Haweswater Aqueduct Resilience Programme - Proposed Bowland Section

Environmental Statement

Volume 1

Non-Technical Summary

June 2021

Water for the North West

Haweswater Aqueduct Resilience Programme - Proposed Bowland Section

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1. Introduction

1.1 Background to the Development

United Utilities Water Ltd (United Utilities) manages the water supply network across the North West of England. United Utilities is proposing to carry out the Haweswater Aqueduct Resilience Programme (HARP), which would replace approximately 53 kilometres (km) of the current 110 km long Haweswater Aqueduct. HARP represents one of the largest UK investments in public water supply infrastructure in the last 50 years. It would increase the resilience of United Utilities' water supplies for customers throughout the North West of England, and deliver world class infrastructure to the region.

This Non-Technical Summary of the Environmental Statement relates to one section of HARP, the Proposed Bowland Section.

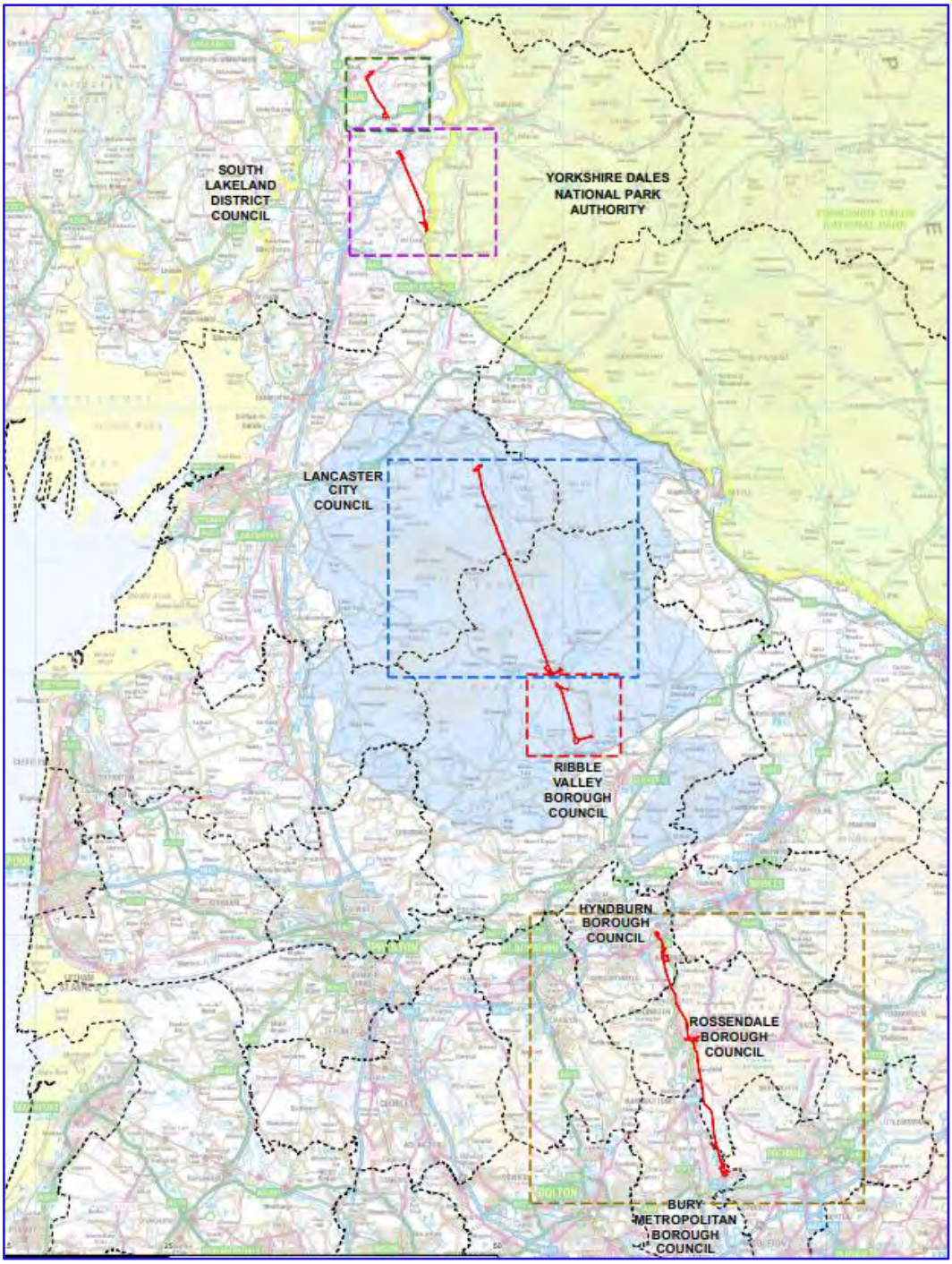
The existing Haweswater Aqueduct comprises a series of single and multi-line underground water supply pipelines taking water from the Haweswater Reservoir in the Lake District National Park to customers in Cumbria, Lancashire and Greater Manchester. Following detailed inspections of the aqueduct, a number of the sections of pipeline showed evidence of poor condition that could lead to leakage or water quality risk. Therefore, United Utilities has decided to replace the single line sections to protect future water quality and provide a more resilient supply of clean drinking water.

