
Regional	<p>Designated or proposed sites or species populations which exceed the County level designations but fall short of SSSI selection criteria.</p> <p>A viable area of ASNW or Regional BAP habitat which meets regionally significant criteria or smaller areas that are essential to maintain the viability of the whole at a regional level.</p>
County / District	<p>Designated or proposed County Wildlife Sites (CWS) or other Local Wildlife Site (LWS) and their qualifying features where they occur within the designation boundaries.</p> <p>A viable area of ASNW or local BAP habitat which meets County significant criteria or smaller areas that are essential to maintain the viability of the whole at a county level.</p> <p>Regularly occurring species populations (including, but not exclusively protected species, SPI or other species of conservation concern) or habitat areas of County (or District) importance due to relative size, rarity or quality.</p>
Local	<p>Local Nature Reserves (LNR), other reserves owned/managed by e.g. Local Wildlife Trust, Local Authority, RSPB (unless also designated at a higher level) and other non-designated sites which may not meet any of the above criteria but which appreciably enrich the local ecological network.</p> <p>Regularly occurring species populations which may include protected species, SPI, or County notable species which are of local significance due to relative size, quality or critical life stage supported.</p> <p>Features that do not meet any of the above criteria but which appreciably enrich the local</p>

Ecological Value	Typical Criteria
Immediate site	Habitats of little or no ecological value or function e.g. densely urbanised environments, amenity grassland, hard standing etc.

- 19) The purpose of assigning value to an ecological feature is to allow potential effects to be considered in relation to the feature value. The viability of an ecological feature is considered at the appropriate geographic frame of reference, thereby determining whether an ecological effect is likely to be significant or not. Viability of an ecological feature is taken to refer to 'integrity' for sites and ecosystems and 'conservation status' in respect of habitats and species.
- 20) Site 'integrity' is defined by Government Circular³⁴ as '*The coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or levels of populations of species for which it is classified*'.
- 21) Conservation of Habitats and Species Regulations 2017 (as amended) Regulation 3(1) confirms the conservation status of natural habitats is defined by Article 1(e) of the Habitats Directive to be favourable when:
- 'its natural range and areas it covers within that range are stable or increasing; and the species structure and functions which are necessary for its long term maintenance exist and are likely to continue to exist for the foreseeable future; and the conservation status of its typical species is favourable as defined in Article 1(j)'*.
- 22) The conservation status of a species is defined (as per Article 1(i) of the Habitats Directive) as favourable when:
- 'population dynamics data on the species concerned indicate that it is maintaining itself on a long term basis as a viable component of its natural habitats; and the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and there is, and will probably continue to be, a sufficiently large habitat to maintain its population on a long-term basis'*.

9.4.4 Characterising Effects

Magnitude of Effects

- 23) Characterisation of an impact upon an important ecological feature considers the parameters described in Table 9A.4.

Table 9A.4: Characterisation of Ecological Impacts

Parameter	Description
Direction	Positive: a change that improves the quality of the environment e.g. by increasing species diversity, extending habitat or improving water quality. This may also include slowing or halting an existing decline in the quality of the environment Negative: a change which reduces the quality of the environment e.g. destruction of

Parameter	Description
	context of a long-lived species but may span five generations of some invertebrate species.
Frequency and timing	The number of times an activity occurs and the timing of the activity as it may correlated with critical life-stages or seasons e.g. the bird nesting season.
Reversibility	Irreversible: recovery is not possible within a reasonable timescale or there is no reasonable change of action being taken to reverse it. Reversible: spontaneous recovering is possible or it may be counteracted by mitigation.

Significance of Effects

- 24) *Guidelines for EclA*³⁵ defines a significant ecological effect as 'an effect that either supports or undermines the biodiversity conservation objectives for important ecological features or for biodiversity in general'.
- 25) The significance of impacts on important ecological features is determined in accordance with *Guidelines for EclA*³⁶, such that an ecological effect is assessed to be either significant or not significant at the appropriate geographic frame of reference. For most designated wildlife sites, a significant upon such a site is likely to be significant at the same scale at which the site is valued (for example, an effect upon a SSSI is likely to be of national significance). However, the scale of significance may not always directly correspond to the geographic scale at which an ecological feature is valued. An effect upon a species which is included on the national list of SPI may not have a significant effect upon its national population.

9.4.5 Embedded Mitigation and Good Practice

- 26) Embedded mitigation is inherent to the design, and good practice measures are those which are standard industry practice used to manage commonly occurring environmental effects. The assessment of likely significant effects in Section 9.6 takes into account the application of both embedded mitigation and good practice measures as set out in this section.
- 27) The need for any additional topic-specific essential mitigation (generally for effects likely to be significant in the context of the EIA Regulations) identified as a result of the assessment in Section 9.6 is then set out separately in Section 9.7

Embedded Mitigation

- 28) Chapter 3: Design Evolution and Development Description explains the evolution of the design with input from the environmental team, including mitigation workshops and the use of GIS based constraints data. Embedded mitigation of particular relevance to terrestrial Ecology is set out below:
- Tunnel construction has been selected to avoid open cut methods (excepting for short multi-line siphon (MLS) sections to connect between the new and existing aqueduct sections)
 - A direct tunnel option has been taken to avoid the need for intermediary shafts which would have been located closer to the SPA boundaries and within at least one local wildlife site

- The temporary access route is offset from the River Hodder (except at the crossing) to avoid disturbing habitats and species associated with the river corridor
- At the Lower Houses Compound the redline boundary has been reduced to exclude some watercourses that flow along the boundaries.

Standard Measures

29) In addition to the above design considerations to deliver avoidance measures, a series of common approaches to facilitate feature avoidance has been developed to ensure legal compliance and to accord with industry standards and best practice. Details of these measures are provided within the Construction Code of Practice (CCoP) (Appendix 3.2). Those measure of most relevance to important ecological features include, but may not be limited to, the following:

- CCoP Section 5.2.2 'Protection of trees' requires appropriate tree and hedgerow protection measures to be implemented in accordance with current standards (BS 5837:2012) for all retained woodland, trees and hedgerows to avoid risk of incidental damage and disturbance to the habitats and the species they support during site clearance and construction
- CCoP Section 5.3.3.1 'Geomorphology – General Provisions' requires works to be avoided in or on the floodplains of Main Rivers and Ordinary Watercourses where practical and, where this is not practicable, the CCoP requires a minimum distance of 10 m to be provided between the works and the banks of the watercourse
- CCoP Section 5.3 'Water Environment' and Section 5.6 'Soils, Geology and Land Quality' set out a series of measures to preserve existing surface water run-off rates and land drainage rates and protect surface and groundwater flows, levels and quality
- CCoP Section 5.10 'Noise and Vibration' specifies a range of measures that, while focussed primarily on human receptors, would also reduce the potential for disturbance effects upon ecological features
- CCoP Section 4.5 'Lighting' requires that artificial lighting, where unavoidably required for safety and security during the construction phase, is designed in accordance with best practice to minimise potential impact upon the environment, including ecological features
- CCoP Section 5.11 'Air Quality' provides a list of measures to reduce potential impacts on air quality' requiring a range of avoidance or control measures to reduce the impact of dust and other adverse effects upon air quality
- CCoP Sections 5.2.1 Landscape management – general provisions', 5.4.1 'Ecological management – general provisions' and 5.4.2 'Measures to reduce potential impacts on ecological resources' in combination require updated pre-commencement surveys to be completed, vegetation removal to be minimised as far as practical, removal / translocation of habitats and other habitat features to be subject to ecological watching briefs, procedures for unanticipated discoveries or disturbance of protected species or important habitats and for accidental pollution incidents that may affect valued ecological features
- CCoP Sections 5.4.1 'Ecological management – general provisions' and 5.4.2 'Measures to reduce potential impacts on ecological resources' in combination require habitat re-instatement and restoration to be implemented at the earliest appropriate and to deliver at least like for like (quantity

- CCoP Section 4.4 specifies the fencing around compounds. Screening to dampen noise and dust effects are also included in the CCoP. These screening measures could help to reduce visual disturbance effects from certain activities within the compounds.

9.4.6 Assumptions and Limitations

- 30) Likely ecological effects described in this EclA are based on the Proposed Bowland Section development as described in Chapter 3.
- 31) Only above-ground works are considered in the EclA for Terrestrial Ecology. Detailed ecological surveys were completed for the above-ground envelopes comprising the Newton-in-Bowland Compound (launch facility) and Lower Houses Compound (reception facility), inclusive of temporary and permanent enabling and construction works. Buffers applied to the envelopes to extend areas for survey and assessment varied according to the type of survey, target feature(s) and access permissions but generally included up to a 50 m as part of detailed assessment and buffers up to 200 m for habitat and species context (e.g. species mobility and landscape permeability) and up to 200 m from compounds, 250 m from access routes and 500 m from shafts for identification of potential GWDTE.
- 32) This EclA has been completed on the basis of a reasonable worst-case. For example, the compound areas are wider than the comprehensive draft compound designs to provide some flexibility for the contractor in compound layout. Where retention of features within the compound is certain, due to location along boundaries for example or because of a commitment to protect a high value feature, this is reflected in the assessment. All other features within compounds are recorded as lost, although there is a commitment to minimise these losses were possible when compound layouts are updated. Habitat losses that United Utilities aspires to avoid but cannot guarantee at this stage are included in the EclA impact calculations. However, for clarification, those features that would be unavoidably lost (for example due to the location of shafts or open cut sections) are identified.
- 33) Assumptions have been made with regard to the quantification of habitat features. Numbers of individual trees are quantified from the Arboricultural Impact Assessment (AIA) report (Doc Ref LCC_RVBC-BO-TA-006-007). However, it should be noted that other assessments, for example ground-based assessment of trees for bat roost suitability, may include additional trees that are not identified by the AIA as they may be hedgerow features or occur within groups. Consequently, quantification of individual trees may differ according to the target feature being assessed. Linear hedgerow or watercourse measurements and woodland and other habitat area measurements are calculated from digitised field survey data using GIS. All measures quantified in this EclA are considered reasonable estimates.
- 34) Surveys were completed within appropriate seasons over appropriate periods in accordance with industry standards for the specific survey. Nevertheless, the surveys will only identify habitats and plants present at the time of survey. Additionally, most species investigated are mobile and will move into and out of areas over time. For these reasons a precautionary approach has been taken in the prediction of impacts. Where there is any doubt, except where specifically noted, species are assumed present and the impact is given the higher level of significance.
- 35) Constraints or limitations upon survey method or interpretation of survey findings are discussed in the relevant Appendix.
- 36) Information provided by third parties, including publicly available information, is correct at the time of

- Haweswater Aqueduct Resilience Programme – Proposed Bowland Section – EIA Scoping Report Addendum (Jacobs, February 2020)
- Lancashire Ecological Records Network (LERN), including boundaries and site information for non-statutorily designated sites such as Biological Heritage Sites (BHS) and pre-existing species records within 2 km of the Proposed Bowland Section
- Natural England habitat and species inventories³⁷ including:
 - Land-based statutory designated wildlife sites in England, including Ramsar sites, proposed Ramsar sites, Special Areas of Conservation (SAC), Possible SACs, Special Protection Areas (SPA), Potential SPAs, Sites of Special Scientific Interest (SSSI), SSSI units, SSSI Impact Risk Zones (IRZ), National Nature Reserves (NNR) and Local Nature Reserves (LNR)
 - Inventory of Ancient Woodland (IAW)
 - Priority Habitat Inventory (PHI)
 - European Protected Species Licences (EPSL)
- RSPB reserve boundaries
- RSPB 'Important Bird Areas' (IBA)
- Plantlife International 'Important Plant Areas' (IPA)
- Ecology Survey Data Reports produced by Bowland Ecology for the Proposed Bowland Section (Appendices 9.2 to 9.8) and supporting plans (Figures 9.5 to 9.21)
- Haweswater Aqueduct Resilience Programme Proposed Bowland Section Habitats Regulation Assessment (HRA) (The Environment Partnership) (LCC_RVBC-BO-APP-010)
- Haweswater Aqueduct Resilience Programme Proposed Bowland Section SSSI Report (The Environment Partnership) (Doc Ref LCC_RVBC-BO-APP-009)
- Haweswater Aqueduct Resilience Programme Proposed Docker Section AIA (Jacobs, June 2021) (Appendix 6.6) and supporting plans (Figures 6.5 and 6.6)
- Haweswater Aqueduct Resilience Programme Proposed Bowland Section GWDTE Assessment (Jacobs) (Appendix 7.2) and supporting plans (Figure 7.7)
- Haweswater Aqueduct Resilience Programme Proposed Bowland Section Air Quality Assessment (Jacobs) (Appendices 18.1 and 18.2) and supporting plan (Figure 18.1)

9.5.2 Designated Sites

38) There are 12 statutorily designated wildlife sites located within 5 km of the Proposed Bowland Section. The Bowland Fells SPA and the underlying Bowland Fells SSSI are located approximately 1.5 km north of the Newton-in-Bowland compound area. The North Pennine Dales Meadows SAC is located 2.2 km north east of the Newton-in-Bowland compound area along with the component Myttons Meadows SSSI, Bell Sykes Meadow SSSI and Langcliff Cross Meadow SSSI. Four other SSSIs are located within 5 km of the Newton-in-Bowland Compound area to the north east. Four further SSSIs are located within 5 km of the Lower Houses Compound. A summary of the statutory designations and qualifying features is presented at Table 9A.5.

- 41) The Lower Houses Compound overlies SSSI IRZs for Far Holme Meadow SSSI and Robert Hall Moor SSSI. The IRZs identify risk categories relating to air pollution, combustion, waste and composting processes.
- 42) A total of 42 Biological Heritage Sites (BHS) were identified within 2 km from the Proposed Bowland Section. Both the Lower Houses and the Newton-in-Bowland Compounds and all associated temporary and permanent works apart from a small area of junction improvements near Low Bentham are located within the Bowland Fells IBA. No other non-statutory wildlife site, including RSPB reserves or IPAs, were identified within the search area. These non-statutory sites are summarised in Table 9A.5.

Table 9A.5: Designated Wildlife Sites

Wildlife Site	Proximity to Proposed Bowland Section and Site Area	Summary Features
Statutorily Designated Wildlife Sites Within 5 km of the Proposed Bowland Section		
Bowland Fells SPA	2.7 km north west from the Newton-in-Bowland Compound 16,002.3 ha	The Bowland Fells SPA is important for the Annex I upland breeding birds hen harrier and merlin. It also supports an internationally important population of breeding lesser black-backed gulls which is proposed as an additional feature of the site. The Bowland Fells SPA encompasses the main upland block within the area of Lancashire known as the Forest of Bowland.
Bowland Fells SSSI	2.7 km north west from the Newton-in-Bowland Compound 15,759 ha	The SSSI Unit closest to the Proposed Bowland Section comprises unit 1011820, which was last reported to be in 'favourable' condition. The main habitat present is upland bogs.
North Pennine Dales Meadows SAC	2.2 km north east from the Newton-in-Bowland Compound 497.09 ha	The site is designated for supporting <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils and for its mountain hay meadows which contain a wide range of rare and local meadow species. The grasslands included show very limited effects of agricultural improvement and have good conservation of structure and function.
Myttons Meadows SSSI	2.2 km north east from the Newton-in-Bowland Compound 10.0 ha	Three of the SSSI underlying the North Pennine Dales Meadows SAC located within 5 km from the Proposed Bowland Section (units 1011702, 1022959 and 1011637) were last reported to be in 'favourable' condition.
Bell Sykes Meadow SSSI	3.1 km north east from the Newton-in-Bowland Compound 13.7 ha	The SSSIs represent some of the best examples of the few remaining species-rich meadow grasslands in the county.
Langcliff Cross Meadow SSSI	3.6 km north east from the Newton-in-Bowland Compound 5.3 ha	

Wildlife Site	Proximity to Proposed Bowland Section and Site Area	Summary Features
	4.4 ha	one of the few remaining unimproved herb-rich pastures present in this part of Lancashire. The SSSI Unit (1056500) was last reported to be in 'favourable' condition.
Far Holme Meadow SSSI	0.68 km east from the Lower Houses Compound 1.7 ha	The grassland plant communities present support many species characteristic of old hay meadows which have been traditionally managed and left unimproved for many years. Such communities are now scarce nationally and represent a highly vulnerable habitat which, in Lancashire, has been severely reduced by agricultural intensification. The SSSI Unit (1011696) was last reported to be in 'favourable' condition.
Robert Hall Moor SSSI	2.0 km north from the Lower Houses Compound 10.3 ha	The site is remarkable for the range of plants represented including two nationally rare communities and several species which are rare or very limited in their distribution. This assemblage of species is unique in Lancashire. Its most outstanding feature as a habitat is that it is the only extensive example of species-rich undrained and unimproved base-flushed neutral grassland known to remain in the county. The SSSI Unit (1011731) was last reported to be in 'favourable' condition.
Roeburndale Woods SSSI	2.0 km west from the Lower Houses Compound 20.3 ha	The extensive woodlands of the Roeburn gorge contain the best examples of the range of northern deciduous woodland types characteristic of the River Lune and its tributaries draining the north side of the Bowland Fells. The SSSI Unit (1011720) was last reported to be in 'favourable' condition.
Clear Beck Meadow SSSI	2.7 km north west from the Lower Houses Compound 0.5 ha	Although small in size the site represents one of the best examples of species-rich meadow grassland in Lancashire. Unlike the larger, more accessible fields adjacent to it, Clear Beck Meadow has not been agriculturally improved and supports an exceptionally diverse grassland flora. The SSSI Unit (1011480) was last reported to be in 'favourable' condition.

Wildlife Site	Proximity to Proposed Bowland Section and Site Area	Summary Features
		Lowland hay meadow (which includes species-rich neutral grassland) and swamp and fen are priority habitats.
Newton West Roadside Verge BHS	Adjacent to Newton-in-Bowland Compound. 0.22 ha	The site supports artificial roadside verge habitats
River Hodder From Confluence with River Ribble Upstream to Cross of Greet Bridge/ Bowland Fells SSSI Boundary BHS	Crossed by Newton-in-Bowland Compound (construction access) 94.9 ha	The site comprises almost the entire length of the River Hodder. The river is important for otter and supports salmon, brown trout, sea trout, bullhead, dace and stone loach. Sandpipers and oystercatchers are associated with areas of shingle. Three species included in the Provisional Lancashire Red Data List of Vascular Plants are present along the riverside, namely yellow star-of-Bethlehem, green figwort and melancholy thistle. Many of the river banks are lined by woodland or individual trees and shrubs.
Over Houses Great Wood BHS	0.19 km east from the Lower Houses Compound 6.7 ha	Semi-natural woodland (the majority comprising ASNW) situated on steeply sloping ground. Notable for wood fescue being present.
Goodber Common (including Summersgill Fell & White Moss) BHS	0.2 km south from the Lower Houses Compound 914.9 ha	Extensive area of open moorland with an intricate mosaic of blanket bog, wet acid grassland and marshy grassland with many flushes and small streams.
Waddington Fell Road Roadside Verges BHS	260m from the Newton-in-Bowland Compound (construction access) 0.22 ha	The site supports artificial roadside verge habitats
Waddington Fell and Browsholme Moor BHS	300m south east from the Newton-in-Bowland Compound 268.03 ha	Extensive area of moorland with upland heath, blanket bog, acid grassland and mires lying along the western side of Fell Road (B6478). Of particular note is the frequent occurrence of cranberry together with occasional round-leaved sundew, cross-leaved heath and crowberry.
Haw Wood BHS	400m north east from the Lower Houses Compound 9.17 ha	Long band of semi-natural woodland adjoining the west bank of the river Hindburn.
Newton North	400m north from the Newton	The site supports artificial roadside verge habitats

Wildlife Site	Proximity to Proposed Bowland Section and Site Area	Summary Features
Hole House and Lower House Grasslands BHS	500m north east from the Lower Houses Compound 5.75 ha	Seven separate but neighbouring parcels of species-rich semi-natural neutral grassland lying on both sides of the river Hindburn.
River Hindburn BHS	0.56 km east from the Lower Houses Compound 13.6 ha	The site covers 13.59 ha of the River Hindburn.
Clerk Laithe BHS	650m north from the Newton-in-Bowland Compound 1.06 ha	Comprises areas of species-rich pastoral grassland along the banks and slopes of the initial 180 m of a headwater stream. The most species-rich grassland within the site occurs on the south-easterly facing slope.
Hole House Wood BHS	650m north east from the Lower Houses Compound 1.99 ha	Comprises semi-natural woodland situated on sloping ground along the eastern bank of the river Hindburn approximately 4 km south east of Wray.
Great Dunnow Hill BHS	700m north east of Newton-in-Bowland Compound 14.54 ha	Comprises a large limestone reef knoll rising to 212 m situated in the Hodder Valley 0.75 km. The hill supports areas of species-rich calcareous grassland. The species-rich grassland occurs on steep slopes and shallow soils throughout the site. It is also found around the small disused quarry and the lime kiln. Less steep areas with deeper soils support more improved grassland
Bank Wood, High Lot Wood, Over Wood and Mosit Shoe Wood BHS	800m east from the Lower Houses Compound 7.72 ha	Semi-natural woodland on steeply sloping ground along both sides of Crossdale Beck.
Gibb's Wood and Bonstone Wood BHS	0.8 km from the Newton-in-Bowland Compound 4.2 ha	The site comprises 4.15 hectares of semi-natural ancient woodland.
Helks Wood BHS	0.89 km south east from the Lower Houses Compound 8.0 ha	Semi-natural woodland which is identified within Natural England's Inventory of Ancient Woodland. Ancient woodland is an irreplaceable habitat.
Scale Wood BHS	800m west of the Lower Houses Compound 1.3 ha	Small, semi-natural, clough wood. It lies on steeply sloping ground alongside Hunt's Gill Beck and a tributary stream.

Wildlife Site	Proximity to Proposed Bowland Section and Site Area	Summary Features
Cowkins Coppice BHS	1.2km north from the Lower Houses Compound 3.39 ha	Semi-natural wood situated on a slope of varying steepness adjoining the river Hindburn.
New Barn Meadow, Lowgill BHS	1.2km east from the Lower Houses Compound 0.35 ha	Sloping bank of species-rich semi-natural neutral grassland on the eastern edge of an otherwise species-poor field.
Birkett Fell, Hodder Bank Fell and Mossthwaite Fell BHS	1.3 km south west from the Newton-in-Bowland Compound 231.1 ha	Large area of upland heath and blanket bog with scattered flushes. Much of the site is dominated by heather with purple moor-grass in varying proportions. The site provides valuable habitat for upland breeding birds such as red grouse.
Little Dunnaw Wood BHS	1.3km north east of the Newton-in-Bowland Compound 2.28 ha	Semi-natural woodland situated on the west side of the Hodder Valley.
Crag House Roadside Verges BHS	1.4 km south from the Newton-in-Bowland Compound 0.8 ha	The site covers 0.75 hectares of species rich roadside verges.
Foss Bank Wood, Tower Holme Wood and Middleton Wood BHS	1.4km east from the Lower Houses Compound 7.79 ha	Semi-natural woodland situated along both sides of Crossdale Beck.
Stubbins Wood (Including Bull Gill Wood, High Holme Wood, Tenter Hill Wood, Far Plain Wood, Bent Close Wood and Long Field Wood BHS	1.4km south east of the Lower Houses Compound 8.18 ha	Band of semi-natural woodland situated along both sides of Bull Gill and along the eastern side of the River Hindburn to the north.
Dunsop Fell and Low Fell BHS	1.5 km north east from the Newton-in-Bowland Compound 279 ha	Mosaic of upland moorland habitats including blanket bog, heathland and acid grassland.
Ashnott Wood BHS	1.5 km south from the Newton-in-Bowland Compound 2.6 ha	The 2.55 ha site comprises semi-natural woodland, which is identified within Natural England's inventory as ancient woodland.

Wildlife Site	Proximity to Proposed Bowland Section and Site Area	Summary Features
		a small area of adjoining damp semi-natural pasture situated on a steep bank next to a conifer plantation
Ashnott Meadow BHS	1.8 km south from the Newton-in-Bowland Compound 2.6 ha	Damp, semi-natural, neutral grassland meadow notable for containing heath spotted-orchid.
Cragg Wood, Holme Wood, Birks Wood and Park House Wood BHS	1.5km north from the Lower Houses Compound 17.02 ha	Band of semi-natural woodland situated on sloping ground along the south bank of the river Hindburn.
Pike Gill Wood (Including Willock Close Wood and High Grasses Wood) BHS	1.5km north west from the Lower Houses Compound 8.4 ha	Semi-natural clough woodland adjoining Hunt's Gill Beck. The site supports an intimate mix of woodland types including oak woodland on the valley sides and wet woodland dominated by alder in base rich flushes and along the valley bottom.
Wray Wood Moor BHS	1.5km west from the Lower Houses Compound 22.62 ha	Grazed common situated at an altitude of 180 m. It comprises a mosaic of bog, damp unimproved acid grassland, flushes and a small tarn.
Bradford Fell, Easington Fell and Harrop Fell BHS	1.6km south east from the Newton-in-Bowland Compound 517.97 ha	Extensive area of upland heath and mire situated on Bradford, Easington and Harrop Fells immediately east of the B6478.
Sugar Loaf BHS	1.6km west from the Newton-in-Bowland Compound 11.05 ha	Comprises a disused limestone quarry and associated semi-natural grassland situated on a prominent, steep sided mound in the Hodder valley. The site supports species-rich limestone grassland on shallow soils and rock outcrops. The sward grades gradually into less diverse, semi-improved grassland on the lower slopes as the soil cover deepens.
Collinson's Wood BHS	1.8km north from the Lower Houses Compound 2.35 ha	Semi-natural woodland situated on steeply sloping ground along the north bank of the river Hindburn.
Oxenhurst Clough Wood BHS	1.8km north west from the Newton-in-Bowland Compound 2.12 ha	Small remnant of semi-natural clough woodland.
Broad Wood (Including Higher	1.9km north west from the Lower Houses Compound	Consists of three adjoining woods; Broad Wood, Deep Gill Wood and Higher Broad Wood. They comprise

Wildlife Site	Proximity to Proposed Bowland Section and Site Area	Summary Features
Upper Hindburn Valley - Grassland and Woodland Between Stairend Bridge and Botton Bridge BHS	2.0 km south east from the Lower Houses Compound 11.1 ha	A series of semi-natural grasslands situated along the upper reaches of the River Hindburn with several small areas of semi-natural woodland.
Bowland Fells IBA	Extensive coverage which lies contiguous with the Forest of Bowland AONB. The Proposed Bowland Section is entirely situated within the IBA.	An important landscape for upland birds including hen harrier, ring ouzel, whinchat, curlew, golden plover, lapwing, merlin, oyster catcher, peregrine, red grouse, redshank, snipe and stonechat. Other notable wildlife recorded across the landscape includes brown hare, bats (eight species resident in Lancashire) and moths (among the more notable include common heath, emperor, Manchester treble bar, northern spinach, red twin-spot carpet).

9.5.3 Habitats and Flora

43) Table 9A.6 summarises the habitat features present within and surrounding (within 200 m) the Proposed Bowland Section. Further details of habitat, hedgerow and NVC survey and assessment results are presented at Appendices 9A.2, 9A.3 and 9A.4, respectively.

Table 9A.6: Habitats present at the Proposed Bowland Section

Habitat	Extent Within Site Component				Summary Features	Status
	Newton-in-Bowland Compound	Lower Houses Compound	Wray Compound	Offsite		
Broadleaved semi-natural woodland	0.03 ha	Not present	Not present	Present <50 m (Newton-in-Bowland Compound) Present <200 m (Lower Houses Compound)	A small patch of broadleaved semi-natural woodland is present on the north bank of the River Hodder, in the periphery of the temporary construction access corridor in the west of the Newton-in-Bowland Compound. The edge of the broadleaved woodland associated with Over Houses Great Wood is just within 200 m east of the Lower Houses Compound. Undesignated ASNW are also present in the landscape, with the nearest being 100 m northwest of the Newton-in-Bowland Compound. No ASNW is present within 200 m of the Lower Houses Compound.	HPI LBAP
Broadleaved woodland plantation	0.04 ha	Not present	Not present	Present <50 m (Newton-in-Bowland Compound)	A strip of broad-leaved woodland plantation are present adjacent to the temporary construction access area along the north bank of the River Hodder (TR3.TN132).	
Plantation mixed woodland	0.04 ha	Not present	Not present	Present <50 m	A strip of mixed woodland plantation is present along the southern end of the Newton-in-Bowland Compound (TR3.TN133), adjacent to the River Hodder BHS.	LBAP
Dense / continuous scrub	Not present	Not present	Not present	Present <200 m	Small areas of dense scrub are present in the wider area surrounding both compounds.	

Habitat	Extent Within Site Component				Summary Features	Status
	Newton-in-Bowland Compound	Lower Houses Compound	Wray Compound	Offsite		
					species diversity recorded amongst the rough edges of the grassland close to hedgerows or other boundary features.	
Semi-improved neutral grassland	0.12 ha	0.002 ha	Not present	Present <50 m	A small area of this habitat is present at the southern end of the Newton-in-Bowland Compound (TR3.TN154) adjacent to the River Hodder (partially within the BHS) where the temporary access corridor crosses the river.	HPI
Poor semi-improved grassland	21.48 ha	10.85 ha	Not present	Present <50 m	The majorities of the two compound areas comprise this habitat, including the temporary construction access routes.	
Marshy grassland	0.35 ha	Not present	Not present	Present <50 m	Small areas marshy grassland dominated by soft rush are present in the Newton-in-Bowland Compound, extending in a belt across the temporary access corridor north of the River Hodder (TR3.TN148 and TR3.TN150), associated with the route of a small watercourse W461. A small area of marshy grassland is present approximately 5 m from the north eastern boundary of the Lower Houses Compound. Another larger area of this habitat is present 50 m south of the compound.	
Semi-improved acid grassland	0.11 ha	Not present	Not present	Present <50 m (Newton-in-Bowland)	A thin strip of semi-improved acid grassland is present along the south verge of Newton Road within the Newton-in-Bowland Compound. Another smaller area is present towards	HPI

Habitat	Extent Within Site Component				Summary Features	Status
	Newton-in-Bowland Compound	Lower Houses Compound	Wray Compound	Offsite		
Fen	0.90 ha	Not present	Not present	Present <50 m (Newton-in-Bowland Compound)	<p>Fen habitats extend into the Newton-in-Bowland Compound in the north (TR3.TN103), comprising part of the Gamble Hole Farm Pasture BHS. NVC across the BHS described the area as a gently sloping, base rich spring and seepage on a thin mineral soil supporting a fen mosaic, with affinities with M22 habitat. The vegetation comprises a variable sward generally dominated by <i>Juncus articulata</i>/<i>J. acutiflorus</i> with stands of short grazed sedge carpets (<i>Carex panacea</i>, <i>C. nigra</i>), tall stands with fen species including <i>Cirsium palustre</i>. This area is a rare example of fen meadow within the Forest of Bowland AONB. The area is spring fed and base rich. Of note is the presence of marsh helleborine, a local rarity in Lancashire, located in a small area in the south western corner of the compound.</p> <p>A small area of fen habitat is also present to the south of Newton Road north of the River Hodder, associated with a small watercourse (TR3.GW6/ TR3.TN149). This area of fen is not within a designated area.</p>	HPI
Acid/neutral flush	Not present	Not present	Not present	Present <50 m (Newton-in-Bowland Compound)	<p>An area of acid/neutral flush extends out from a ditch just within 50 m north of the temporary construction access route in the Newton-in-Bowland Compound (TR3.GW5/ TR3.TN156).</p>	

Habitat	Extent Within Site Component				Summary Features	Status
	Newton-in-Bowland Compound	Lower Houses Compound	Wray Compound	Offsite		
				(Newton-in-Bowland Compound) Present <200 m (Lower Houses compound)	in the Newton-in-Bowland Compound (TR3.GW4), around a field boundary at the base of a sloping field into which several lime rich springs flow. Another short section of a spring fed ditch (TR3.GW7) extends into the northern periphery of the temporary construction access route in the Newton-in-Bowland Compound.	
Swamp	Not present	Not present	Not present	Present <50 m (Newton-in-Bowland compound)	An area of swamp dominated by <i>S7 Carex acutiformis</i> swamp vegetation is present outside of the Newton-in-Bowland Compound to the west, on the far side of an access track (TR3.GW9).	
Standing water (Ponds)	Not present	Not present	Not present	Present <200 m (Newton-in-Bowland)	Four ponds are present within 200m of the Newton-in-Bowland Compound (P87, P88, P89 and P89a).	HPI
Tall ruderals	0.05 ha	Not present	Not present	Present <50 m	A small area of tall ruderal vegetation is present within the temporary access corridor at the Newton-in-Bowland Compound (TN153), just west of the River Hodder.	
Buildings and structures	0.03 ha (4 no.)	0.005 ha	Not present	Present <50 m	Four buildings are present in the Newton-in-Bowland Compound (TR3.TN126, TR3.TN127, TR3.TN128, and TR3.TN130) comprising two operational buildings for the	

Habitat	Extent Within Site Component				Summary Features	Status
	Newton-in-Bowland Compound	Lower Houses Compound	Wray Compound	Offsite		
Bare ground	0.062 ha	Not present	Not present	Present <50 m	Limited to tracks and parking places within the Newton-in-Bowland Compound.	
Scattered broadleaved trees	138 no.	34 no.	2 no.	Present <50 m	Individual trees are largely confined to scattered trees along field boundaries and watercourses. No veteran trees were identified within works areas but one potential veteran silver birch (T124) was identified adjacent to the north boundary of the temporary construction access route to the Newton-in-Bowland Compound.	
Running water (mesotrophic)	1.30 km	0.25 km	Not present	Present <50 m	<p>Six watercourses flow across the Newton-in-Bowland Compound – W461 crossing Newton Road flowing south and, to the south of Newton Road flowing across the temporary access corridor into the River Hodder (W477), shallow slow watercourses W462, W463, W470 and W1382 which generally flow along field boundaries.</p> <p>Watercourses follow several field boundaries in and around the Lower Houses Compound; most flow around the periphery of the compound, but three watercourses (W206 and W215) cross in part through the Lower Houses Compound area.</p> <p>The assessment of impacts upon all watercourses present are provided in Chapter 9B.</p>	HPI LBAP
Dry ditch	0.74 km	Not present	Not present	Present <50 m	A short section of dry ditch is present running along a fence	

Habitat	Extent Within Site Component				Summary Features	Status
	Newton-in-Bowland Compound	Lower Houses Compound	Wray Compound	Offsite		
and without trees				(Newton-in-Bowland Compound)	A species rich hedgerow without trees (TR3.WH1) is present along the southern edge of the Wray Compound, along the B6480 and Back Lane.	
Intact native species poor hedgerow with and without trees	0.51 km	Not present	Not present	Present <50 m (Newton-in-Bowland compound)	A species poor hedgerow with trees is present along the northern boundary of Newton Road (HTR3.H31) and a species poor hedgerow without trees is present along the southern boundary of Newton Road (HTR3.H32) within the Newton-in-Bowland Compound. HTR3.H31 qualifies as important under the Hedgerow Regulations. Another species poor hedge borders the northern edge of the construction access area at Newton-in-Bowland.	HPI Hedgerow Regulations
Walls	0.79 km	< 0.01 km	Not present	Present <50 m	Dry stone walls rich with lichens are present along the western field boundaries in the Newton-in-Bowland Compound.	

44) Plant species of note identified within the Proposed Bowland Section above-ground working areas included:

- Marsh helleborine, which is classed as a local rarity in Lancashire.
- English bluebell– Schedule 8, WCA 1981

9.5.4 Fauna

45) Table 9A.7 provides a summary of the baseline from fauna surveys completed across the Proposed Bowland Section. Detailed survey findings are described in the relevant Appendix and illustrated on the relevant Figures, as directed by Table 9A.2.

Table 9A.7: Species and species groups present at the Proposed Bowland Section

Species / Group	Summary Features	Status
Bats: roost sites	<p>The operational buildings within the Newton-in-Bowland Compound (TR3.TN127, TR3.TN128, Figure9A.5) were both assessed to have low suitability while the corresponding buildings in Lower Houses Compounds (TR3.TN26 and TR3.TN27, Figure9A.5) were assessed to have negligible suitability (although swallow nests were noted on both). The agricultural building (TR3.TN126) and lean-to (TR3.TN130, Figure9A.5) in Newton-in-Bowland Compound was assessed to have low suitability and the aqueduct structure within 50 m of the compound (TR3.TN136) was assessed to have moderate suitability.</p> <p>Eleven trees with moderate roost suitability and nineteen trees with low roost suitability are present within the Newton-in-Bowland Compound (Figure9A.10, sheets 3 and 4). Another four individual trees and four groups of trees with moderate roost suitability and six individual trees and three groups of trees with low roost suitability are present within 50 m of the compound group (Figure9A.10, sheets 3 and 4).</p> <p>Two trees with low suitability for roosting bats are present within the Lower Houses Compound (Figure9A.10, sheet 2) and five additional trees with low potential are present within 50 m of the compound (Figure9A.10, sheet 2). One tree and one group of trees with moderate bat roost suitability is present within 50 m of the Lower Houses Compound (Figure 9A.10, sheet 2).</p>	<p>Conservation of Habitats and Species Regulations 2017 (as amended)</p> <p>Wildlife and Countryside Act 1981 (as amended)</p> <p>SPI (soprano pipistrelle, brown long-eared bat and noctule)</p> <p>LBAP (all bat species)</p>
Bats: flyways and foraging	<p>Myotis bats, noctule, common pipistrelle, soprano pipistrelle and brown long-eared bat were recorded by the combination of transect and static activity surveys. Common and soprano pipistrelles were the most abundant species recorded around both compounds, although relative abundance varied during the course of the surveys between these two species. Species diversity in the landscape around the Newton-in-Bowland Compound appears more consistently diverse than around the Lower Houses Compound.</p> <p>Habitats within the Newton in Bowland Compound are of some value for bat</p>	<p>SPI (soprano pipistrelle, brown long-eared bat and noctule)</p> <p>LBAP (all bat species)</p>

Species / Group	Summary Features	Status
	<p>redstart, song thrush, spotted flycatcher, starling and stock dove) and 4 no. were possible breeders (house sparrow, meadow pipit, mistle thrush and willow warbler).</p> <p>Within 100 m of the Lower Houses Compound and temporary construction access route, a total of 15 no. species were recorded during surveys. Of these, ten BoCC species were recorded, including curlew (SPI, Red), greylag goose (Amber), lapwing (SPI, Red), lesser black-backed gull (Amber), mallard (Amber), meadow pipit (Amber), oystercatcher (Amber), reed bunting (SPI, Amber) and snipe (Amber). Of these 6 no. were confirmed or probable breeders within the compound and 100 m buffer (curlew, lapwing, mallard, oystercatcher, skylark and snipe) and two were possible breeders (meadow pipit and reed bunting).</p>	
<p>Wintering birds</p>	<p>A total of 50 no. species were recorded for the Proposed Bowland Section at the two compounds, with forty-four species recorded at the Newton-in-Bowland Compound and surrounding area and 30 no. species recorded at the Lower Houses Compound and surrounding area.</p> <p>Of these, 24 no. species are BoCC: black headed gull, common gull, greylag goose, kestrel, lesser black-backed gull, mallard, meadow pipit, oystercatcher, snipe, stock dove (Amber), dunnock, reed bunting (amber and SPI), fieldfare, grey wagtail, mistle thrush (Red), fieldfare, redwing (Red and Schedule 1 breeding only), curlew, herring gull, lapwing, lesser redpoll, skylark, song thrush and starling (Red and SPI). The wider assemblage was reported to be typical of the habitats present.</p> <p>Forty-four species were recorded at the Newton-in-Bowland Compound, including eighteen BoCC species. Twenty-nine species were recorded at the Lower Houses Compound, including seventeen BoCC species.</p> <p>Wader species recorded included low numbers of curlew, snipe and oystercatcher occasionally recorded at both compound areas. Curlew and oystercatcher were only recorded late in the season in March and were probably associated with birds arriving to set up territories to breed.</p> <p>Oystercatcher were recorded in January and February at the Lower Houses Compound, with a peak count of 215 no. recorded outside of the compound area approximately 75 m north west from the site boundary.</p> <p>The only wildfowl recorded were small numbers of mallard recorded at both compounds (peak count of 9 no. at Newton-in-Bowland Compound in December) and a single greylag goose recorded flying over the Newton-in-Bowland Compound in January.</p> <p>A number of gull species were recorded to use the survey areas, including black headed gull, common gull, herring gull and lesser black-backed gull.</p>	<p>SPI (certain species) BoCC (certain species) LBAP (certain species)</p>

Species / Group	Summary Features	Status
	<p>Both compound areas are considered of very limited suitability for reptiles, with low habitat diversity and limited basking or potential hibernation areas. However, dry stone walls provide suitable shelter opportunity and permeability across the landscape.</p>	
<p>Amphibians, including great crested newts: breeding ponds</p>	<p>No records of amphibians, including great crested newt, were identified within 2 km of either of the compound areas.</p> <p>No ponds are present within either the Newton-in-Bowland or Lower Houses Compounds.</p> <p>No ponds within 500 m of either the Newton-in-Bowland or Lower Houses Compounds were confirmed to support great crested newts; the nearest ponds with great crested newts present were located approximately 1.6 km north of the Lower Houses Compound. Four ponds (TO3.P87, TO3.P88, TO3.P89 and TO3.P89a, Figure 9A.22) are located between about 12 m and 20 m of the Newton-in-Bowland Compound, within plantation and fen habitats that lie adjacent to and extend into the northwest boundary, respectively. Pond descriptions and immediate setting of the ponds would imply they would be suitable for supporting breeding amphibians, including common toad (an SPI).</p>	<p>Conservation of Habitats and Species Regulations 2017 (as amended)</p> <p>Wildlife and Countryside Act 1981 (as amended)</p> <p>SPI (great crested newt and common toad)</p> <p>LBAP (great crested newt and common frog)</p>
<p>Amphibians, including great crested newts: terrestrial habitats</p>	<p>Pond density across the local landscape is generally low and consequently terrestrial habitat densities are likely to be low also. Suitable terrestrial habitats within the Lower Houses Compound are limited to the very small area of marshy grassland in the north and dry stone walls, although pasture would offer some foraging opportunity. The woodland habitats to the north east, joining Over Houses Great Wood BHS is most likely to support terrestrial amphibian populations, including common frog and common toad.</p> <p>The marsh and fen habitats within the Newton-in-Bowland Compound, which forms part of the Gamble Hole Farm Pasture BHS would provide good foraging opportunities, particularly given its proximity to a pond located within the offsite area of the BHS (TO3.P87, Figure 9A.22) and a sequence of online ponds (TO3.P88, TO3.P89 and TO3.P89a, Figure 9A.22), located within the offsite plantation adjacent to the northwest compound boundary. Higher terrestrial densities of amphibians could be assumed in habitats in proximity to these areas. Other suitable habitats within the Newton-in-Bowland Compound include the mixed plantation woodland strips.</p>	
<p>Terrestrial invertebrates</p>	<p>Records of 26 species of butterfly and moth were identified within 2 km of the Proposed Bowland Section during the desk study.</p> <p>Goodber Common BHS is noted for its invertebrate assemblage, including several colonies of large-heath butterfly.</p>	<p>Wildlife and Countryside Act 1981 (as amended)</p>

Species / Group	Summary Features	Status
	The limited range of habitats and floral diversity within the Lower Houses Compound is unlikely to support significant populations of terrestrial invertebrates (individual species or assemblages).	