Haweswater Reservoir

The replacement aqueduct (HARP) would comprise the replacement of six single line tunnel sections with five, which United Utilities is proposing to construct as five separate developments. These are listed below, from north to south:

- Proposed Docker Section in the South Lakeland District area
- Proposed Swarther Section in the South Lakeland District and the Yorkshire Dales National Park areas
- Proposed Bowland Section in the Lancaster City and Ribble Valley Borough areas
- Proposed Marl Hill Section in the Ribble Valley Borough area
- Proposed Haslingden and Walmersley Section in the Hyndburn Borough, Rossendale Borough and Bury Metropolitan Borough areas.

Proposed HARP Programme of Works (Local Planning Authority Overview)



The Proposed Bowland Section is towards the central part of the aqueduct and would involve replacing 16.7 km of water supply pipes. The tunnel route runs in a generally south direction from Lower Houses Compound, near Wray in the north, to Newton-in-Bowland Compound in the south.

The replacement aqueduct section would be constructed by underground tunnel boring, with short open-cut surface trenching sections at each end making connections back to the existing network. The new aqueduct section would be bored (the technical name for tunnelling) from the south at Newton-in-Bowland Compound to the north at Lower Houses Compound.

1.2 Purpose of this Document

This Non-Technical Summary provides an easily readable summary of the Environmental Statement for the Proposed Bowland Section, which has been submitted as part of the planning application.

The Environmental Statement reports the findings of an Environmental Impact Assessment (EIA). It considers the potential impacts of the Proposed Bowland Section on local communities and the environment and identifies mitigation measures to alleviate negative (adverse) effects.

1.3 The Environmental Statement

The Environmental Statement comprises six volumes:

- Volume 1: Non-Technical Summary (this document)
- Volume 2: The main report chapters, providing development information and environmental assessments
- Volume 3: Figures and drawings supporting Volume 2
- Volume 4: Technical appendices and other reports supporting Volume 2
- Volume 5: Off-Site Highway Works
- Volume 6: Ribble Crossing.

Chapters 1-5 of the Environmental Statement provide introductory information and background to the Proposed Bowland Section, and Chapters 6-18 provide assessments of environmental topics. Cumulative effects, mitigation summaries and a summary of likely significant effects are then provided in Chapters 19-21.

Each environmental topic chapter explains the subject, describes the existing environment ('baseline conditions'), assesses the impact of the Proposed Bowland Section on the existing environment, identifies measures to protect the communities and the environment (mitigation), and then reports the significance of any remaining (referred to as 'residual') environmental effects.

The full Environmental Statement can be viewed on the Lancaster City Council and Ribble Valley Borough Council websites:

https://planning.lancaster.gov.uk/online-applications/

https://www.ribblevalley.gov.uk/planningApplication/search.

1.4 This Non-Technical Summary

Within the Environmental Statement (Chapters 6-18), assessments of the likely significant effects are reported by environmental topic. Within this Non-Technical Summary, the relevant information is reported by individual compound, plus a section of relevant information is included for the off-site highway works and Proposed Ribble Crossing. This approach has been adopted for the Non-Technical Summary to help members of the public and non-specialist readers find the information they are most likely to be interested in.

The following environmental topics are included within this non-technical summary:

- Landscape and arboriculture
- Water environment
- Flood risk
- Ecology – terrestrial and aquatic
- Cultural heritage
- Soils, geology and land quality
- Materials and waste
- Public access and recreation
- Communities and health
- Major accidents
- Transport planning
- Noise and vibration
- Air quality and climate change.