Future baseline

46) It is assumed for the purposes of this EclA that the current land uses within and adjacent to the Proposed Bowland Section would remain as they were at the time of the field surveys, except in cases where planning permission has already been granted for development. For consented developments, it is assumed that the developments will take place. These have been considered in the cumulative assessment in Chapter 19.

9.5.5 Identification and Valuation of Ecological Features

47) Table 9A.8 summarises the ecological features which comprise the EclA baseline which may potentially be affected by the Proposed Bowland Section and their ecological importance.

Table 9A.8: Valuation of Terrestrial Ecology Features Present at the Proposed Bowland Section

Feature	Description	Value
Semi-natural broadleaved woodland	Very rare within the Newton-in-Bowland Compound (<0.1 % net area). Absent from the Lower Houses Compound. Woodland (including some ASNW) is reasonably common within the wider landscape surrounding the two compounds. This habitat is likely to be important for diversity, fragility, typicalness and function within the ecological network. A small area of semi-natural broadleaved woodland located within 200 m of the Newton in Bowland on the far side of the Heaning Brook to the west (TR3.GW10, Figure 9A.8) was assessed to have moderate groundwater dependency.	County
Broadleaved woodland plantation	Very rare within the Newton-in-Bowland Compound (<0.1 % net area). Absent from the Lower Houses Compound. Woodland is reasonably common within the wider landscape surrounding the two compounds. Although broadleaved woodland plantation is of lower intrinsic ecological value than semi-natural woodland, it is still likely to be important for diversity, fragility, typicalness and function within the ecological network.	Local
Mixed woodland plantation	Not present within the Lower Houses Compound. Rare within the Newton-in-Bowland Compound (<0.5 % net area). Woodland is	Local

Feature	Description	Value
Semi-improved neutral grassland	Rare within the Newton-in-Bowland Compound and Lower Houses Compound (<0.1 % net area), limited to a small section of the southern boundary compound. Contributes to the interest and function of the wider local ecological network.	Local
Poor semi-improved grassland	Abundant within both compound areas. Common and widespread habitat locally of limited diversity but contributes towards the interest and function of the immediate local ecological network.	Less than Local
Semi-improved acid grassland	Absent within the Lower Houses Compound. Very rare within the Newton-in-Bowland Compound (<0.1 % net area), confined to a thin strip to the south of Newton Road. Acid grassland is rare within the wider landscape.	County
Improved grassland	Occasional within both compound areas. Common and widespread habitat locally of limited diversity although provides permeability within the immediate ecological network for a range of mobile species.	Immediate site
Marshy grassland	Rare within the Newton-in-Bowland Compound, confined to a few small patches within the landscaping area to the north, and within the construction access area (<0.1 % net area). Relatively common and widespread in the local landscape, although associated with localised wet ground conditions. Contributes to the interest and function of the wider local ecological network. Three areas of marshy grassland located beyond the Lower Houses Compound to the north, were assessed to have low to moderate groundwater dependency. An area of marshy grassland present within the temporary construction access area at the Newton-in-Bowland Compound (TR3.GW5, Figure 9A.8) was assessed to hold high groundwater dependency. An area of marshy grassland to the south of the River Hodder beyond the Newton-in-Bowland Compound (TR3.GW12, Figure 9A.8) was assessed to hold moderate groundwater dependency.	Local
Fen	Absent within the Lower Houses Compound. Present within the west of the Newton-in-Bowland Compound, comprising part of the Gamble Hole Farm Pasture BHS (an integral feature to the BHS designation) (TR3.TN103, Figure 9A.5). This area is a rare example of fen meadow within the Forest of Bowland AONB which qualifies as SPI. However, the NVC confirmed the area is affected by over-grazing and also possibly from cutting (arisings from cutting <i>Juncus</i> were noted). Locally, regionally and nationally rare habitat. The fen habitat, located within Gamble Hole Farm Pasture BHS, is a nationally rare habitat.	County

Feature	Description	Value
	TR3.GW4, Figure 9A.8) was assessed to hold high groundwater dependency.	
Swamp	Absent from Lower Houses Compound. Present locally only within to the south of Gamble Hole Farm Pasture BHS on the far side of an access track to the Newton-in-Bowland Compound. Relatively common and widespread in the local landscape, although associated with localised wet ground conditions. Contributes to the interest and function of the wider local ecological network. The swamp habitat located just beyond the Newton-in-Bowland Compound (TR3.GW9, Figure 9A.8) was assessed to hold moderate groundwater dependency.	Local
Ponds	Absent from both the Lower Houses and Newton-in-Bowland Compounds, although a single pond and a cluster of three ponds are all located between 12 m and 20 m from the Newton-in-Bowland Compound in the north. While HPI, the offsite cluster comprises a series of on-line water features within a private garden.	Local
Tall ruderals	Absent from Lower Houses Compound. Rare in and surrounding the Newton-in-Bolton Compound. Generally botanically impoverished but provides limited and localised structural and habitat diversity within the immediate habitat mosaic.	Less than local
Buildings	Rare within both the Newton-in Bowland Compound and the Lower Houses Compounds (<0.1 % net areas). Artificial habitat type of negligible value with negligible contribution to immediate, local or wider ecological networks.	Immediate site
Bare ground	Rare within the Newton-in-Bowland Compound (<0.1 % net area) and absent within the Lower Houses Compound. Artificial (access track) habitat type of negligible value with negligible contribution to immediate, local or wider ecological networks.	Immediate site
Scattered broadleaved trees	Occasional across the Newton-in-Bowland Compound, largely confined to field boundaries and watercourses. One potential veteran (T124) is located adjacent to north boundary of the Newton-in-Bowland construction access route. Rare within the Lower Houses Compound and almost entirely confined to the perimeter of the compound area, associated with field boundaries and watercourses. Broadleaf species typical in the landscape, with additional mature and occasional veteran trees and areas of ASNW and Ancient Replanted Woodland (ARW) identified locally.	County

Feature	Description	Value
Species rich and species poor hedgerow	Very rare within the Newton-in-Bowland Compound. Absent from the Lower Houses Compound. One hedgerow within the Newton-in-Bowland Compound is classed as 'important' under the Hedgerow Regulations 1997. Once species rich hedgerow in the compound west of Wray. Generally common and widespread across the wider landscape. While HPI, they possess limited interconnectivity with the wider hedge network, although provide a connectivity function within the local habitat mosaic.	Local
Walls	Artificial habitat type, common across landscape, of negligible inherent value with limited contribution to immediate, local or wider ecological networks. May provide localised shelter or ranging / dispersal opportunities for some species.	Less than Local
Dry ditch	A dry ditch is present within the landscaping area to the north. Artificial habitat type, common across the local landscape, of negligible inherent value with limited contribution to immediate, local or wider ecological networks. May provide localised foraging or ranging / dispersal opportunities for some species.	Less than Local
Bats: roost sites	Suitable roost habitats (buildings and trees) are present within and bordering the Proposed Bowland Section, with the Newton-in-Bowland Compound containing the majority of these features as well as greater bat activity identified during nocturnal surveys. The static location at the east of the construction access area near to the River Hodder at the Newton-in-Bowland Compound could indicate the presence of a nearby soprano pipistrelle summer roost.	Local
Bats: flyways and foraging	Key landscape corridor features are offsite but localised features (hedges, walls, linear trees and watercourses) are occasional within the Proposed Bowland Section with some connectivity value. Forage habitats within the Lower Houses Compound are limited but the Newton-in-Bowland Compound contains localised features of value including scattered trees, watercourses and hedgerows. Bat assemblage recorded to date is broadly typical for the range of habitats present and geographical location. Species diversity and relative activity levels recorded are generally reflected of the habitat diversity present. Patterns observed in relative activity levels are not suggestive of habitats present within the Proposed Bowland Section functioning as part of any major seasonal migratory routes.	Local
Badgers	No records of this species within 2 km of the Proposed Bowland Section. Setts are absent from the Newton-in-Bowland and Lower Houses Compounds. Habitats in Newton-in-Bowland and Lower Houses	Local

Feature	Description	Value
	Compound. More optimal habitats occur offsite around both compounds. Widespread but declining species.	
Red squirrel	No records were obtained for this species within 2 km of the Newton-in-Bowland and Lower Houses Compounds. Habitats within both compounds are not suitable for this species and offsite adjacent habitats are considered sub-optimal due to fragmentation and composition (broad-leaved or mixed woodland). This species is unlikely to be present within the zone of influence of the Proposed Bowland Section.	Not present
Breeding birds	<p>A moderate assemblage of breeding birds was recorded from within habitats present in the Newton-in-Bowland Compound and adjacent habitats (50 no. species, of which 24 no. are BoCC). Forty-two species were recorded as confirmed, probable or possible breeding bird species within the site and surrounding 100 m buffer.</p> <p>Small assemblage of breeding birds recorded from within habitats present in the Lower Houses Compound and adjacent habitats (fifteen species, of which 10 no. are BoCC). Eleven species were recorded as confirmed, probable or possible breeding bird species within the site and surrounding 100 m buffer.</p> <p>It is likely that 4 no. ground nesting BoCC species (common sandpiper, curlew, lapwing and oystercatcher) nested within the Newton-in-Bowland Compound and 5 no. ground nesting BoCC species (curlew, lapwing, oystercatcher, skylark and snipe) nested within 100 m distance of the Lower Houses Compound. No qualifying species for the Bowland Fells SPA were recorded.</p>	Local
Wintering birds	No significant numbers of waders, wildfowl, gulls, wintering thrushes, farmland passerines or other notable species were recorded utilising habitats within the Proposed Bowland Section. None of the species recorded were present in numbers that would be notable at a County level. No qualifying species for the Bowland SPA were recorded.	Local
Reptiles	No records of reptiles were identified within 2 km. A slow worm carcass was recorded on Helks Brow approximately 2 km south of the Lower Houses Compound during the habitat survey. The habitats present at both compounds are of very limited suitability for reptiles, although there are some localised features within the Newton-in-Bowland that may provide some permeability into or through the site (occasional stone walls or hedges and patches of semi-improved neutral or marshy grasslands). Any reptile species present are likely to be common and widespread and at low density.	Local

Feature	Description	Value
	these habitat, where they occur within 50 m of the offsite ponds (northwest of the compound), habitats are sub-optimal and terrestrial density (amphibians excluding great crested newt) is likely to be low. Grassland at the Lower Houses Compound may offer sub-optimal forage opportunities, however there are no waterbodies within 50 m of this compound and given sub-optimal habitats the presence of terrestrial amphibians is unlikely	
Terrestrial invertebrates	<p>Goodber Common (including Summersgill Fell and White Moss) BHS is notable for its population of large heath butterfly. This BHS is located approximately 200 m from the Lower Houses Compound. However, habitats within the compound are impoverished (poor semi-improved grassland with fenced field boundaries) and are unlikely to support this species or any other notable species, group or assemblage of invertebrate.</p> <p>The fen habitat within the Newton-in-Bowland Compound potentially offers suitable habitat for a range of invertebrates.</p>	Local

48) In line with the requirement for a proportionate approach to EIA, only important ecological features identified as having at least local value are taken forward for individual impact assessment.

9.6 Assessment of likely significant effects

9.6.1 Enabling Works Phase

Proposed Activities

49) Enabling works are anticipated to last from the time planning permission is obtained until the commencement of the construction phase in Q2 2023. The enabling works would include the following activities that have potential to result in biophysical changes to important ecological features:

- Fencing (comprising stock-proof post and wire around open-cut working areas and higher 'heras' type around compounds and lay-down areas)
- Tree, scrub and hedgerow removal, where unavoidable. In accordance with the AIA (Figure 6.6),
- All other trees, woodlands and hedgerows would be retained and protected in accordance with avoidance and mitigation methods embedded through the CCoP Section 5.
- Temporary watercourse diversions or crossing, if unavoidable (impacts upon watercourses are described and assessed in Chapter 9B)
- Topsoil and subsoil strip and storage (within construction area for later reinstatement)

Effects Scoped Out

- 50) Potential effects upon the Bowland Fells SPA and the North Pennine Dales Meadows SAC are detailed within the HRA (LCC_RVBC-BO-APP-010). The HRA concludes that the Proposed Bowland Section would not result in a likely significant effect on any European designated site.
- 51) The SSSI report (LCC_RVBC-BO-APP-009) confirms that no likely significant effects upon air quality, hydrology or the integrity of the local ecological network would be anticipated on any of the SSSI sites identified from the desk-based assessment and listed at Table 9A.5.
- 52) Similarly, of the 42 BHS identified within 2 km of the Proposed Bowland Section, all but 11 are located sufficiently distant (>500 m) that no significant effects in respect of air quality, hydrology or ecological network would be anticipated.
- 53) Transport Planning (Chapter 16) and Air Quality (Chapter 18) assessments conclude that no significant changes to air quality would arise along the haulage or site traffic routes as a consequence of the site traffic journeys alone during any of the project phases. Effects of increased emissions are therefore scoped out for the enabling phase. Potential effects of increased emissions arising from operation of generators within the compounds remains part of the impact assessment, however these effects would be limited to the construction phase and are therefore scoped out for the enabling phase.
- 54) Degradation in quality or function of habitats resulting from dust deposition during bulk earthworks and generated from bulk soil storage would be avoided or reduced to non-significant levels by embedded mitigation (further details of embedded measures to protect sensitive features from dust deposition are provided within Section 5.11 of the CCoP). Therefore, dust impacts are scoped out of this assessment.
- 55) Degradation in quality or function of habitats resulting from surface water changes, site run-off (including sedimentation or wash-out/erosion effects) would be avoided or reduced to non-significant levels by embedded mitigation (further details of embedded measures to protect surface water features, maintain surface water run-off rates and ensure surface and site run-off water quality are provided within Section 5.3 and 5.6 of the CCoP). Potential effects upon watercourses, including construction of temporary outfalls and effects of uncontrolled surface water run-off, are considered in Chapter 9B and consequently watercourses are not considered further as important ecological features within this EclA for Terrestrial Ecology. However, discussion of or reference to watercourses may be included for context in characterising effects upon important (terrestrial) ecological features.
- 56) No invasive species are currently present within any of the compounds or construction access and embedded measures detailed within Section 5.4 of the CCoP will prevent the introduction of invasive species. Therefore, invasive species impacts are scoped out of the assessment.
- 57) Potential effects on the River Hodder BHS and the River Hindburn BHS are considered within Chapter 9B.
- 58) The important ecological features or impact pathways discussed above are therefore scoped out from the EclA for the enabling works.

Effects Carried Forward for Assessment

- 59) In the absence of additional mitigation, potential effects upon other important ecological features would include:

- permanent habitat losses would be limited to the footprints of the permanent above ground new structures, comprising the new valve house buildings and associated maintenance tracks; construction of the new valve house buildings and their maintenance tracks would take effect during the construction phase but these habitat losses are accounted for within the overall areas of habitat loss described for the enabling phase
- Damage, degradation or modification of retained habitats including:
 - as a consequence of potential changes hydrological links (water quality or flows, leading to potential sedimentation, erosion, changes in floral communities etc.), impacting habitats within 10 BHS: Gamble Hole Farm Pasture BHS, Newton West Roadside Verge BHS, Goodber Common BHS, Over Houses Great Wood BHS, Waddington Fell Road Roadside Verges BHS, Waddington Fell and Browsholme Moor BHS, Haw Wood BHS, Newton North Roadside Verges BHS, Great Dunnow Wood BHS and Hole House and Lower House Grasslands BHS and other non-designated sensitive habitats
 - watercourses requiring temporary or permanent new or upgraded culverts or other modifications for crossings and construction of temporary outfalls for the discharge of surface water during the construction phase of both compounds, (impacts upon watercourses are described and assessed in Chapter 9B, but any resulting impacts which have the potential to affect any valued terrestrial features through which the watercourses flow are considered in this chapter)
- Fragmentation and isolation of retained habitats/network:
 - temporary localised effects until habitat reinstatement is implemented (during the construction and commissioning phases) and habitat becomes re-established
- Habitat loss, exclusion, obstruction of movement and habitat fragmentation affecting mobile species:
 - habitat losses, fragmentation of dispersal / migratory corridor features and installation of barrier effects would prevent access to or between habitats by species using those habitats for foraging, breeding or shelter
 - habitat loss and fragmentation may also contribute to higher mortality in species due to increased exposure from loss of shelter or corridor features leading to higher predation risks or loss of foraging habitat
- Killing, injury or entrapment risk of terrestrial fauna:
 - brown hare, hedgehog, badgers, reptiles and amphibians that may range across or utilise localised habitats within the Newton-in-Bowland and Lower Houses Compounds. Passerine birds nesting in trees, scrub and hedgerows, ground nesting birds utilising open grassland habitats and bats roosting in trees would be at risk from vegetation removal and ground works if present at the onset of works
 - open excavations and mesh or wire fencing may pose an entrapment or entanglement risk to fauna species such as brown hare, hedgehog, badgers, reptiles and amphibians.
- Disturbance of fauna species through noise, visual or vibration effects:
 - noise, visual and vibration effects might cause desertion of occupied breeding or shelter sites
 - disturbances might also cause needless expenditure of energy and may expose species to increased

Construction is anticipated to last just short of 5 years between 2024 and 2028 and habitat reinstatement will likely take approximately 3 years at the end of this programme. Habitat establishment timescales would vary according to the complexity of the target habitat. The majority of habitat losses would comprise improved and semi-improved grassland with smaller areas of marshy grassland as well as species poor hedgerows and scattered trees. Establishment of grassland habitats would be anticipated in one to three years (medium term), while establishment of hedgerows would be anticipated in five years (medium to long term) and woodlands/trees would be anticipated to require more than five years (long term). However, given that habitat losses will occur at the start of the enabling phase the duration of temporary habitat loss impacts to establishment are all classed as long-term.

- 62) Effects arising prior to mitigation (but with due consideration of embedded mitigation as described at Section 9A.6.1) upon the important ecological features are summarised in Table 9A.9. Only those important ecological features where effects have been identified are included in the table.

Table 9A.9: Summary of Enabling Works Effects

Ecological Feature	Value	Potential Effect(s) Prior to Mitigation	Significance (Pre-Mitigation)
Gamble Hole Farm Pasture BHS	County	<p>Temporary loss of 0.04 ha fen and 0.05 ha semi-improved grassland habitat within 12 m wide corridor crossing the part of the BHS which extends into the site as a result of construction of temporary access road. This is equivalent to 3.6 % of the total BHS area.</p> <p>The majority of Gamble Hole Farm Pasture BHS, largely consisting of fen habitat (TR3.TN103, Figure 9A.5) was identified (Appendix 9A.5) as having high dependency. Despite physical retention of this additional area within the compound, hydrological links may be lost or modified that could revert or modify the encircled fen habitat retained within the compound to a different type, thus resulting in the loss of the existing fen habitat from this footprint until hydrological links are restored (additional potential temporary loss of 0.49 ha retained fen habitat, equivalent to 19.6% total BHS area)</p>	Significant Adverse County
Gamble Hole Farm Pasture BHS	County	<p>Degradation in quality or function of retained habitats resulting from changes groundwater pathways, flow rates or quality. The majority of Gamble Hole Farm Pasture BHS, largely consisting of fen habitat (TR3.TN103, Figure 9A.5) is identified as having high dependency.</p> <p>Construction of the temporary attenuation pond is assessed to not result in any impacts on groundwater as Gamble Hole Farm Pasture lies outside of the estimated dewatering zone of influence of the pond and is not down gradient.</p> <p>Groundwater flow disturbance could occur within the compound area due to compaction-related construction activities and earthworks, such as topsoil stripping and construction of the temporary access track which would result in a site-wide shallow dewatering effect and the impact on groundwater flows and levels within the site would be direct and major within the footprint of the compound.</p> <p>Ground disturbance due to topsoil stripping and vegetation clearance may also impact</p>	Significant Adverse County

Ecological Feature	Value	Potential Effect(s) Prior to Mitigation	Significance (Pre-Mitigation)				
		<table border="1" data-bbox="776 647 2019 839"> <tr> <td data-bbox="776 647 1325 743">Accidental leak / spills of fuels and chemicals</td> <td data-bbox="1325 647 2019 743">Moderate adverse magnitude/ moderate significance</td> </tr> <tr> <td data-bbox="776 743 1325 839">Mobilisation of suspended solids</td> <td data-bbox="1325 743 2019 839">Moderate adverse magnitude/ moderate significance</td> </tr> </table> <p data-bbox="776 903 2019 1158">Despite methods embedded through the CCoP (Sections 4.9, 5.3, 5.6 and 5.7) (which would reduce the likelihood of adverse effects occurring, but not necessarily the severity or consequence of the effect), vegetation clearance and topsoil stripping and accidental leaks or spills are assessed to result in moderate significance effects upon groundwater levels / flows and quality affecting Gamble Hole Farm Pasture. Corresponding effects for Gamble Hole Farm Pasture are assessed to be of large significance upon groundwater levels / flows and moderate significance upon groundwater quality.</p> <p data-bbox="776 1174 2019 1366">Due to the coverage of the Gamble Hole Farm Pasture GWDTE site incorporating almost all of the Gamble Hole Farm Pasture BHS (40% of which falls within the Newton-in-Bowland Compound), the degradation, loss or modification of habitats within this area as a consequence of groundwater levels/flows or quality changes has the potential to significantly adversely affect the integrity of the CWS and fragment this wildlife site.</p>	Accidental leak / spills of fuels and chemicals	Moderate adverse magnitude/ moderate significance	Mobilisation of suspended solids	Moderate adverse magnitude/ moderate significance	
Accidental leak / spills of fuels and chemicals	Moderate adverse magnitude/ moderate significance						
Mobilisation of suspended solids	Moderate adverse magnitude/ moderate significance						
Newton West Roadside Verges BHS Goodber Common BHS Over Houses Great Wood BHS Waddington Fell Roadside	County	Degradation in the quality or function resulting from changes to surface water flows or air quality arising from run off or dust deposition during bulk earthworks and generated from bulk soil storage would be avoided or reduced to non-significant levels by embedded mitigation measures, including but not limited to provision of buffers, surface water management and dust suppression measures (further details of which are provided in the CCoP Sections 4.4, 5.6 and 5.11).	Not significant				

Ecological Feature	Value	Potential Effect(s) Prior to Mitigation	Significance (Pre-Mitigation)
Great Dunnow Wood BHS Hole House and Lower House Grasslands BHS			
Semi-natural broadleaved woodland	County	Temporary loss of 0.03 ha to be removed to facilitate crossing of River Hodder for temporary construction access route to Newton-in-Bowland Compound. The loss is from within a small linear block situated on a southeast facing bank north of the river. Reversible (with intervention).	Significant Adverse Local
Broadleaved and mixed plantation woodlands	Local	Temporary loss or damage of 0.08 ha broadleaved and mixed plantation, located on the north bank of the River Hodder to be removed to facilitate temporary drainage from the construction access route to Newton-in-Bowland Compound. Reversible (with intervention).	Significant Adverse Less than local
Semi-natural broadleaved woodland	County	Degradation in the quality or function resulting from changes to surface water flows or air quality arising from run off or dust deposition during bulk earthworks and generated from bulk soil storage would be avoided or reduced to non-significant levels by embedded mitigation measures, including but not limited to provision of buffers, surface water management and dust suppression measures (further details of which are provided in the CCoP Sections 4.4, 5.6 and 5.11). No effects upon groundwater flows/levels or quality are predicted for the area of broadleaved woodland to the east of the Newton-in-Bowland Compound (TR3.GW10, Figure 9A.).	Not significant
Broadleaved and mixed plantation woodlands	Local		
Semi-improved neutral grassland	Local	Temporary loss of 0.12 ha to form Newton-in-Bowland Compound inclusive of temporary construction routes. Reversible (with intervention).	Significant Adverse Less than local
Woodland	Local	Temporary loss of 0.05 ha to form Newton-in-Bowland Compound (TR3.TM110, TR3.TM150, TR3.TM150E).	Significant Adverse Local

Ecological Feature	Value	Potential Effect(s) Prior to Mitigation	Significance (Pre-Mitigation)																
		<p>measures, including but not limited to provision of buffers, surface water management and dust suppression measures (further details of which are provided in the CCoP Sections 4.4, 5.6 and 5.11).</p> <p>In addition to areas experiencing direct loss of marsh habitat from soil stripping, the GWDTE assessment (Appendix 7.2) identified further areas of marsh that would be at risk of impact resulting from changes to groundwater quality originating from the main compound works. Marshy grassland within and beyond the Newton-in-Bowland Compound and the Lower Houses Compound with significant effects are summarised as follows:</p> <table border="1" data-bbox="776 967 2022 1596"> <thead> <tr> <th data-bbox="776 967 1094 1147">Effect Type</th> <th data-bbox="1094 967 1404 1147">Lower House Cottage (Lower Houses Compound)</th> <th data-bbox="1404 967 1695 1147">Dunsop Bridge Road (Newton-in-Bowland Compound)</th> <th data-bbox="1695 967 2022 1147">River Hodder North (Newton-in-Bowland Compound)</th> </tr> </thead> <tbody> <tr> <td data-bbox="776 1147 1094 1316">Intercept flows in short or long term including ground compaction</td> <td data-bbox="1094 1147 1404 1316">Moderate adverse magnitude/ Moderate significance</td> <td data-bbox="1404 1147 1695 1316">Minor adverse magnitude/ slight significance</td> <td data-bbox="1695 1147 2022 1316">Major adverse magnitude/ large significance</td> </tr> <tr> <td data-bbox="776 1316 1094 1497">Accidental leak / spills of fuels and chemicals</td> <td data-bbox="1094 1316 1404 1497">Minor adverse magnitude/ slight significance</td> <td data-bbox="1404 1316 1695 1497"></td> <td data-bbox="1695 1316 2022 1497">Moderate adverse magnitude/ moderate significance</td> </tr> <tr> <td data-bbox="776 1497 1094 1596">Mobilisation of suspended solids</td> <td data-bbox="1094 1497 1404 1596">Minor adverse magnitude/ slight significance</td> <td data-bbox="1404 1497 1695 1596"></td> <td data-bbox="1695 1497 2022 1596">Moderate adverse magnitude/ moderate significance</td> </tr> </tbody> </table>	Effect Type	Lower House Cottage (Lower Houses Compound)	Dunsop Bridge Road (Newton-in-Bowland Compound)	River Hodder North (Newton-in-Bowland Compound)	Intercept flows in short or long term including ground compaction	Moderate adverse magnitude/ Moderate significance	Minor adverse magnitude/ slight significance	Major adverse magnitude/ large significance	Accidental leak / spills of fuels and chemicals	Minor adverse magnitude/ slight significance		Moderate adverse magnitude/ moderate significance	Mobilisation of suspended solids	Minor adverse magnitude/ slight significance		Moderate adverse magnitude/ moderate significance	
Effect Type	Lower House Cottage (Lower Houses Compound)	Dunsop Bridge Road (Newton-in-Bowland Compound)	River Hodder North (Newton-in-Bowland Compound)																
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Accidental leak / spills of fuels and chemicals	Minor adverse magnitude/ slight significance		Moderate adverse magnitude/ moderate significance																
Mobilisation of suspended solids	Minor adverse magnitude/ slight significance		Moderate adverse magnitude/ moderate significance																

Ecological Feature	Value	Potential Effect(s) Prior to Mitigation	Significance (Pre-Mitigation)
		groundwater quality may also occur. The net extent of habitats potentially effected is not significant in the context of the extent of this resource locally.	
Semi-improved acid grassland	County	Temporary loss of 0.11 ha to be removed within the Newton-in-Bowland Compound, to form the construction access crossing the B6478. Reversible (with intervention).	Significant Adverse Less than local
	County	Significant degradation in quality or function of acid grasslands retained within and surrounding the Newton-in-Bowland Compound arising as a consequence of ground or surface water changes, run-off or dust deposition would be avoided by embedded mitigation measures, including but not limited to provision of buffers, surface water management, site run-off treatment, soil stabilisation techniques and dust suppression measures (further details of which are provided in the CCOP Sections 4.9, 5.2, 5.3, 5.4, 5.6, 5.7 and 5.11).	Not significant
Fen	County	Temporary loss of 0.04 ha as a consequence of constructing the temporary access road at Newton-in-Bowland Compound within the Gamble Hole Farm Pastures BHS. Likely additional loss of 0.59 ha comprising the part of fen habitat retained within the Newton-in-Bowland Compound (TR3.TN103, Figure 9A.5) due to its complete enclosure by the construction compound and access road resulting in hydrological changes. Reversible (with intervention). In addition to that described above, temporary loss of 0.08 ha in Newton-in-Bowland Compound (TR3.TN149, Figure 9A.5) within the temporary construction access route to the east of the compound, directly south of watercourse W470. The total temporary loss of fen habitat would be 0.71 ha, equivalent to 30% of the fen habitat present within 200 m of the Newton-in-Bowland (2.3 ha) Reversible (with intervention).	Significant Adverse Local
Fen	County	As described for Gamble Hole Farm Pasture BHS, significant degradation in quality or function of	Significant

Ecological Feature	Value	Potential Effect(s) Prior to Mitigation	Significance (Pre-Mitigation)												
		<p>habitat within and beyond the Newton-in-Bowland Compound with significant effects are summarised as follows:</p> <table border="1" data-bbox="776 735 2005 1337"> <thead> <tr> <th data-bbox="776 735 1155 839">Effect Type</th> <th data-bbox="1155 735 1561 839">Gamble Hole Farm Pasture</th> <th data-bbox="1561 735 2005 839">River Hodder North</th> </tr> </thead> <tbody> <tr> <td data-bbox="776 839 1155 979">Intercept flows in short or long term including ground compaction</td> <td data-bbox="1155 839 1561 979">Major adverse magnitude/ large significance</td> <td data-bbox="1561 839 2005 979">Major adverse magnitude/ large significance</td> </tr> <tr> <td data-bbox="776 979 1155 1161">Accidental leak / spills of fuels and chemicals</td> <td data-bbox="1155 979 1561 1161">Moderate adverse magnitude/ moderate significance</td> <td data-bbox="1561 979 2005 1161">Moderate adverse magnitude/ moderate significance</td> </tr> <tr> <td data-bbox="776 1161 1155 1337">Mobilisation of suspended solids</td> <td data-bbox="1155 1161 1561 1337">Moderate adverse magnitude/ moderate significance</td> <td data-bbox="1561 1161 2005 1337">Moderate adverse magnitude/ moderate significance</td> </tr> </tbody> </table> <p>Despite methods embedded through the CCoP (Sections 4.9, 5.3, 5.6 and 5.7) (which would reduce the likelihood of adverse effects occurring, but not necessarily the severity or consequence of the effect), vegetation clearance and topsoil stripping and accidental leaks or spills are assessed to result in moderate significance effects upon groundwater levels / flows and quality affecting fen habitat associated with Gamble Hole Farm Pasture.</p>	Effect Type	Gamble Hole Farm Pasture	River Hodder North	Intercept flows in short or long term including ground compaction	Major adverse magnitude/ large significance	Major adverse magnitude/ large significance	Accidental leak / spills of fuels and chemicals	Moderate adverse magnitude/ moderate significance	Moderate adverse magnitude/ moderate significance	Mobilisation of suspended solids	Moderate adverse magnitude/ moderate significance	Moderate adverse magnitude/ moderate significance	
Effect Type	Gamble Hole Farm Pasture	River Hodder North													
Intercept flows in short or long term including ground compaction	Major adverse magnitude/ large significance	Major adverse magnitude/ large significance													
Accidental leak / spills of fuels and chemicals	Moderate adverse magnitude/ moderate significance	Moderate adverse magnitude/ moderate significance													
Mobilisation of suspended solids	Moderate adverse magnitude/ moderate significance	Moderate adverse magnitude/ moderate significance													

Ecological Feature	Value	Potential Effect(s) Prior to Mitigation	Significance (Pre-Mitigation)
Basic flush Acid/neutral flush	County	Temporary loss of 0.04 ha basic flush as a consequence of constructing the temporary access road at the east of the Newton-in-Bowland Compound. 0.04 ha represents 21% of the basic flush habitat present within 200 m of the compound. Reversible (with intervention).	Significant Adverse Local
	County	<p>Degradation in quality or function of retained flush habitats within and to the north of the Newton-in-Bowland temporary construction access, resulting from changes groundwater pathways, flow rates or quality. The flush habitats in this location (TR3.GW2, TR3.GW3 (Dunsop Bridge Road GWDTE site), TR3.GW5 and TR3.GW7 (River Hodder North GWDTE site, Appendix 9A.5)) were assessed to range from low to high dependency.</p> <p>Construction of the temporary attenuation pond is assessed to not result in any impacts on groundwater as the flush habitats lie outside of the estimated dewatering zone of influence of the pond and are not down gradient.</p> <p>Groundwater flow disturbance could occur within the compound area due to compaction-related construction activities and earthworks, such as topsoil stripping and construction of the temporary access track which would result in a site-wide shallow dewatering effect and the impact on groundwater flows and levels within the site would be direct and major. This would not be expected to impact the flush habitats outside of the footprint of the works at TR3.GW2 and TR3.GW3.</p> <p>Ground disturbance due to topsoil stripping and vegetation clearance may also impact groundwater quality due to mobilisation of suspended solids.</p> <p>In addition to areas experiencing direct loss of flush habitat from soil stripping, the GWDTE assessment (Appendix 7.2) identified further areas of flush that would be at risk of impact resulting from changes to groundwater quality originating from the main compound works. Flush habitat within and beyond the Newton-in-Bowland Compound with significant effects are</p>	Significant Adverse Local

Ecological Feature	Value	Potential Effect(s) Prior to Mitigation			Significance (Pre-Mitigation)
		Intercept flows in short or long term including ground compaction	Minor adverse magnitude/ slight significance	Major adverse magnitude/ large significance	
		Accidental leak / spills of fuels and chemicals		Moderate adverse magnitude/ moderate significance	
		Mobilisation of suspended solids		Moderate adverse magnitude/ moderate significance	
		<p>Despite methods embedded through the CCoP (Sections 4.9, 5.3, 5.6 and 5.7) (which would reduce the likelihood of adverse effects occurring, but not necessarily the severity or consequence of the effect), vegetation clearance and topsoil stripping and accidental leaks or spills are assessed to result in moderate significance effects upon groundwater levels / flows and quality affecting flush habitats at Newton-in-Bowland (River Hodder North GWDTE site). Corresponding effects are assessed to be of large significance upon groundwater levels / flows and moderate significance upon groundwater quality.</p> <p>No impacts on groundwater quality are expected on the flush habitats outside of the footprint to the north (River Hodder North GWDTE site).</p>			
Ponds	Local	Significant degradation in quality or function of the 4 no. ponds (TO3.P87- TO3.P89a, Figure 9A.22) located between 12 m and 20 m west of the Newton-in-Bowland Compound arising as a consequence of ground or surface water changes. run-off or dust deposition would be avoided by			Not significant

Ecological Feature	Value	Potential Effect(s) Prior to Mitigation	Significance (Pre-Mitigation)
			Local
Scattered broadleaved trees (veteran and non-veteran)	County	The potential veteran tree (T124, adjacent to Newton-in-Bowland Compound) and all other non-veteran trees would be retained in line with embedded mitigation. Significant effects arising on retained trees as a consequence of pollutants/spillages, run-off or dust deposition would be avoided by embedded mitigation measures, including but not limited to provision of buffers, surface water management, site run-off treatment, soil stabilisation techniques and dust suppression measures (further details of which are provided in the CCOP Sections 4.9, 5.2, 5.3, 5.4, 5.6, 5.7 and 5.11).	Not significant
Hedgerows (species rich, species poor with trees and species poor without trees)	Local	Physical loss of 0.18 km species poor hedgerows with trees (HTR3.H31, Figure 9A.6) and 0.28 km species poor hedgerows without trees (HTR3.H32, Figure 9A.6) to create temporary construction access into Newton-in-Bowland Compound across Newton Road. Physical loss of approximately 0.3 km species rich hedgerow for access into compound west of Wray. Reversible (with intervention).	Significant Adverse Local
Bats: roosts	Local	Unavoidable loss of 16 no. individual trees with low bat roost suitability TR3.BT103/T78, BT106/G95, BT107/G95, BT108/T100, BT112/T109, BT115/G129, BT116/G128, BT118/G129, BT120/G129, BT122/G128, BT123/G132, BT135/G129, BT138/G115, BT139/T123, BT140/G115, BT141/G115 and two low potential groups (TR3.BG25/H83 and TR3.BG35/G112), as well as 10 no. trees with medium roost suitability (TR3.BT113/G103, BT117/G128, BT119/G128, BT121/G129, BT124/G132, BT125/G132, BT126/G132, BT127/G132, BT128/T139, BT142/T94) and one medium potential group (BG28) (Figure 9A.10) at the Newton-in-Bowland Compound. Unavoidable loss of one tree with low bat roost suitability TR3.BT24/T71 (Figure 9A.10) at the Lower Houses Compound. All other trees with roost suitability would be retained and protected	Significant Adverse Local Newton-in-Bowland Compound only