The absence of information for a particular topic within the Non-Technical Summary indicates that no likely significant effects has been identified within the EIA. Further information on each topic and full details of impacts identified and assessed can be found in the relevant topic chapters in the Environmental Statement.

A summary is presented of the potential cumulative effects of the Proposed Bowland Section, considered in conjunction with the overall HARP Proposed Programme of Works, and also taking account of other anticipated major developments in the region.

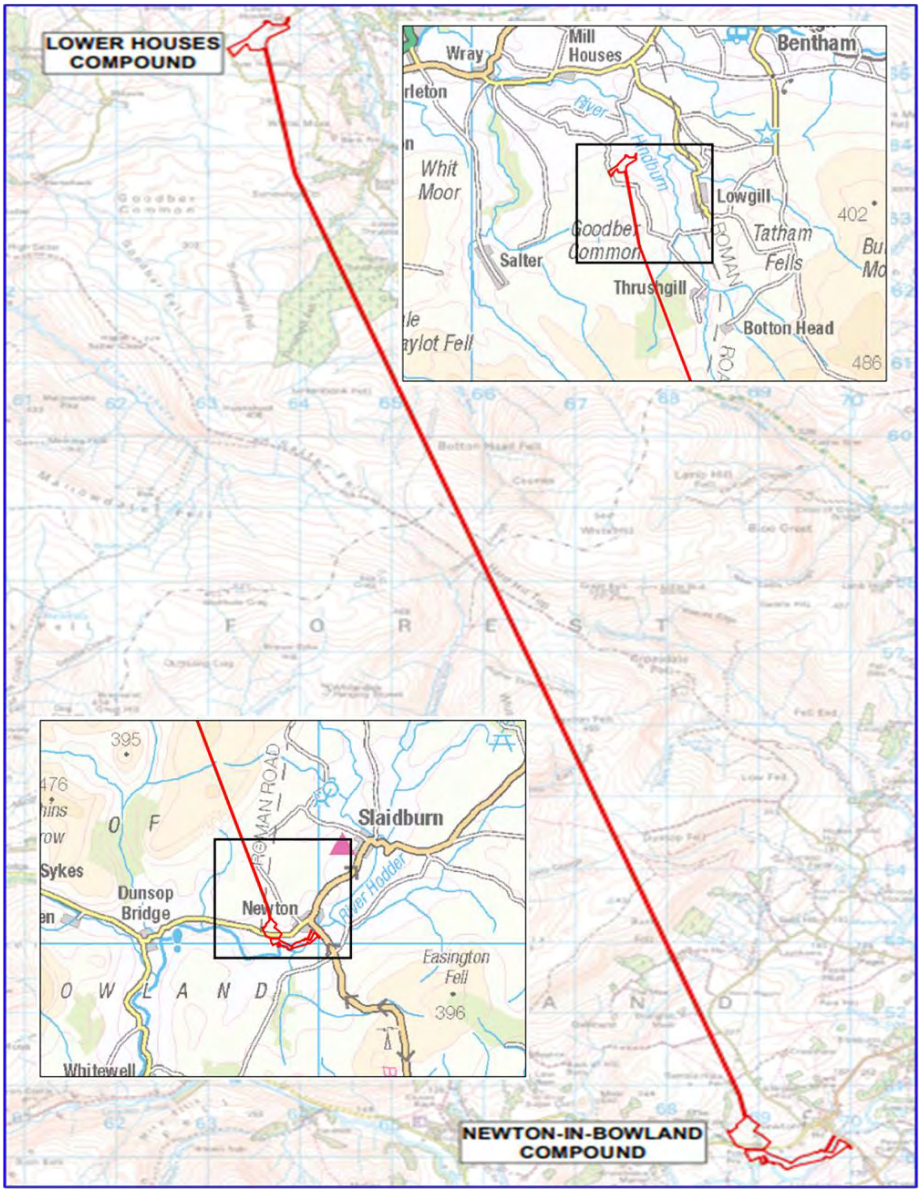
In addition, the residual significant effects of the Proposed Bowland Section following the application of appropriate mitigation is also included.

2. Development Overview

2.1 Proposed Bowland Section

The route of the Proposed Bowland Section runs north to south, starting in an upland area of semi-improved pasture, passing at depth below the Bowland Fells before emerging in the Hodder river valley to the west of Newton-in-Bowland. The planning application boundary of the Proposed Bowland Section including the compound locations used to construct the tunnel are shown below.