Ecological Feature	Value	Potential Effect(s) Prior to Mitigation	Significance (Pre-Mitigation)
		<p>crossing which would potentially result in longer necessary foraging routes for bats and greater energy expenditure.</p> <p>Due to the low levels of bat activity recorded at the Lower Houses Compound, the potential fragmentation effect on bat foraging are unlikely.</p>	
Badger, brown hare, hedgehog, terrestrial amphibians, reptiles	Local	Vegetation clearance, soil stripping and handling, excavations and other enabling phase activities would put species at risk of killing, injury as well as entrapment in excavations or temporary fencing (subject to design). Embedded mitigation measures would prevent any significant effects from this.	Not significant
	Local	<p>Physical loss of foraging and shelter habitats. Reversible (with intervention).</p> <p>Disturbance from noise, visual or vibration effects, resulting in possible localised displacement from retained habitats. Fenced construction zones would may also create localised barrier effects, resulting in exclusion from retained habitats. Reversible.</p> <p>Disturbance events may result in needless expenditure of energy and may expose species to increased risk of predation, resulting in increased mortality of individuals. Irreversible (loss of individuals).</p>	Significant Adverse Less than Local
Breeding birds	Local	<p>It is likely that there would be a loss of nesting habitat for the following seven BoCC species which were confirmed or probable breeders within the Newton-in-Bowland Compound footprint: one pair of curlew, one pair of grey wagtail, two pairs of lapwing, two pairs of mallard, three pairs of oystercatcher, one pair of redstart and one pair of starling.</p> <p>It is likely that there would be a loss of nesting habitat for the following three BoCC species which were confirmed or probable breeders within the Lower Houses Compound footprint: one pair of curlew, one pair of mallard and one pair of oystercatcher.</p>	Significant Adverse Local

Ecological Feature	Value	Potential Effect(s) Prior to Mitigation	Significance (Pre-Mitigation)
		<p>Six BoCC species were confirmed or probable breeders within the Lower Houses compound and surrounding area that could be affected by disturbance impacts: curlew, lapwing, mallard, oystercatcher, skylark and snipe. No species associated with the Bowland Fells SPA were recorded within or surrounding the compounds.</p> <p>Species nesting in retained habitats on or offsite, or utilising habitats within or surrounding the compounds to support nesting, may be subject to disturbance from noise, visual or vibration effects, resulting in possible localised displacement. Reversible (with intervention).</p> <p>Disturbance events may also result in needless expenditure of energy and may expose species to increased risk of predation, resulting in increased mortality of individuals. Irreversible (loss of individuals).</p> <p>Embedded mitigation measures would limit disturbance impacts on breeding birds (further details of which are provided in the CCOP Section 5.4.2 and 5.10) Irreversible (loss of individuals).</p>	
Wintering birds	Local	<p>Small numbers of waders, wildfowl and gulls were recorded from within the compounds or habitats within 500 m of the compounds. A group of 215 oystercatcher were recorded 75 m from the Lower Houses Compound on one occasion.</p> <p>Vegetation clearance could result in the loss of foraging and resting habitats. Reversible (with intervention).</p> <p>Species utilising offsite habitats to rest or forage may be subject to disturbance from noise, visual or vibration effects, resulting in possible localised displacement from retained habitats. Reversible (with intervention).</p> <p>Disturbance events may also result in needless expenditure of energy and may expose species to increased risk of predation, resulting in increased mortality of individuals. Embedded mitigation measures would limit disturbance impacts on wintering birds (further details of which are provided</p>	<p>Significant Adverse Less than Local</p>

Ecological Feature	Value	Potential Effect(s) Prior to Mitigation	Significance (Pre-Mitigation)
Amphibians: breeding	Local	Breeding and aquatic foraging habitat deterioration, leading to reduced breeding success for at least four breeding seasons as a consequence of water quality change /sediment loading of 4 no. ponds to west of Newton-in-Bowland Compound. Possible mortality of common amphibians if event is extreme through oxygen depletion. However, embedded mitigation measures would avoid significant effects impacting these breeding and aquatic foraging habitats, including but not limited to provision of buffers, surface water management, site run-off treatment, soil stabilisation techniques and dust suppression measures (further details of which are provided in the CCOP Sections 4.9, 5.2, 5.3, 5.4, 5.6, 5.7, 5.10 and 5.11).	Not significant
Terrestrial invertebrates	Local	Physical loss of foraging and shelter habitats for larval and adult stages of a range of species, with butterflies and moths likely to be the most diverse of assemblages affected. Reversible (with intervention). Species utilising retained habitats on or offsite could be subject to disturbance from noise, visual or vibration effects, resulting in possible localised displacement from retained habitats. Reversible. Disturbance events may result in needless expenditure of energy and may expose species to increased risk of predation, resulting in increased mortality of individuals. Irreversible (loss of individuals).	Significant Adverse Less than local

9.6.2 Construction Phase

Proposed Activities

- 63) Following enabling works, the construction phase is anticipated to continue for just less than 6 years, from commencement of construction activities in Q2 2023 to completion in Q4 2028. Habitat reinstatement will follow on from the construction phase and into the commissioning phase, the timing of which is dependent on outage periods, which are limited to every two years and likely to occur in 2029. Blasting would be undertaken where hard rock is encountered and where alternative excavation methods are not practical. Appendix 17.3 discusses how blasting shall be considered during construction, including noise and vibration limits that would be adopted, subject to discussion and agreement with the local planning authority. Blasting to form the drive portal at the Newton-in-Bowland Compound is anticipated to occur during the first year of the construction phase in 2023.
- 64) Activities anticipated during the construction phase which have the potential to give rise to significant ecological effects are summarised as follows:
- Operation of the Newton-in-Bowland Compound, the launch facility, with activities including delivery and storage of tunnel sections, blasting and excavation to construct the drive portal, the operation and storage of plant, machinery and equipment, use and access to welfare facilities and offices. Above ground activities may require 24 hrs / 7 day week working once tunnelling is underway, although vehicle movements to and from site and blasting to construct the drive portal would be restricted outside normal construction site working hours
 - Storage and treatment of tunnel arisings at the Newton-in-Bowland Compound before removal from site to Waddington Fell Quarry
 - Vehicle movements and traffic management along temporary haulage routes between strategic road network and the Newton-in-Bowland and Lower Houses Compounds and lay-down areas, including but not limited to the delivery and removal of plant, machinery or equipment and removal of tunnel arisings
 - Open cut sections comprising multi-line siphon (MLS) connections between new Valve House Buildings and existing aqueduct
 - Construction of the drive portal at the Newton-in-Bowland Compound, including blasting works presumed to be undertaken during regular intervals during the first year of construction works
 - De-watering operations (temporary attenuation and discharge of surface waters)
 - Operation of power supply comprising generators, required 24 hr a day
 - Operation of artificial lighting for safety reasons and where 24 hr working is required (lights would be located to minimise light spill towards sensitive locations)
 - Construction of permanent new Valve House Buildings (single storey approximately 11 m wide and 12 m long) and associated maintenance tracks at both compounds
 - Removal of temporary surfaces and
 - Habitat reinstatement (following completion of construction phase), including soil handing, topsoil spreading and other ground preparation techniques, seeding, planting and aftercare requirements, installation of a slab cover over the tunnel shafts and backfilling for habitat reinstatement above (excepting for access covers). Methods and timing of habitat reinstatement would vary according to the target habitat and would be agreed with the LPA.

Effects Scoped Out

- 65) Tunnel boring would take place below ground up to a depth of approximately 300 m. Tunnel lining would be installed progressively as the TBM moves forward, leaving only about 10 m of tunnel unlined at any one time and so would be very unlikely to give rise to any significant effects upon important ecological features. Tunnel boring has therefore been scoped out from this EclA for Terrestrial Ecology.

- 66) All habitat losses and fragmentation effects would occur during the enabling phase; these impacts are assessed at Section 9A.6.2. This includes construction of permanent structures (Valve House Buildings, maintenance routes and other small scale associated surface level structures) as these are located within the compound boundaries. Adverse ecological effects anticipated to arise from the construction phase would therefore primarily comprise disturbance effects upon adjacent and nearby retained habitats or species utilising those offsite habitats.
- 67) Landtake for the construction of the temporary attenuation and discharge structures has been accounted for within the habitat losses calculated for the enabling phase in Section 9A.6.2. De-watering operations during construction would involve attenuation of site runoff from across the compounds and subsequent discharge to existing surface-water features, the effects of which are considered in Chapter 9B, in addition to the removal of the temporary outfalls that were constructed in the watercourses during enabling works. De-watering operations during the construction phase are therefore not considered further in this EclA in respect of watercourses or habitat losses.
- 68) Temporary de-watering operations during the construction phase would involve attenuation of surface waters from across the compounds and subsequent discharge to existing surface-water features, the effects on which are considered in Chapter 9B, in addition to the removal of the temporary outfalls that would be constructed during enabling works. De-watering operations during the construction phase are therefore not considered further in this EclA in respect of watercourses or habitat losses.
- 69) Similarly, the decommissioning of existing aqueduct sections which would include flushing out and subsequent surface discharge of waters used, would utilise existing temporary (constructed during enabling phase) or permanent (pre-existing) outfall structures. Consequently, no additional landtake and resulting habitat losses are anticipated additional to those considered for the enabling phase. Surface water discharges are anticipated into existing surface water features, the potential effects of which are considered in Chapter 9B.
- 70) The potential for significant dust generation during the construction phase, for example as a consequence of temporary storage and removal from site of the tunnel arisings or during blasting would be avoided through the implementation of embedded mitigation measures including soil stabilisation techniques as detailed in the CCoP Sections 5.6 and 5.10. No significant effects upon any important ecological features are therefore anticipated to arise during the construction phase as a consequence of dust generation.
- 71) The Air Quality assessment (Appendices 18.1 and 18.2) concludes that no significant changes to air quality would arise as a consequence of the site traffic during any of the project phases. Effects of increased emissions from site traffic alone are therefore scoped out for the construction phase. Potential effects of increased emissions arising from operation of generators within the compounds were scoped into the Air Quality assessment. As these effects are considered limited to the main compounds the assessment considered international valued ecological designations up to 5 km from the compounds and locally to nationally valued ecological features containing nitrogen (N) sensitive habitats up to 200 m from the compounds. However, as the Air Quality Assessment only identified one site (Far Holme Meadow SSSI) where potentially significant impacts might occur this impact pathway is scoped out for all other ecology features in this assessment.

Effects Carried Forward for Assessment

- 72) In the absence of additional mitigation, potential effects upon important ecological features during the construction would include:
- Damage, degradation or modification of retained habitats including:
 - potential air quality changes (increased emissions from operation of generators) affecting habitats within Far Holme Meadow SSSI
 - accidental pollution events from fuel/oil spills from vehicles using the construction access across Gamble Hole Farm Pasture BHS or from accidental encroachment off the access by vehicles or vehicle loads affecting fen habitats retained within the BHS

- possible changes or disruptions to surface or ground water (changes to flow/levels or quality) affecting fen habitats retained within Gamble Hole Farm Pasture BHS
 - effects on retained / offsite GWDTE as a result of construction phase activities
 - encroachment within root protection areas of retained hedgerows and trees, whether accidental or required as part of construction methods
 - Killing, injury or entrapment risk of terrestrial fauna:
 - storage of certain arisings e.g. top soil, sub soil, tunnel arisings, stonework from dry stone wall removal could create potentially attractive habitat features for a range of species such as badger, hedgehog, reptiles and amphibians. Subsequent removal of these materials and reuse in habitat reinstatement could put such species at risk, were they able to gain access to the stockpiles and be present at the time materials are recovered
 - temporary fencing used to demarcate working or stockpile areas outside of the compounds may pose an entrapment or entanglement risk to terrestrial fauna such as badger, brown hare and hedgehog
 - temporary attenuation ponds pose a risk of drowning to terrestrial fauna such as badger, brown hare and hedgehog
 - Disturbance of species through noise, visual, lighting or vibration effects:
 - noise and vibrations from blasting and noise, visual, lighting and vibration effects from ongoing construction activities and construction traffic might cause desertion of occupied breeding or shelter sites in affected adjacent habitats
 - lighting disturbance may cause habitat fragmentation for bats, disrupting commuting routes between roost and foraging sites, and may effect behavioural changes in other nocturnal fauna (certain birds and invertebrates, for example).
 - disturbances might also cause needless expenditure of energy and may expose species to increased risk of predation
- 73) Habitat reinstatement would occur on completion of the construction phase. This would result in the reversal of the majority of effects arising from habitat loss and fragmentation that occurred during the enabling phase, once habitats become established. The reinstatement of habitats is included in the following construction phase effects, but the timescales considered in this assessment take account of the potential for a pause between the construction and commissioning phase (and associated reinstatement) as a result of needing to wait for an outage.
- 74) In the absence of mitigation, but with due consideration of embedded mitigation measures described at Section 9A.6.1 and detailed in the CCoP, construction effects on the important ecological features are presented in Table 9A.10 below. Only those important ecological features where effects have been identified are included in the table.

Table 9A.10: Summary of Construction Phase Effects

Ecological Feature	Value	Potential Effect(s) Prior to Mitigation	Significance (Pre-Mitigation)
Far Holme Meadow SSSI	National	Degradation in quality or function resulting from changes to air quality arising from increased emissions from generator use at Lower Houses Compound. Critical loads had the potential to be breached based on the precautionary approach of the Air Quality Assessment which anticipates 24hr running of generators, however as Lower Houses is a reception compound, 24hr working will be limited to only two short periods during excavation and infilling of the shaft. As such no significant effects are predicted to arise on the designation. Further details are provided in the SSSI report (LCC_RVBC-BO-APP-009).	Not Significant
Gamble Hole Farm Pasture BHS	County	Degradation of fen habitat of Gamble Hole Farm Pasture BHS within the site as a result of pollution or erosion from vehicles using temporary access route across fen habitat (e.g. fuel/oil leaks, spills of spoil being transported, encroachment off the track, run-off from the track surface). Embedded mitigation measures detailed within CCoP Sections 5.2.1, 5.4.2, 5.3 and 5.6 would reduce the likelihood of contaminating groundwater, however they do not affect the severity or consequence of an event occurring. Should groundwater become contaminated within the upgradient works footprint, or from use of the temporary access track, the impact on groundwater quality on the area of the BHS within the site would be minor, resulting in a significant effect of slight significance. This only applies to the area of the BHS within the site however, with no significant effect on the more diverse and ecologically valuable area of the BHS outside of the site to the west.	Significant Adverse County
	County	Ground compaction caused by heavy haulage vehicles and plant, could create a local barrier to groundwater flows from the west and northeast that would be of large significance for the central area of Gamble Hole Farm Pasture BHS, located both in the site and off site to the west. The area of Gamble Hole Farm Pastures of highest diversity and ecological value is located offsite	Significant Adverse County

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Ecological Feature	Value	Potential Effect(s) Prior to Mitigation	Significance (Pre-Mitigation)										
	County	<p>The temporary dewatering operations as a result of the portal may result in changes to a drawdown in groundwater levels of very large significance for the groundwater dependent habitat in the east of the Gamble Hole Farm Pasture site.</p> <p>Habitat at Gamble Hole Farm Pastures with significant effects as identified within the GWDTE assessment (Appendix 7.2) during the construction phase are summarised as follows:</p> <table border="1" data-bbox="724 866 1956 1342"> <thead> <tr> <th data-bbox="724 866 1273 922">Effect Type</th> <th data-bbox="1273 866 1956 922">Gamble Hole Farm Pasture</th> </tr> </thead> <tbody> <tr> <td data-bbox="724 922 1273 1018">Portal dewatering (groundwater levels / flows)</td> <td data-bbox="1273 922 1956 1018">Major adverse magnitude/ very large significance</td> </tr> <tr> <td data-bbox="724 1018 1273 1114">Open-cut connection dewatering (groundwater levels / flows)</td> <td data-bbox="1273 1018 1956 1114">Moderate adverse magnitude/ large significance</td> </tr> <tr> <td data-bbox="724 1114 1273 1209">Overflow dewatering (groundwater levels / flows)</td> <td data-bbox="1273 1114 1956 1209">Moderate adverse magnitude/ large significance</td> </tr> <tr> <td data-bbox="724 1209 1273 1342">Intercept flows in short term, including ground compaction (groundwater levels / flows)</td> <td data-bbox="1273 1209 1956 1342">Major adverse magnitude/ large significance</td> </tr> </tbody> </table> <p>The western half of the GWDTE site lies along the edge of the estimated dewatering zone of influence, and the impact to groundwater levels and flows in this part of the site would likely be minor, with significant groundwater inflows expected to be unaffected from the contributing catchment to the north. The area within the west of the GWDTE site consists of the most diverse area of the BHS broadly outside of the red line boundary.</p>	Effect Type	Gamble Hole Farm Pasture	Portal dewatering (groundwater levels / flows)	Major adverse magnitude/ very large significance	Open-cut connection dewatering (groundwater levels / flows)	Moderate adverse magnitude/ large significance	Overflow dewatering (groundwater levels / flows)	Moderate adverse magnitude/ large significance	Intercept flows in short term, including ground compaction (groundwater levels / flows)	Major adverse magnitude/ large significance	Significant Adverse County
Effect Type	Gamble Hole Farm Pasture												
Portal dewatering (groundwater levels / flows)	Major adverse magnitude/ very large significance												
Open-cut connection dewatering (groundwater levels / flows)	Moderate adverse magnitude/ large significance												
Overflow dewatering (groundwater levels / flows)	Moderate adverse magnitude/ large significance												
Intercept flows in short term, including ground compaction (groundwater levels / flows)	Major adverse magnitude/ large significance												

Ecological Feature	Value	Potential Effect(s) Prior to Mitigation	Significance (Pre-Mitigation)
		<p>groundwater flows or quality changes, which could result in a significant adverse effect on the integrity of the BHS.</p> <p>Despite methods embedded through the CCoP (Sections 4.9, 5.3, 5.6 and 5.7) (which would reduce the likelihood of adverse effects occurring, but not necessarily the severity or consequence of the effect), should groundwater become contaminated within the upgradient works footprint, or from use of the temporary access track, the impact on groundwater quality throughout the centre and east of the site would be minor, resulting in a Slight significance of effect. The exception is the far west of the site, which lies cross-gradient of the works area and would likely experience negligible to no impacts on groundwater quality.</p> <p>Reversible</p>	
<p>Newton West Roadside Verges BHS Goodber Common BHS Over Houses Great Wood BHS Waddington Fell Roadside Verges BHS Waddington Fell and Browsholme Moor BHS Haw Wood BHS Newton North Roadside Verges BHS Great Dunham Wood BHS</p>	<p>County</p>	<p>One watercourse passes through the Lower Houses Compound which flows through Haw Wood BHS, located 400 m north east of this compound. Another watercourse flows adjacent to the southern boundary of Lower Houses Compound which then passes through Hole House and Lower House Grasslands BHS, located 500 m north east of the compound. While impacts upon the watercourses themselves are assessed in Chapter 9B, habitats within the BHS would be at risk of degradation in quality or function resulting from surface water and site run-off carried by the watercourses, including sedimentation or wash-out/erosion effects. However, significant effects of this nature would be avoided or reduced to non-significant levels by embedded mitigation (further details of embedded measures to protect surface water features, maintain surface water run-off rates and ensure surface and site run-off water quality are provided within CCoP Sections 4.9, 5.3, 5.6 and 5.7.</p> <p>No above ground hydrological changes, sedimentation, erosion or effects anticipated as a consequence of new temporary site run-off drainage solution for the Newton-in-Bowland Compound, as this would outfall to a separate watercourse that does not flow through any of</p>	<p>Not significant</p>

Ecological Feature	Value	Potential Effect(s) Prior to Mitigation	Significance (Pre-Mitigation)
Broadleaved and mixed plantation woodlands	Local	<p>Embedded mitigation measures detailed within the CCoP (Section 5.10.2.2 and Section 5.11) would require a range of avoidance or control measures to reduce the impact of dust and other adverse effects upon air quality and would prevent any impacts on the woodland from dust.</p> <p>No impacts on semi-natural broadleaved woodland are predicted due to construction phase dewatering, as the habitat lies outside of the calculated dewatering zone of influence of the proposed portal and open-cut MLS connection.</p> <p>No impacts on groundwater quality including any surface water impacts are expected at the woodland area during the construction phase. This is because all works activities that could introduce suspended solids, and / or fuels and chemicals into the groundwater environment, are located across-gradient and at least 80 m southeast of the site. Embedded mitigation measures detailed within CCoP Sections 5.2.1 and 5.4.2 would further ensure that there would be no impacts on groundwater quality.</p>	
Semi-improved neutral grassland	Local	<p>Habitat reinstatement would reverse habitat losses incurred during enabling phase, once established. With the implementation of embedded measures provided within the CCoP Sections 4.9, 5.3, 5.6 and 5.7 to protect surface water features, surface water run-off rates would be maintained and surface and site run-off water quality would be protected. No additional adverse effects would be anticipated to arise upon retained grassland habitats as a consequence of grassland reinstatement works (sub- and topsoil replacement, soil preparation and seeding).</p>	Not significant
Marshy grassland	Local	<p>Several areas of marshy grassland that are assessed as GWDTE with varying levels of dependency are present within and adjacent to the temporary construction access area for the Newton-in-Bowland Compound and adjacent to the north of the Lower Houses Compound.</p> <p>Marshy grassland habitat with significant effects as identified within the GWDTE assessment (Appendix 7.2) during the construction phase are summarised as follows:</p>	Not significant

Ecological Feature	Value	Potential Effect(s) Prior to Mitigation			Significance (Pre-Mitigation)
		Soil storage direct impact / compaction (groundwater levels / flows)		Minor adverse magnitude/ slight significance	
		Accidental leak / spills of fuels and chemicals	Minor adverse magnitude/ slight significance		
		Mobilisation of suspended solids	Minor adverse magnitude/ slight significance		
		<p>Marshy grassland assessed as GWDTE adjacent to the River Hodder within the temporary access track area for the Newton-in-Bowland Compound may be subject to compaction caused by heavy haulage plant that could create a barrier to groundwater flows from the north. This may have the result in drying out, such that marshy grassland may revert to a different grassland community (effective loss). Degradation or reduction in extent through partial drying or reduced groundwater quality may also occur. The net extent of marshy grasslands potentially affected is not significant in the context of the extent of this resource locally.</p>			
Fen	County	<p>As described for Gamble Hole Farm Pastures BHS above, degradation in quality or function resulting from changes in water quality or flows in watercourses that feed or flow through retained habitats and which are temporarily modified during construction.</p> <p>Fen habitat with significant effects as identified within the GWDTE assessment (Appendix 7.2) during the construction phase are summarised as follows:</p>			Significant Adverse Local

Ecological Feature	Value	Potential Effect(s) Prior to Mitigation			Significance (Pre-Mitigation)
		Open-cut connection dewatering (groundwater levels / flows)	Moderate adverse magnitude/ large significance		
		Overflow dewatering (groundwater levels / flows)	Moderate adverse magnitude/ large significance		
		Soil storage direct impact / compaction (groundwater levels / flows)		Minor adverse magnitude/ slight significance	
		Intercept flows in short term, including ground compaction (groundwater levels / flows)	Major adverse magnitude/ large significance	Major adverse magnitude/ large significance	
		As described for Gamble Hole Farm Pasture BHS, despite embedded methods set out in the CCoP (Sections 4.9, 5.3, 5.6 and 5.7), which would reduce the likelihood of any pollution impacts occurring (e.g. through fuel/oil leaks, spills of spoil being transported, encroachment off the track, run-off from the track surface), in the event that a pollution event did occur, the impact on fen habitat within the site would be minor, resulting in a significant effect of slight significance.			
		As described for Gamble Hole Farm Pastures BHS, ground compaction caused by heavy haulage			Significant

Ecological Feature	Value	Potential Effect(s) Prior to Mitigation	Significance (Pre-Mitigation)						
		Habitat reinstatement would reverse habitat losses incurred during enabling phase, once established. With the implementation of embedded measures outlined in the CCoP (Sections 5.3, 5.6 and 5.7), no additional adverse effects are anticipated to arise.	Not significant						
Basic flush	County	<p>Basic flush habitat with significant effects as identified within the GWDTE assessment (Appendix 7.2) during the construction phase are summarised as follows:</p> <table border="1" data-bbox="724 874 1972 1254"> <thead> <tr> <th data-bbox="724 874 1319 978">Effect Type</th> <th data-bbox="1319 874 1972 978">River Hodder North</th> </tr> </thead> <tbody> <tr> <td data-bbox="724 978 1319 1121">Soil storage direct impact / compaction (groundwater levels / flows)</td> <td data-bbox="1319 978 1972 1121">Minor adverse magnitude/ slight significance</td> </tr> <tr> <td data-bbox="724 1121 1319 1254">Intercept flows in short term, including ground compaction (groundwater levels / flows)</td> <td data-bbox="1319 1121 1972 1254">Major adverse magnitude/ large significance</td> </tr> </tbody> </table> <p>As described for Gamble Hole Farm Pastures BHS above, degradation in quality or function resulting from changes in water quality or flows in watercourses that feed or flow through retained habitats and which are temporarily modified during construction (for construction access route crossings or temporary surface water outfalls). Groundwater flow disturbance could occur due to compaction-related construction activities at the River Hodder North GWDTE site, assessed to be of minor adverse magnitude and slight significance within the GWDTE assessment (Appendix 7.2). Reversible (with intervention).</p>	Effect Type	River Hodder North	Soil storage direct impact / compaction (groundwater levels / flows)	Minor adverse magnitude/ slight significance	Intercept flows in short term, including ground compaction (groundwater levels / flows)	Major adverse magnitude/ large significance	Significant Adverse Local
Effect Type	River Hodder North								
Soil storage direct impact / compaction (groundwater levels / flows)	Minor adverse magnitude/ slight significance								
Intercept flows in short term, including ground compaction (groundwater levels / flows)	Major adverse magnitude/ large significance								

Ecological Feature	Value	Potential Effect(s) Prior to Mitigation	Significance (Pre-Mitigation)
Scattered broadleaved trees (veteran and non-veteran)	County	Damage or degradation of trees retained veteran trees within or adjacent to construction areas from surrounding construction activities (e.g. soil compaction, erosion, root or tree damage, wash out etc.) would be avoided by embedded measures outlined in the CCoP (Sections 5.3, 5.6 and 5.7). Habitat reinstatement would reverse (or compensate for mature trees) losses incurred during enabling phase, once established in the long term, no additional significant adverse effects are anticipated to arise.	Not significant
Hedgerows	Local	Habitat reinstatement would reverse habitat losses incurred during enabling phase, in the long term once established. With the implementation of embedded measures outlined in the CCoP Sections 5.3, 5.6 and 5.7, no additional significant adverse effects are anticipated to arise.	Not significant
Bats: roosts	Local	Potential ongoing disturbance of retained roost habitat (trees and buildings) may result from noise, light or vibration effects during construction phase (tunnelling activities would operate 24/7, throughout construction although it is assumed haulage and blasting to create the drive portal would operate during restricted daylight hours). Reversible (with intervention).	Significant Adverse Less than Local
Bats: flyways and foraging	Local	No significant additional habitat losses would occur during operation, but ongoing disturbance of foraging and commuting bats may result from new artificial lighting introduced during the construction phase (tunnelling activities would operate 24/7). Flight routes that may be affected include the linear woodland located to the northeast of the Lower Houses Compound, with linear extensions/tree lines reaching towards the site and the line of woodlands, ponds and wetland immediately west of the Newton-in-Bowland Compound which connects with the river corridor to the south. Reversible (with intervention). Embedded mitigation measures outlined in the CCOP (Section 4.5) would reduce lighting impacts on bats, through best practice design to minimise impacts on ecological features.	Significant Adverse Less than Local
Breeding birds	Local	Ongoing disturbance from noise, lighting or vibration effects, or visual effects during construction	Significant

Ecological Feature	Value	Potential Effect(s) Prior to Mitigation	Significance (Pre-Mitigation)
		<p>Disturbance from noise and vibration effects during blasting to construct the drive portal at the northern end of the Newton-in-Bowland Compound would occur during the first year of construction works. Given the anticipated timescales, disturbance effects would occur over one season or less. Disturbance would result in localised displacement from retained habitats (reversible) and may also result in needless expenditure of energy and may expose species to increased risk of predation, resulting in increased mortality of individuals. Embedded mitigation measures outlined in the CCOP (Section 5.10) would reduce the severity of this impact. Irreversible (loss of individuals).</p>	<p>Significant Adverse Local</p>
<p>Wintering birds</p>	<p>Less than Local</p>	<p>Ongoing disturbance from noise, lighting or vibration effects, or visual effects during construction phase could result in localised displacement from retained habitats (reversible) and may also result in needless expenditure of energy and may expose species to increased risk of predation, resulting in increased mortality of individuals. Irreversible (loss of individuals). Given the timescales of the construction programme (just short of 11 years), habituation to ongoing disturbance events would be expected to occur in the majority of species over this timeframe. Embedded mitigation measures outlined in the CCOP (Sections 4.5 and 5.10) would reduce the risk of these impacts occurring.</p>	<p>Significant Adverse Less than Local</p>
		<p>Disturbance from noise and vibration effects during blasting to construct the drive portal at the northern end of the Newton-in-Bowland Compound would occur during the first year of construction works. Given the anticipated timescales, disturbance effects would occur over one season or less. Disturbance would result in localised displacement from retained habitats (reversible) and may also result in needless expenditure of energy and may expose species to increased risk of predation, resulting in increased mortality of individuals. Embedded mitigation measures outlined in the CCOP (Section 5.10) would reduce the severity of this impact. Irreversible (loss of individuals).</p>	<p>Significant Adverse Less than Local</p>

Ecological Feature	Value	Potential Effect(s) Prior to Mitigation	Significance (Pre-Mitigation)
Badger, brown hare, hedgehog, terrestrial amphibians, terrestrial invertebrates, reptiles	Local	<p>Disturbance from noise, light or vibration effects, or visual effects resulting in possible localised displacement from retained habitats. Disturbance events may also result in needless expenditure of energy and may expose species (excluding badger) to increased risk of predation, resulting in increased mortality of individuals. Measures outlined in the CCoP relating to noise and vibration might not be effective for ecological features within/adjacent to compounds, or even surrounding compounds unless there are corresponding human receptors present. Noise and acoustic screening may be recommended under embedded measures outlined in the CCoP Section 5.4.2 and 5.10 to reduce disturbance of nesting birds, subject to a watching brief. Embedded mitigation to reduce light disturbance of bats is outlined in the CCoP Section 4.5 and 5.4.1 and these measures would be anticipated to be at least partially effective to reduce disturbance of other wildlife.</p>	Not significant
		<p>Disturbance from noise and vibration effects during blasting to construct the drive portal at the northern end of the Newton-in-Bowland Compound would occur during the first year of construction works. Given the anticipated timescales, disturbance effects would occur over one season or less. Disturbance would result in localised displacement from retained habitats (reversible) and may also result in needless expenditure of energy and may expose species to increased risk of predation, resulting in increased mortality of individuals. Embedded mitigation measures outlined in the CCOP (Section 5.10) would reduce the severity of this impact. Reversible once blasting is complete.</p>	Significant Adverse Less than local

9.6.3 Commissioning Phase

- 75) Activities during the commissioning phase (including the commissioning of the new aqueduct and the removal of the sections of the existing aqueduct from service) which may potentially give rise to ecological effects are anticipated to be limited to the cleansing of the new aqueduct route prior to it entering service.
- 76) As with the decommissioning of existing aqueduct sections, the commissioning of the new sections would include flushing out and subsequent discharge of waters used. Discharge is anticipated to utilise existing temporary (constructed during enabling phase) or permanent (pre-existing) outfall structures. Consequently, no additional landtake and resulting habitat losses are anticipated additional to those considered for the enabling phase. Discharges are anticipated into existing surface water features, the potential effects of which are considered in Chapter 9B.
- 77) Other above ground activities which may be required during the commissioning phase, such as access to valve house buildings and maintenance/inspections of the pipeline at well structure points, are unlikely to be of a scale, duration or nature that would give rise to significant ecological effects. These activities are scoped out from the EclA for Terrestrial Ecology.
- 78) Effects relating to habitat reinstatement have been accounted for in the construction phase effects.
- 79) No significant adverse effects upon terrestrial ecology features are therefore anticipated to arise during the commissioning phase.

9.6.4 Operational Phase

- 80) Activities during the operational phase (including the use of the new aqueduct and effects from the decommissioned asset) which may potentially give rise to ecological effects are anticipated to be limited to:
- De-watering of the decommissioned sections of aqueduct, requiring permanent discharge into surface waters
 - Routine maintenance at valve house buildings with access by foot or light vehicle.
- 81) De-watering of the decommissioned but retained sections of aqueduct would require discharges into surface water features via existing outfall structures. Discharges into surface water features are discussed within Chapter 9B and are not considered further in this EclA for Terrestrial Ecology.
- 82) Backfilling of the open-cut trenches required for the portal, MLS and overflow structures could lead to permanent localised alterations in groundwater flows and levels at the site, depending on the use of arisings or granular bedding material. Since the southeast corner of the Gamble Hole Farm GWDTE site associated with the BHS falls directly adjacent to the footprint of the MLS excavation, impacts upon groundwater flows/levels upon GWDTE at the south east part of Gamble Hole Farm BHS (approximately 10% of the BHS site) are assessed to be of moderate significance. Elsewhere within Gamble Hole Farm BHS there may be minor but localised impacts on groundwater flows resulting in a slight significance of effect. No significant ecological effect upon other GWDTE such as marshy grassland or flush habitats outside of Gamble Hole Farm Pastures BHS are anticipated during the operational phase.
- 83) Routine maintenance activities at air valves and Valve House Buildings would require access by foot or light vehicle using existing access points and existing access routes. Maintenance events would be very short term. Temporary disturbance effects that might result upon habitats and species would be no greater than experienced during existing agricultural practices in the landscape or routine maintenance of existing above-ground infrastructure for the retained sections of the aqueduct. Potential ecological effects arising from routine maintenance of new above-ground structures associated with the Proposed Bowland Section are therefore unlikely to be of a scale, duration or nature that would give rise to significant ecological effects.
- 84) No other significant adverse effects upon important (terrestrial) ecology features are anticipated to arise during the operational phase.

9.7 Mitigation and Residual Effects

85) Details for embedded mitigation measures, where they describe industry standards for best practice, for example, are outlined in the CCoP (Appendix 3.2). The following sections summarise the suite of additional essential mitigation measures proposed to reduce the significant adverse ecological effects described for enabling and construction phases. These additional essential mitigation measures are collated into the Mitigation Schedule (Appendix 20.1) and illustrated on the Environmental Master Plan (EMP) (Figure 20.1). The mitigation items are described within the Mitigation Schedule (Appendix 20.1).

9.7.1 General Measures

86) Embedded measures outlined in the CCoP Section 5.4.1 would require pre-commencement surveys and monitoring during each development phase to be carried out as part of the watching brief to confirm progress and identify any change on site. Subject to the findings of these surveys and monitoring, updates to the EMP may be appropriate.

9.7.2 Designated Sites and GWDTE

87) Embedded mitigation measures, summarised in Section 9A.6.1 and detailed in the CCoP ([Doc Ref SLDC-DO-TA-021-003](#)), would ensure the protection of designated wildlife sites and GWDTEs against adverse changes in ground and surface waters, habitat condition or extent, including from surface or site water run-off, accidental pollution events and dust deposition. However, in certain instances additional measures would be required as detailed below.

88) The unavoidable partial loss of the Gamble Hole Farm Pasture BHS as a consequence of the Newton-in-Bowland Compound open cut and road crossing works would be offset by a compensation package (including methods and timescales) to be agreed with the LPA and relevant statutory consultees. This would likely include the following:

- Maintaining water connectivity between fen habitat areas across road crossings (**Mitigation Item ET5**)
- Topsoil stripping would be reduced to a bare minimum, with all soil storage and plant storage outside of the designation (**Mitigation Item ET1**)
- Wetland habitats to be removed would be cut as turves and laid in areas of lower species richness within the BHS, but of suitable wetness (the land being within the red line boundary and therefore under United Utilities control for at least 6-7 years). Any marsh helleborine present or any other important plant species identified during pre-commencement surveys would be plug planted in suitable unaffected habitat in the nearby area (**Mitigation Item ET3 and ET4**)
- With the exception of the road crossing location, a buffer of a minimum of 10 m would be maintained around the Gamble Hole Farm Pastures BHS and the important wetland habitat surrounding this site. Within this buffer no topsoil stripping or other groundworks, vehicle or pedestrian access would be permitted and no materials or plant stored. The area would be clearly demarcated to ensure that the buffer is not accessed (**Mitigation Item ET2**)
- Some areas of Gamble Hole Farm Pastures BHS, particularly the eastern part within the Newton-in-Bowland are currently of lower botanical diversity, probably due to grazing pressure, mowing and possibly nutrient enrichment. There is high potential to enhance habitats with more sensitive

- 90) Additional site-specific groundwater mitigation measures for GWDTE habitats within and surrounding the Compounds would include the following:
- Avoiding soil stripping at the north eastern edge of the Lower Houses Compound near to the area of marshy grassland. This would minimise groundwater flow and quality impacts to the area of GWDTE habitat (Lower House Cottage GWDTE site) (**Mitigation Item ET9**)
 - Avoiding soil stripping at the areas of swamp and woodland associated with The Coach House GWDTE site located to the west of the Gamble Hole Farm Pastures BHS, to minimise impacts on this GWDTE site (**Mitigation Item ET9**). This GWDTE site would also be protected by the buffer of a minimum of 10 m of the Gamble Hole Farm Pastures BHS and adjacent associated habitats as described above (**Mitigation Item ET2**)
 - Reducing area of topsoil stripping at the River Hodder North GWDTE site located within the construction access area to the east of the Newton-in-Bowland Compound to minimise groundwater flow and quality impacts to the area of GWDTE habitat (**Mitigation Item ET9**)
 - Careful consideration in the selection of the backfilling material(s) to prevent granular material draining groundwater flows, or clay material creating an impermeable barrier to groundwater flows. Granular backfill with intermittent clay bunds is typically recommended (**Mitigation Item ET11**)
 - Staggering topsoil stripping activities, i.e. smaller sections would be stripped at any one time rather than stripping an entire whole compound footprint as a single event (**Mitigation Item ET12**)
 - Keeping dewatering durations to the absolute minimum (**Mitigation Item ET13**)
 - Mitigation for direct habitat loss affecting GWDTE areas would be delivered through habitat restoration measures during the construction phase. Re-use of the topsoil stored from the same areas will also reintroduce the existing seedbank (**Mitigation Item ET19**).
 - Works associated with the access routes that pass through the fen and basic flush habitats would be restricted to a narrow corridor and all materials and plant would be stored outside of these locations (**Mitigation Item ET14**)
 - Loss of fen and basic flush habitat along the haul road to the Newton-in-Bowland Compound would be offset through the use of turf translocation and / or seed collection for habitat creation or enhancement on retained land under United Utilities control and this would be entered into a 30 year management plan (**Mitigation Item ET23**).

9.7.3 Habitats

- 91) In addition to the standard measures incorporated as embedded mitigation, summarised in Section 9A.6.1 and detailed in the CCOP (Sections 5.2 and 5.4), a number of site-specific mitigation approaches are required for impacts on habitats and trees:
- Temporary construction routes would be finalised to avoid or minimise impacts to hedgerows, trees, wetlands, watercourses and other sensitive habitat features where practically possible by marking out and micro-siting construction activities with the ECoW prior to works commencing (**Mitigation Item ET16**)
 - Working areas (including storage areas and accesses) would be segregated from adjacent habitats

- Methods and timings for habitat reinstatement and creation/enhancement would vary according to the target habitat. Planting plans (Appendix 20.3) would be produced for all habitats and habitat features to be reinstated and replaced. Habitat reinstatement and creation/enhancement would utilise locally appropriate native species matching existing botanical diversity and seeking, where possible, to increase diversity (**Mitigation Item ET21**). Without reducing habitat quality, seed mixes for reinstatement of agricultural fields would be agreed with landowners but in summary the following approach would be used:
 - Improved and poor semi-improved grassland would be reinstated with a rye grass dominated seed mix
 - Scattered trees and scrub within fields would generally be reinstated within field boundaries unless landowners or landscape considerations specified otherwise
 - Small areas of tall ruderal herb will be reinstated with the surrounding grassland seed mix
 - Existing trees and areas of woodland to be retained would be subject to protection measures in compliance with BS5837:2012 standards for tree protection detailed within the AMS. The AMS would consider all aspects of detailed design (drainage, utilities etc.) and would detail the special mitigation measures required to minimise avoid/minimise impacts on the root system and any notable characteristics of the retained trees.
 - Areas of permanent habitat loss or habitat change (including areas above shafts where trees cannot be reinstated), alongside opportunities for advanced, additional and/or enhanced habitat creation on offsite locations within United Utilities ownership are discussed under Section 9.7.12 in relation to the Biodiversity Net Gain strategy.
- 92) Measures for habitats within Gamble Hole Farm Pastures BHS and GWDEs have been described in the previous section.
- 9.7.4 Bats**
- 93) Suitable bat roost habitat features have been identified in numerous trees within and adjacent to the Proposed Bowland Section, some of which would require removal during the enabling works phase. Embedded measures already described and outlined in the CCoP (Section 5.4) include RAMs for avoiding loss of bat tree roosts, the installation of bat boxes to replace loss of suitable tree roost habitat and general approach to sensitive lighting. Site specific lighting principals have been produced and include the identification of sensitive ecological features (including potential bat roosting, foraging and commuting habitat) describing how lighting would take account of these. If bat roosts are confirmed in any trees requiring removal, mitigation under licence from Natural England would be implemented as appropriate to the species and status of the roost(s). No further mitigation is anticipated to be required in respect of roosting bats.
- 94) Habitat reinstatement measures would replace foraging habitats and flyways used by local bat populations would be effective in the long-term accounting for the time between habitat loss and habitat reinstatement, including establishment periods.
- 95) No additional essential mitigation measures are therefore required for bats.