Proposed Bowland Section



2.2 Construction Programme and Phasing

Construction of the Proposed Bowland Section is due to commence in 2023, with completion of the main construction works anticipated in 2028. This programme does not include reinstatement works, which would continue beyond the completion of construction. Key phases are:

- Enabling Works – Establishment of construction compounds and their access, off-site highway works
- Construction – Tunnelling and trenching works

- Commissioning – Land reinstatement, cleaning and testing of pipework
- Operation – Operation of the new sections and decommissioning of the existing Haweswater Aqueduct.

Construction Compounds

Two construction compounds are required for the main pipeline route:

- Lower Houses Compound
- Newton-in-Bowland Compound

Compounds would be the main hub of construction activity. Establishment of compounds would typically require:

- Creation of site access
- Vegetation clearance, including felling of trees and hedge removal outside of seasonal ecological constraints
- Earthworks to create level areas in the sites
- Creation of platforms for working machinery
- Topsoil stripping, with storage for reuse
- Installation of site drainage
- Site fencing, hoarding and lighting
- Provision of offices, workshops and welfare cabins
- Delivery and storage areas for materials.

Tunnel Construction

The tunnel section would be constructed using tunnel boring machines, boring through the ground to form a tunnel drive and removing excavated material back to the surface. Tunnel drives would be 'launched' from a portal within the Newton-in-Bowland Compound to a reception shaft within the Lower Houses Compound, where the tunnel boring machine would be lifted out and dismantled prior to removal from site. The maximum depth of the tunnel would be approximately 380 metres (m) below ground level.

Some 650,000 m^3 of material removed from the tunnel during construction would be brought to the surface at the Newton-in-Bowland Compound. The material may require some form of processing such as dewatering within the construction compound. Where possible, material / waste arisings would be re-used on-site if appropriate. All other surplus materials would be stored within the compound before being transferred to the nearby Waddington Fell Quarry for use in a revised and enhanced restoration scheme (subject to a separate planning application).

Surplus material arising from the construction of the reception shaft at Lower Houses Compound, connecting pipework and associated structures would be stored on site. Suitable material from these arisings would then be incorporated in the reinstatement and landscaping of the compound. It is proposed that approximately 6,000 m^3 of material would be used to the south of the proposed reception shaft within the existing field boundary. The material would be placed to blend with the existing patterns of surrounding field boundaries, topography and vegetation within the wider landscape. These permanent landscaping works would affect a plan area approximately 200 m by 100 m. The works would comprise careful stripping of topsoil and subsoil from the land, appropriate storage within the construction area for later reinstatement, placement and compaction of the appropriately selected material, modification or provision of land drainage as necessary, reinstatement of subsoil and topsoil and planting as appropriate.

Tunnelling and above ground activities at the launch shaft at Newton-in-Bowland Compound would require 24 hours seven days a week operation including soil and rock arisings being transported to the surface, handling of materials, and water treatment works operation.

Example of a tunnel construction compound layout

Example of a portal construction compound

Open-Cut Pipework Construction

Open-cut trenching would be required when connecting the new section of aqueduct into the existing line. Trenches would be excavated in the ground with pipe(s) being placed in the trenches prior to backfilling with excavated or imported material. Topsoil and subsoil would be carefully stripped from the land and stored appropriately within the compound for later reinstatement.

Example of open-cut trenching

Permanent Infrastructure

A new valve house building would be required at each of the Lower Houses and Newton-in-Bowland Compounds. These buildings would be 12 m long and 10 m wide, with tarmac or stone access roads and hard standings.

Air valves constructed in buried chambers, would be installed close to the new valve house buildings, to release any trapped air from within the pipework. The access cover would be formed by a slightly mounded grassed area. Access to these chambers would be by foot or light vehicles.

Tunnel launch and reception shafts would have a cover slab fitted on completion of construction and be backfilled and covered for reinstatement.

Overflows

Existing overflow structures are located at the Newton-in-Bowland Compound and protect the existing infrastructure from excessive pressure by allowing flows to pass over overflow weirs before passing on to the existing outfall on the River Hodder. A new flow distribution structure would be constructed with a connection to the existing overflow chamber which would continue to serve the same purpose for the new section of aqueduct.