9.7.5 Badgers

98) No additional essential mitigation measures are therefore required for badgers.

9.7.6 Other Mammals

99) Suitable habitats for hedgehog and brown hare occur across the Proposed Bowland Section in varied patches. Both species are known to be present. RAMs for hedgehog and brown hare would be implemented as set out in the CCoP (Section 5.4) to avoid impacts including killing, injury, entrapment or drowning.

100) Habitat reinstatement would replace foraging, ranging and shelter habitats for local populations of brown hare and hedgehog. Additional hedge planting would increase habitat availability and permeability for hedgehogs. Habitat reinstatement measures would be effective in the long-term accounting for the time between habitat loss and habitat reinstatement, including establishment periods.

101) No additional essential mitigation measures are therefore required for hedgehogs or brown hares.

9.7.7 Nesting and Wintering Birds

102) The Proposed Bowland Section supported assemblages of breeding birds of local importance, with a range of noteworthy BoCC species recorded in localised habitats within and adjacent, including a number of breeding wader species. RAMs to avoid the destruction of nests and the killing and injury or disturbance of nesting birds (passerine and ground nesting species) within and surrounding the Proposed Bowland Section would be implemented as set out in the CCoP Section 5.4.1 and 5.4.2.

103) The Proposed Bowland Section did not support significant species or assemblages of overwintering birds, although small numbers of noteworthy BoCC species were recorded in localised habitats adjacent. RAMs to avoid disturbance (noise or visual) of overwintering birds in retained habitats surrounding the Proposed Bowland Section would be implemented as set out in the CCoP Section 5.4.1 and 5.4.2. This would include screening measures to reduce noise and visual disturbance if deemed necessary by the watching brief.

104) Habitat reinstatement would replace, nesting, foraging and overwintering habitats for local bird populations. Habitat reinstatement measures would be effective in the long-term accounting for the combined durations of enabling phase and construction phase (the time between habitat loss and habitat reinstatement), including establishment periods. Measures to mitigate for impacts on GWDTE habitats would also provide long term habitat enhancement for breeding and wintering wader species such as curlew, lapwing and snipe.

105) No additional essential mitigation measures are therefore required for nesting birds.

9.7.8 Terrestrial Amphibians and Reptiles

106) Great crested newts were found to be absent from ponds within 500 m of the Proposed Bowland Section and are therefore very unlikely to be present in terrestrial habitats. Other terrestrial amphibians reliant on offsite ponds and reptiles (slow worm) may be present within suitable habitats at the Proposed Bowland Section. Suitable habitats might include hedgerow bases, scrub, tall herb, marshy grassland and fen. RAMs to avoid the killing, injury and entrapment of amphibians and reptiles and the drowning of reptiles within the Proposed Bowland Section would be implemented as set out in the CCoP Section 5.2.1 and 5.4.

107) Habitat reinstatement would replace foraging, shelter and overwintering habitat for amphibian and reptile populations. Habitat reinstatement measures would be effective in the long-term accounting for the

9.7.9 Terrestrial Invertebrates

- 110) The habitat reinstatement implemented during the construction phase would offset habitat losses for terrestrial invertebrates. Where practical, use of arisings from vegetation would be utilised to create additional habitat for invertebrates, especially dead wood features.
- 111) Where practical, use of arisings from vegetation would be utilised to create additional habitat for invertebrates, especially dead wood features. This would include habitat pile creation from any unavoidable tree or scrub loss to deliver shelter and winter hibernation habitat.
- 112) No further essential mitigation measures are required.

9.7.10 Biosecurity

- 113) No Schedule 9 non-native invasive species are known to be present within the Newton-in-Bowland Compound or the Lower Houses Compound. Embedded measures for avoiding the spread of Schedule 9 non-native invasive species and general biosecurity measures are outlined in the CCoP (Section 5.4.4).

9.7.11 Residual Effects

- 114) A summary of the residual ecological effects (beneficial and adverse) is presented in Table 9A.11. This table summarises the ecological effects anticipated to arise as a consequence of the development proposals, the mitigation and compensation measures to be implemented and confirms whether the residual effect remains significant.
- 115) The only significant adverse residual ecological effect concerns impacts on Gamble Hole Farm Pastures BHS and impacts on fen and basic flush habitat.
- 116) No other significant adverse residual effects are anticipated to arise during any project phase, providing the suite of embedded and essential mitigation measures are implemented as described.
- 117) No significant positive residual effects are identified at this stage, however, the Proposed Bowland Section would achieve 10% net gain through additional habitat creation on offsetting sites and this is discussed further under section 9.7.12 which details compensation and offsetting measures.

Table 9A.11: Summary of Mitigation and Residual Effects

Ecological Feature	Value	Effect Pre-Mitigation	Mitigation	Residual Effect	Significance
Enabling Phase					
Gamble Hole Farm Pasture BHS including HPI which solely comprises BHS: Fen	County	<p>Temporary loss of 0.63 ha fen habitat within BHS as a result of construction of temporary access road and subsequent enclosure of another element of the BHS with potential disruption to water supply. Including degradation in quality or function of fen resulting from changes groundwater pathways, flow rates or quality due to compaction-related construction activities and earthworks and ground disturbance.</p> <p>Reversible (with intervention) adverse effect significant at County level.</p>	<p>Detailed design (restriction of the crossing width to 12 m and targeting the narrowest part of the BHS for the crossing point) would minimise physical habitat loss within and damage to the BHS.</p> <p>Turf stripping to be undertaken from areas lost and translocated to suitable areas of lower biodiversity value outside of the area to be affected by works.</p> <p>Control measures to be built into detailed design to retain appropriate drainage regime that would maintain condition and integrity of the isolated part of the BHS within the compound.</p> <p>10m no access buffer zone to be maintained around BHS and associated adjacent important habitats</p>	<p>0.04 ha of fen habitat within the BHS will be translocated and reasonable worst case currently assumes management is only secured for the 6-7 years of the enabling, construction and commissioning phases. In addition 0.04 ha of fen habitat will be recreated during reinstatement works when the road is removed.</p> <p>Permanent effects on water supply to the BHS from ground compaction and presence of the underground tunnel and creation of the portal may remain but are assessed under the construction</p>	Significant Adverse Local

Ecological Feature	Value	Effect Pre-Mitigation	Mitigation	Residual Effect	Significance
		effect upon the integrity and interconnectivity of retained woodland network, including ASNWs would result as a consequence of this loss. Reversible (with intervention) adverse effect significant at local level.		non-significant levels in the long term.	
Broadleaved and mixed plantation woodlands	Local	Temporary loss/damage of 0.08 ha mixed plantation to accommodate surface water drainage from construction access route for Newton-in-Bowland Compound. Reversible (with intervention) adverse effect significant at less than local level.	Habitat reinstatement to be implemented during construction phase on like for like basis (quantity and quality) or better.	Habitat reinstatement after the construction phase would reduce enabling phase effects to non-significant levels in the long term.	Not significant
Semi-improved neutral grassland	Local	Temporary loss of 0.12 ha to form Newton-in-Bowland Compound inclusive of temporary construction route. Reversible (with intervention) adverse effect significant at the less than local level.	Habitat reinstatement to be implemented during construction phase on like for like basis (quantity and quality) or better.	Habitat reinstatement would reduce effect to non-significant levels in the long term.	Not significant
Marshy grassland	Local	Physical loss: 0.35 ha temporary (Newton-in-Bowland Compound). Reversible (with intervention) adverse effect significant at less than local level.	Adjusted working areas could allow some assumed losses to be reduced. Habitat reinstatement to be implemented during construction phase on like for like basis (quantity and quality) or better.	Habitat reinstatement would reduce effect to non-significant levels in the long term.	Not significant
Semi-improved acid grassland	County	Temporary loss of 0.11 ha to form Newton-in-Bowland Compound inclusive of temporary	Habitat reinstatement to be implemented during	Habitat reinstatement would reduce effect to	Not significant

Ecological Feature	Value	Effect Pre-Mitigation	Mitigation	Residual Effect	Significance
		access route. Reversible (with intervention) adverse effect significant at Local level.	groundwater flow and quality impacts to the area of GWDTE habitat Translocation of turfs / collection of seeds to retained areas under UU control. Habitat reinstatement to be implemented following construction phase on like for like basis (quantity and quality) or better.	followed by habitat reinstatement would reduce effect to non-significant levels in the long term.	
Scattered broadleaved trees (non-veteran)	County	Temporary loss of 75 no. trees within the Newton-in-Bowland Compound and 10 no. trees at Lower Houses Compound would be unavoidable. Reversible (with intervention). Reversible adverse effect significant at local level.	Special construction measures or adjusted working areas could allow some assumed (amber) losses to be reduced. Replacement tree planting to be implemented at earliest practical point during construction phase on like for like basis (quantity and quality) or better.	Habitat reinstatement would reduce effect to non-significant levels in the long term (replacement of mature specimens is compensation not mitigation)	Not significant
Hedgerows (species poor with and without trees)	Local	Temporary loss of 0.46 km to form Newton-in-Bowland construction access route and approximately 0.1 km for access to the satellite compound at Wray Reversible (with intervention) adverse effect significant at less than local level.	Habitat reinstatement to be implemented during construction phase on like for like basis (quantity and quality) or better.	Habitat reinstatement would reduce effect to non-significant levels in the long term.	Not significant

Ecological Feature	Value	Effect Pre-Mitigation	Mitigation	Residual Effect	Significance
Bats: roosts	Local	Loss of 16 no. individual trees and two groups of trees with low bat roost suitability as well as 10 no. Individual trees and one group of trees with medium roost suitability at the Newton-in-Bowland Compound. Unavoidable loss of one tree with low bat roost suitability BT24 at the Lower Houses Compound Reversible adverse significant at local level.	Adjusted working areas could allow some assumed tree losses to be reduced. Any trees with confirmed bat roosts would have bespoke, licensed mitigation packages.	Bespoke mitigation for any confirmed bat roosts would reduce effects to insignificant.	Not significant
Badger, brown hare, hedgehog, terrestrial amphibians and reptiles	Local	Loss of foraging and shelter habitats. Reversible (with intervention) adverse effect significant at local level. Disturbance leading to displacement and possibly increased mortality/predation pressures. Reversible adverse effect significant at local level.	Habitat reinstatement to be implemented following construction phase on like for like basis (quantity and quality) or better. Creation of habitat piles would provide some shelter and foraging throughout the enabling and construction phases.	Creation of habitat piles in addition to some measure of habituation would prevent significant effects occurring. Habitat reinstatement would reduce effect to non-significant levels in the long term.	Not significant
Breeding birds	Local	Loss of foraging and nesting habitats: reversible adverse effect significant at local level	Habitat reinstatement to be implemented during construction phase on like for like basis (quantity and quality) or better. Measures to mitigate for impacts on GWDTE habitats could provide some habitat enhancement for	Habitat reinstatement would reduce effect to non-significant levels in the long term	Not significant

Ecological Feature	Value	Effect Pre-Mitigation	Mitigation	Residual Effect	Significance
				shows they are significant, although disturbance effects continue (and are assessed) into the construction phase.	
Wintering birds	Local	Loss of foraging and resting habitats: reversible adverse effect significant at less than local level.	Habitat reinstatement to be implemented during construction phase on like for like basis (quantity and quality) or better.	Habitat reinstatement would reduce effect to non-significant levels in the long term	Not significant
		Disturbance leading to displacement and possibly increased mortality/predation pressures. Reversible adverse effect significant at local level.	Additional visual and or acoustic screening would be employed if required.	Enabling phase disturbance effects will be short lived and can be reduced if monitoring shows they are significant, although disturbance effects continue (and are assessed) into the construction phase.	Not significant
Terrestrial invertebrates	Local	Loss of foraging and shelter habitats. Disturbance leading to displacement and possibly increased mortality/predation pressures. Reversible (with intervention) adverse effect significant at less than local level	Creation of habitat piles would provide some shelter and foraging for invertebrates. Habitat reinstatement to be implemented during construction phase on like for	Creation of habitat piles during the enabling phase and habitat reinstatement following construction would reduce enabling phase effects to non-	Not significant

Ecological Feature	Value	Effect Pre-Mitigation	Mitigation	Residual Effect	Significance
including HPI which solely comprises BHS: Fen		being transported, encroachment off the track, run-off from the track surface). Reversible (with intervention). Reversible (with intervention) adverse effect significant at County level	of the BHS will prevent these effects from occurring.	prevent significant effects occurring.	
		Degradation as a result of ground compaction. Irreversible adverse effect significant at County level	Additional measures to maintain water supply to the BHS and positive management of the habitats during enabling, construction and reinstatement.	Essential mitigation measures will reduce these effects but some may persist in the long term.	Significant Adverse Local
		Degradation: decline in quality or function of retained fen habitats through disruption of ground or surface water paths as a consequence of drawdown associated with construction activities. Reversible (with intervention) adverse effect significant at County level.	Additional measures to reduce the extent of draw down effects plus measures to maintain water supply to the BHS and positive management of the habitats during enabling, construction and reinstatement.	Essential mitigation measures will reduce these effects and they will not persist once drawdown construction activities have ceased in the medium to long term.	Not significant
Fen (outside BHS), Basic flush	County	Degradation as a result of ground compaction. Irreversible adverse effect significant at Local level	Additional measures to maintain water supply to the habitat and positive management of the habitats during enabling, construction and reinstatement.	Essential mitigation measures will reduce these effects but they may persist in the long term.	Significant Adverse Less than Local
		Degradation: decline in quality or function as a result of vehicles using temporary construction access	Pre-emptive measures to intercept and divert any potential	Embedded mitigation and additional controls would	Not significant

Ecological Feature	Value	Effect Pre-Mitigation	Mitigation	Residual Effect	Significance
Bats: roosts	TBC	Potential disturbance of retained roost habitat may result from noise, light or vibration effects during construction activities. Significant adverse effect at less than local level.	Should bat roosts be confirmed during embedded pre-start surveys within the influence of the construction works, additional site specific measures would be identified avoid and mitigate disturbance effects.	Mitigation would prevent significant effects occurring.	Not significant
Bats: flyways and foraging	TBC	Disturbance of foraging and commuting bats may result from new artificial lighting introduced during the construction phase, which would operate 24/7 during tunnelling works. Significant adverse effect at less than local level.	In addition to the general approach to sensitive lighting, site specific lighting principals have been produced and include the identification of sensitive ecological features and describing how lighting would take account of these.	Mitigation would prevent significant effects occurring.	Not significant
Breeding birds	Local	Significant adverse effect at local level.	Additional visual and or acoustic screening would be employed if required but this is unlikely to assist during blasting works.	Disturbance would be experienced for the latter half of one breeding season, but disturbance and displacement effects would diminish after the blasting was completed. And would not be experienced in the long term (beyond construction phase)	Not significant

Ecological Feature	Value	Effect Pre-Mitigation	Mitigation	Residual Effect	Significance
				blasting was completed. And would not be experienced in the long term (beyond construction phase).	
Badger, brown hare, hedgehog, terrestrial amphibians, breeding birds, wintering birds, terrestrial invertebrates	Local	Disturbance from noise or vibration effects, during blasting to construct the portal. Reversible effect significant at local level.	ECoW appointment as set out in the CCoP (Ecology: General Measures). RAMS to avoid disturbance as set out in the respective sections of the CCoP	Embedded mitigation and additional controls would prevent significant effects occurring.	Not significant
Commissioning Phase					
All terrestrial ecology features	Local to National	Activities relating to commissioning of the new aqueduct, including discharges, are assessed in Chapter 9B. Activities which may be required during the commissioning phase, such as access to valve houses and maintenance/inspections of the pipeline at well structure points, are unlikely to be of a scale, duration or nature that would give rise to significant ecological effects upon terrestrial ecology features. No significant effects.	No additional essential mitigation required.	No effect	Not significant
Operational Phase					

Ecological Feature	Value	Effect Pre-Mitigation	Mitigation	Residual Effect	Significance
All terrestrial ecology features	Local to National	Maintenance events would be very short term. Temporary disturbance effects on habitats and species would be no greater than experienced during existing agricultural practices or routine maintenance of existing above-ground infrastructure for the retained sections of the aqueduct. No significant effects.	No additional essential mitigation required.	No effect	Not significant

9.7.12 Compensation and Offsetting Measures

118) The residual effects described previously do not take account of the measures detailed in this section. Compensation and offsetting are distinct from the embedded mitigation and essential mitigation measures previously outlined. Where it would not be possible to avoid or mitigate adverse effects or where difficulty, uncertainty or other risks to achieving net gain would remain, compensation measures provide appropriate and proportionate offsetting and contingencies.

Biodiversity Net Gain Compensation

119) United Utilities (UU) has committed to delivering Biodiversity Net Gain (BNG) on the HARP scheme (**Mitigation Item ET24**). Full details of the BNG assessment and proposals are provided at LCC-BO-APP-008.01 and 02 and RVBC-BO-APP-008.01 and 02. A summary is detailed in the following paragraphs.

120) HARP is committed to achieving a 10% net gain in biodiversity. Baseline value and loss has been measured using Natural England Metric 2.0. The Metric provides a way of measuring and accounting for biodiversity losses and gains resulting from development or land management change. A BNG report, the completed metric, supporting GIS data and outline long term (30 year) management plan is included in the planning submission.

121) Permanent above ground structures are minimal and therefore the overwhelming majority of habitats would be reinstated. However, to achieve the 10% gain and to account for the loss in value (as calculated by the metric) resulting from the reinstatement process, additional habitat creation and / or enhancement measures are required. These are referred to as offsetting sites.

122) It has been agreed (and is often the case for similar schemes) that habitats of low and very low distinctiveness are included in the BNG calculations but would not be subject to long term management plans. This largely relates to the reinstatement of low biodiversity value agricultural habitats such as improved and semi-improved grasslands.

123) Offsetting sites have been identified on which to deliver net gain, these are primarily on UU land holdings although relevant authorities have been given the opportunity promote alternative locations. Sites have been sought as close to the impact and within the same LPA area wherever possible. Offsetting sites have been shared with local planning authorities (LPAs) and discussions held if there was difficulty finding "in borough" sites.

124) Offsetting sites are not included within the planning application development boundary. Planning conditions and s106 agreements would secure the delivery of BNG for these locations and draft conditions and s106 agreements have been shared.

125) These offsetting sites could also provide some opportunities for advance habitat creation ahead of enabling phase habitat losses or ahead of construction phase reinstatement.

Very High Distinctiveness Habitats

126) The BNG metric does not allow consideration of habitats categorised as very high distinctiveness, these must be dealt with separately. Wetland - Fens habitat of very high distinctiveness was identified; this is reported under the Phase 1 habitat survey as fen and flush habitats. Both of these habitats have been assessed previously within this document under effects on fen habitat associated with Gamble Hole Farm Pastures BHS

128) At the time of writing this assessment, some additional measures are proposed outside the red line planning boundary as detailed below. These measures are subject to landowner agreement and therefore not included in the mitigation for the purpose of the assessment.

Newton-in-Bowland Compound:

- Prior to, or during the enabling phase, a new species-rich hedge, approximately 200 m in length would be planted along the western edge of the Newton-in-Bowland Compound along the edge of the existing track between the existing hedgerow along Newton Road (TR3.H31) and the woodland area at the southern edge of Gamble Hole Farm BHS to the north to enhance habitat connectivity. Broadleaved trees would be established within the hedgerow.
- Prior to, or during the enabling phase, a new area of semi-natural woodland (0.5 ha) would be created at the western edge of the Newton-in-Bowland Compound to provide habitat for a wide range of wildlife including bats, birds, terrestrial amphibians, mammals and invertebrates.

Lower Houses Compound:

- Prior to, or during the enabling phase, a section of species rich hedge would be created at the northern end of the Lower Houses Compound near to Lower Houses Farm.
- With landowner agreement offsite areas of marshy grassland will be managed to provide alternative ground nesting habitat during periods of active works.

9.8 Cumulative Effects

129) The following section provides an overview of the potential cumulative effects from different developments, in combination with the Proposed Bowland Section (inter-project). For cumulative effects related to the combined action of a number of different environmental topics (intra-project), see Chapter 19 (Cumulative Effects and Interaction of Effects) and supporting Figure 19.1.

130) Cumulative effects have been assessed in terms of the additional and combined effects. Other than impacts on Gamble Hole Farm Pastures BHS and fen and basic flush habitats, no significant habitat/species impacts are anticipated as a result of the Proposed Bowland Section. On this basis, it is assumed that for potential cumulative impacts to occur with regard to impacts on habitats and species, the application would need to be relatively close or in the case of rare habitats, impacting the same habitat type. Small developments, i.e. residential applications of 10 units or under, single agricultural buildings, certain change of land use applications, have been scoped out. The assessment of cumulative effects focussed on the remaining identified applications and allocations within 5 km of the Proposed Bowland Section. Table 9A.12 lists the cumulative effects of the identified developments:

Table 10.11: Summary of Cumulative Effects

Proposed Development	Relevant Documents	Nature / Scope of Effects	Commentary on Cumulative Effects
Ribble Valley Borough Council			
<p>3/2020/0275 United Utilities Hodder Works Improved treatment including construction of rapid gravity filters and associated building, security fencing together with re-profiling of agricultural land using surplus soil</p>	<p>Preliminary Ecological Appraisal (November 2019) Bat Survey (September 2019) Bird Report (August 2019) Botany Survey (November 2019)</p>	<p>The Application Site is located 4.9 km north east of Newton-in-Bowland Compound.</p> <p>One building was found to hold a soprano pipistrelle maternity roost and another soprano pipistrelle satellite roost. Mitigation measures are to be put in place to ensure no works are undertaken within a certain distance of the roost sites. Some woodland would be lost however this would be replanted to avoid impacts.</p> <p>Six species were confirmed to nest in the survey area which included Stocks Reservoir, including the notable species oystercatcher (6 pairs), greylag goose (350 no. individuals) and mallard (7 pairs). Other probable breeding notable bird species included teal, common sandpiper, lapwing, little ringed plover and herring gull. Thirty species of wildfowl recorded at Stocks Reservoir during average winter, however the works were to be undertaken during summer months. Mitigation measures, largely involving timing of works and ensuring no active bird nests are damaged or destroyed to be undertaken to avoid impacts on birds.</p> <p>Mitigation measures for the development include fencing off roadside verge of Bentham Road BHS to avoid impacts from construction vehicles, habitat replacement and reinstatement and a sensitive lighting strategy, as well as measures to avoid impacts on mammals including hedgehog and brown hare.</p> <p>As part of the application, enhancement for breeding birds was being provided as well as enhancement of existing amenity grassland to species rich grassland around the water treatment works.</p>	<p>Without mitigation the Application Site could potentially impact a number of species also recorded in the Proposed Bowland Section (e.g. soprano pipistrelle, oystercatcher, mallard, common sandpiper, lapwing). However, mitigation measures are provided to ensure that impacts do not occur to these species. No cumulative effects would therefore be predicted to arise from this application in combination with the Proposed Bowland Section.</p>
Craven District Council			
<p>2020/21363/OUT LB012 Land To North Of Wenning View, Low Bentham Road, Low Bentham</p>	<p>Craven Local Plan 2012 to 2032 Ecological Appraisal (November 2019) Bat Survey (November 2019)</p>	<p>The outline application is located 3.9 km north east of Lower Houses Compound.</p> <p>The site largely comprises species poor semi-improved grassland with some species poor hedgerows present.</p> <p>Any hedgerows or trees to be lost were to be transplanted or replaced, and retained trees were to be protected.</p>	<p>No adverse effects predicted on habitats or species therefore no cumulative effects would be predicted to arise from this application in combination with the Proposed Bowland Section.</p>

Proposed Development	Relevant Documents	Nature / Scope of Effects	Commentary on Cumulative Effects
Outline application with all matters reserved (except for access), for 18 dwellings		Reasonable Avoidance Measures to be put in place to avoid any impacts on amphibians, reptiles, badgers, birds and brown hare. Bat boxes to be installed and no adverse impacts on bats predicted.	
<p>08/2017/17887 Felstead Low Bentham Road High Bentham Demolition of existing dwelling and industrial unit and erection of a residential development of 16 dwellings HB038 Land south of Low Bentham Road, High Bentham 19 dwellings</p>	Craven Local Plan 2012 to 2032	<p>The Housing Allocation is located 4.2 km north east of Lower Houses Compound.</p> <p>The eastern part of the site is safeguarded for the provision of an extension to the primary school. In the event that the eastern part of the site is not required for such provision, additional residential development would be acceptable in principle.</p> <p>The Craven Local Plan states that the development would include measures to minimise impacts on air quality, noise and light pollution.</p>	The allocation is located adjacent to an existing school within a residential area. Due to the location and type of allocation and the requirement for a development to include measures to minimise pollution, no cumulative effects would be predicted to arise from this application in combination with the Proposed Bowland Section.
<p>HB023 North of Low Bentham Road, High Bentham 53 dwellings</p>	Craven Local Plan 2012 to 2032	<p>The Housing Allocation is located 4.4 km north east of Lower Houses Compound.</p> <p>The Craven Local Plan states that a surface water hazard has been identified within the southwest corner of the site and development proposals would therefore require a Flood Risk Assessment and sustainable Drainage Systems (SuDS) where possible. The development would include measures to minimise impacts on air quality, noise and light pollution.</p>	Due to the location of the allocation and the requirement for any future development to include measures to minimise pollution, no cumulative effects would be predicted to arise from this application in combination with the Proposed Bowland Section.
<p>HB044 Land to west of Goodenber Road, High Bentham 61 dwellings</p>	Craven Local Plan 2012 to 2032	<p>The Housing Allocation is located 4.7 km north east of Lower Houses Compound.</p> <p>The Craven Local Plan states that development of the site as well as adjoining allocated sites HB052 and HB024 would secure benefits by creating green infrastructure linkages across all three sites.</p>	The allocation is located to the north of High Bentham on the far side of this town from the Proposed Bowland Section at a distance of almost 5 km. No cumulative effects would be predicted to arise from this application in combination with the Proposed Bowland Section.
<p>HB052 Land to north west of Bank Head Farm and south of Ghyllhead Farm, High Bentham 118 dwellings</p>	Craven Local Plan 2012 to 2032	<p>The Housing Allocation is located 5.0 km north east of Lower Houses Compound.</p> <p>The Craven Local Plan states that development would contribute to the improvement and green infrastructure and achieve net gains in biodiversity. Substantial areas of additional on-site public green space, totalling</p>	The allocation is located to the north of High Bentham on the far side of this town from the Proposed Bowland Section at a distance of over 5 km. Due to the location of the site and the commitments to provide biodiversity net gain through provision of green open space, no cumulative effects would be predicted to arise from this application in combination with the Proposed Bowland Section.

Proposed Development	Relevant Documents	Nature / Scope of Effects	Commentary on Cumulative Effects
		<p>approximately 2 ha would be provided in order to mitigate landscape impact, enhance local green infrastructure, achieve a net gain in biodiversity, provide a connection to the countryside and secure well-being benefits. Development of the site as well as adjoining allocated sites HB024 and HB044 would secure benefits by creating green infrastructure linkages across all three sites. A surface water hazard has been identified within the southwest corner of the site and development proposals would therefore require a Flood Risk Assessment and sustainable Drainage Systems (SuDS) where possible. The development would include measures to minimise impacts on air quality, noise and light pollution.</p>	<p>this application in combination with the Proposed Bowland Section.</p>
<p>HB024 North of Lakeber Drive, High Bentham 29 dwellings</p>	<p>Craven Local Plan 2012 to 2032</p>	<p>The Housing Allocation is located 4.9 km north east of Lower Houses Compound. Development of the site as well as adjoining allocated sites HB044 and HB052 would secure benefits by creating green infrastructure linkages across all three sites. The development would include measures to minimise impacts on air quality, noise and light pollution.</p>	<p>The allocation is located to the north of High Bentham on the far side of this town from the Proposed Bowland Section at a distance of approximately 5 km. Due to the location of the site and the requirement to include measures to minimise pollution, no cumulative effects would be predicted to arise from this application in combination with the Proposed Bowland Section.</p>
<p>2017/18715/FUL Former High Bentham Community Primary School Residential development for extra care housing comprising 64 apartments and 8 bungalows including associated parking, landscaping and formation of new access off Robin Lane HB011</p>	<p>Craven Local Plan 2012 to 2032 Preliminary Ecological Assessment (June 2017) Bat Static Survey Report (October 2017) Bat Emergence Return Survey (October 2017) Bat Risk Assessment (October 2017) Bat Transect Site Survey Report (October 2017)</p>	<p>The full application is located 4.7 km north east of Lower Houses Compound. The grasslands within the application site are all of low ecological value, with the deciduous trees providing the most important ecological features on site as they provide suitable habitat for birds and bats. Trees are to be maintained wherever possible and enhanced with supplementary planting. Two maternity day roosts of common pipistrelle and myotis bats were found to be present within one of the buildings to be demolished. Works were therefore to be completed between October and May, outside of the bat breeding season, and a range of measures to be implemented under an EPS licence issued by Natural England to ensure no bats are harmed during works. Mitigation and enhancement for the loss of roost sites is to be provided, with alternative roosts created and additional roosts provided in the tree lines.</p>	<p>As works would be done under an EPS licence, it will be ensured that an increase in overall bat roosting habitat would be achieved. No cumulative effects would be predicted to arise from this application in combination with the Proposed Bowland Section.</p>
<p>HB025</p>	<p>Craven Local Plan 2012 to 2032</p>	<p>The Housing Allocation is located 4.9 km north east of Lower Houses Compound.</p>	<p>The allocation is located to the north of High Bentham on the far side of this town from the Proposed Bowland Section at a distance of approximately 5 km.</p>

Proposed Development	Relevant Documents	Nature / Scope of Effects	Commentary on Cumulative Effects
East of Butts Lane, High Bentham 32 dwellings		The Craven Local Plan states that a surface water hazard has been identified within the southwest corner of the site and development proposals would therefore require a Flood Risk Assessment and sustainable Drainage Systems (SuDS) where possible. The development would include measures to minimise impacts on air quality, noise and light pollution.	the location of the allocation and the requirements for any future development to include measures to minimise pollution, no cumulative effects would be predicted to arise from this application in combination with the Proposed Bowland Section.
HBO26 North of Springfield Crescent and east of Butts Lane, High Bentham 82 dwellings	Craven Local Plan 2012 to 2032	The Housing Allocation is located 5.1 km north east of Lower Houses Compound. The Craven Local Plan states that a surface water hazard has been identified within the southwest corner of the site and development proposals would therefore require a Flood Risk Assessment and Sustainable Drainage Systems (SuDS) where possible. The development would include measures to minimise impacts on air quality, noise and light pollution.	The allocation is located to the north of High Bentham on the far side of this town from the Proposed Bowland Section at a distance of over 5 km. Due to the location of the allocation and the requirement for any future development to include measures to minimise pollution, no cumulative effects would be predicted to arise from this application in combination with the Proposed Bowland Section.
2017/18792/FUL Bentham Golf Club Robin Lane High Bentham Change of use of land for the siting of 8 holiday lodges at the Bentham Golf Club	Ecological Appraisal (November 2017) Decision Notice	No protected species impacts were identified within the Ecological Appraisal and the habitats present were assessed to be of low ecological value. Measures would be put in place to ensure no damage or destruction of bird nests occurs during construction. Planning conditions included like for like replacement planting of any tree or shrub to be removed. Bird boxes and bat boxes to be installed as part of the development.	The allocation is located to the north of High Bentham on the far side of this town from the Proposed Bowland Section at a distance of over 5 km. Habitats to be affected are of low ecological value and no significant ecological impacts were identified. No cumulative effects would be predicted to arise from this application in combination with the Proposed Bowland Section.
Lancaster City Council			
WR5 Hoskins Farm 15 dwellings	Wray-with-Botton Neighbourhood Plan	The Housing Allocation is located 3.6 km north west of Lower Houses Compound and is 0.35 km east of the satellite compound. The allocation is on the location of an existing farm complex within the edge of a residential area.	Due to the small size of the development and the location of the allocation within a residential area currently developed land, no cumulative effects would be predicted to arise from this application in combination with the Proposed Bowland Section.
Lancashire County Council			
LCC/2018/0060 Bankfield Quarry Chatburn Old Road Clitheroe Variation of condition 1 of planning permission 3/97/636 to extend the mining	Environmental Statement (November 2018) Noise Assessment (November 2018) Lancashire County Council Ecology Response (S. Manchester, January 2018)	The quarry site is located 8.5 km north west of the Newton-in-Bowland Compound. Various mitigation measures were identified within the Noise Assessment to prevent noise impacts. No interests of acknowledged importance were identified within the Environmental Statement that would be adversely affected by extending the currently permitted end date of the quarrying and associated operations until 2033.	The application is for a time extension to the existing works occurring at the quarry. There would be no intensification of use or alteration to the current scheme of working. The Environmental Statement does not identify any impacts on any International, national or local designations assessed within this chapter of the Proposed Bowland Section.

Proposed Development	Relevant Documents	Nature / Scope of Effects	Commentary on Cumulative Effects
operations until 31 December 2033 with completed restoration by 31 December 2034	Natural England Consultation Response (January 2019)	<p>The Environmental Statement states that further ecological surveys were being carried out and were to be provided.</p> <p>Natural England had no comment to make on the variation of Condition 1.</p>	No cumulative effects would be predicted to arise from this application in combination with the Proposed Bowland Section.
Waddington Fell Quarry	Breeding Bird Survey Report (August 2020)	<p>During the breeding bird survey a total of 27 bird species were recorded to use Waddington Fell Quarry. The site was assessed to hold local significance for breeding birds. Confirmed breeding of the protected species peregrine was recorded and BoCC species black-headed gull, mallard and oystercatcher. The BoCC species cuckoo (1 no. pair), reed bunting (2 no. pairs), skylark (3 no. pairs), swallow and willow warbler were also assessed as probably breeding within the site. The protected species little ringed plover and BoCC species common redstart, lapwing and linnet possibly nested within the site.</p>	<p>No ES chapter available at the time of writing.</p> <p>A number of the BoCC bird species recorded as confirmed, probably or possibly nesting within the Waddington Fell Quarry site also were recorded at the Proposed Bowland Section (common redstart, lapwing, linnet, mallard, oystercatcher, reed bunting, skylark and willow warbler). However only low numbers of these species were recorded. It is possible that some of these birds could be displaced by the proposed works at the quarry, however the extent of displacement or habitat loss for these species is not known. Due to the low numbers of these bird species recorded it is unlikely that any significant cumulative effects would be predicted to arise from this application in combination with the Proposed Bowland Section.</p>

9.9 Conclusion

- 131) Chapter 9A and 9B of the ES together with the Habitats Regulation Assessment and SSSI Report considers the potential terrestrial and aquatic ecology impacts associated with enabling works, construction, commissioning and operational phases along the route of the Proposed Bowland Section.
- 132) No significant residual impacts on international, or national designations are predicted.
- 133) Embedded mitigation, best practice measures and essential mitigation will avoid or reduce most adverse effects on habitats to non-significant. Within main compounds habitat loss would be temporary with small exceptions and the majority of habitats that would be lost and reinstated are common and widespread and these include woodland (semi-natural broad-leaved and broadleaved and mixed plantation), scattered trees, hedgerows and grassland (semi-improved neutral, acid and marshy).
- 134) Impacts on Gamble Hole Farm Pastures BHS and fen and basic flush habitats largely associated with this are the only significant adverse residual effect predicted on terrestrial ecology as a result of the Proposed Bowland Section. Bespoke habitat creation packages agreed with the LPA will be employed to compensate for these losses.
- 135) At the time of writing this assessment works were ongoing to identify options for further reducing the effects on Gamble Hole Farm Pastures BHS caused by the crossing of the designation. Investigations of options for extending habitat management beyond the time frame of the construction phase and or the boundaries of the planning application are also ongoing. As these options are currently uncertain, the residual effects identified for this designation represent a reasonable worst case scenario. Further information will be provided as an addendum should and reduction in effects be secured.
- 136) Significant impacts on species would be avoided through embedded mitigation measures and potential impacts would be reduced following habitat reinstatement and through installation of bat boxes to provide alternative roosting habitats. With the potential exception of bats (tree roosts) it is anticipated that no protected species licences would be required.
- 137) In addition to habitat reinstatement, United Utilities is committed to habitat improvements equating to approximately 10% net gain in biodiversity. Baseline value and loss has been measured using Natural England Metric 2.0 and offsetting sites have been sought as close to the impact and within the same LPA area wherever possible. This includes additional habitat enhancement or creation measures delivered with landowner agreement on land adjacent to the proposals.
- 138) No significant effects upon terrestrial ecology features is anticipated during the operation of the new asset. Temporary disturbance effects on habitats and species would be no greater than experienced during existing agricultural practices or routine maintenance of existing above-ground infrastructure for the aqueduct. Separate reports have also confirmed no impacts on SSSIs and no HRA impacts.

9.9.1 Off-Site Highways Works and Proposed Ribble Crossing

- 139) This section assesses the likely significant effects associated with enabling works and construction activities required for off-site highways works and the Proposed Ribble Crossing. As explained in Chapter 1, off-site highways works and the Proposed Ribble Crossing were developed at a late stage in the EIA

- 142) The TR4 highways assessment identified two likely significant residual effects. Permanent loss of scattered broad-leaved trees and woodland was assessed as a residual Significant Adverse Effect at the Local level. Permanent loss of habitat within Waddington Fell Road, Roadside Verges BHS as assessed as a residual Significant Adverse Effect at the Local level.
- 143) At the time of writing, the GWDTE assessment is pending and potential temporary or permanent changes to groundwater conditions giving rise to effects on GWDTEs within five Biological Heritage Sites (BHS), River Ribble BHS; Waddington Fell and Browsholme Moor BHS; Bradford Fell, Easington Fell & Harrop Fell BHS; Waddington Fell Road, Roadside Verges BHS and Bellman Farm Marsh BHS. Initial assessment of habitats within influencing distance suggests that four of the designations are unlikely to experience significant residual effects. However, significant residual effects on one designation; Bradford Fell, Easington Fell & Harrop Fell BHS cannot be ruled out at this time. Although adverse effects would only be at the local level. It is expected that even if effects were identified, additional essential mitigation could be designed to reduce these to not significant.
- 144) Following implementation of embedded, best practice and essential mitigation measures, Volume 6 identified no significant effects upon terrestrial ecology features from the Proposed Ribble Crossing.
- 145) While the overall cumulative effects of each EIA topic is summarised in Chapter 19 it is worth noting here that due to the geographical separation of effects arising from the various elements of the Proposed Bowland Section, no cumulative change in significance level is predicted on any International, National, or County designation.
- 146) Cumulative effects on habitats could occur if permanent losses were such that the availability of the habitat within the local area or wider was significantly reduced. However, even accounting for the overlapping periods where habitats would be lost, due to reinstatement proposals, effects on habitats do not cumulatively increase significance levels overall. Some more valuable habitat losses associated with the off-site highways would be permanent including hedgerow and tree losses, however because losses of these habitats within the main compounds and Ribble Crossing are relatively low and would be reinstated, these would not cumulatively increase the residual effect beyond that identified for off-site highways alone. Small losses of wet dwarf shrub heath and acid dry dwarf shrub heath would occur for the highways works but these habitats are not present within the main compounds or Ribble Crossing. The size and/or value of other permanent habitat losses are below that where cumulatively significant effects could reasonably occur.
- 147) Cumulative effects on species are unlikely to arise due to avoidance of death/injury impacts through embedded mitigation and best practice measures and due to geographical separation of disturbance, fragmentation and habitat loss impacts.

9.10 Glossary and Key Terms

- 148) Key phrases and terms used within this technical chapter relating to Terrestrial Ecology are defined within Appendix 1.2: Glossary and Key Terms.