Off-Site Highways Works

Traffic management plans and highways works, including passing places and road widening on the public highway, are proposed, to minimise potential conflicts with other road users (see Section 6 Off-Site Highways Works). These would also enable the safe and timely movement of heavy goods vehicles and other construction vehicles along local roads, prior to joining the strategic road network.

Hornby / Wray Satellite Compound and Temporary Parking Area

A temporary satellite compound is proposed on fields to the west of Wray, off Hornby Road (B6480). This satellite compound forms part of the proposed off-site highways works, which are explained in Section 6 of the NTS and form the basis of Volume 5 of the Environmental Statement. The proposed satellite compound would allow abnormal load vehicles seeking access to the Lower Houses Compound to be held until being cleared to proceed via a communication system. In addition, the compound would act as a park and ride facility, enabling construction personnel to park before being shuttled to the Lower Houses Compound, reducing the volume of vans and other light vehicles on the local road network surrounding Wray. It would be made up of a hard-surfaced parking area, welfare facilities and have a topsoil storage area and surface water attenuation lagoon with packaged treatment plant.

It is anticipated that construction traffic may need to use Main Street on 18 separate weeks during the overall construction programme. When required, it is expected there would be a maximum of 42 two-way movements per week. On these occasions when abnormal load vehicles need to pass directly through Wray, temporary parking and traffic restrictions would be in place to enable the safe movement of construction vehicles through the village. A temporary residents' parking area is proposed, therefore, at the 'Bridge House Farm Tea Rooms' at the southern end of Main Street.

Clitheroe Heavy Goods Vehicle (HGV) Holding Facility and Park and Ride

A holding facility for HGVs is also proposed on land within the Ribblesdale Cement Works, off West Bradford Road in Clitheroe. The holding facility would allow large construction vehicles to park off the public highway during certain periods, for instance school drop off and pick up times, before being released onto the approved haulage route towards the Newton compound. In addition, a park and ride facility is proposed within an existing staff car park opposite the Ribblesdale Cement Works. Construction personnel would park here before being shuttled to the Newton compound. These facilities would also be used for the Proposed Marl Hill Section (subject to separate planning application).

Ribble Crossing

The construction of the Proposed Bowland Section would require access from the A59 for a wide variety of construction vehicles, some of them exceptional loads. Two haulage route options have been assessed which go through Clitheroe and the surrounding villages. One of the haulage route options comprises the use of two sections of the existing public highway network, taking construction vehicles through the centre of Clitheroe and towards Waddington, and also through Chatburn, Grindleton and West Bradford. The second haulage route option would involve the construction of a dedicated haulage route, open only to construction traffic, across the River Ribble and open countryside to the north of Clitheroe. Through agreement with Ribble Valley Borough Council, one of these two options will be discounted from the planning application following planning submission. It is therefore anticipated that only one of the two options would be presented as part of the full application for determination at planning committee.

2.3 Commissioning and Operational Phase

During the commissioning phase, the new tunnel pipeline would be deep cleaned and tested before being connected to the existing Haweswater Aqueduct. Land used for compounds would be reinstated after completion of construction works, with temporary access roads being removed. Launch and reception shafts would be covered and reinstated at ground level. Access tracks would be reinstated to the original land on completion of the commissioning works with agreement of the landowner.

The operational phase of the new aqueduct would give rise to very low volumes of traffic.

Following completion and commissioning of the new aqueduct, the existing section of aqueduct would be taken out of service. The decommissioning phase of the existing aqueduct would be conducted by carrying out repairs within the tunnel (perhaps extending over several weeks) supported by reduced compounds at the Lower Houses and Newton-in-Bowland Compounds.

Following the decommissioning of the existing aqueduct, groundwater is expected to drain into the old tunnels. This would flow down the old aqueduct before being discharged via the existing overflow chamber to the River Hodder.

2.4 Design Evolution and Alternatives Considered

Plans for the Haweswater Aqueduct Resilience Programme have been in development since 2000, with extensive studies and consultation leading to this planning application. This has included consideration of alternative ways to address the need to protect the water supply provided by the existing Haweswater Aqueduct.

Screening and decision-making exercises confirmed that targeted repairs and installation of treatment plants at supply points would lead to unrepaired sections continuing to deteriorate. Lining the existing

pipes would address water quality and supply issues but would not be possible in the very short available timescales within which operational flows would be stopped to enable safe access to the tunnels by personnel and equipment.

Following extensive assessment, it was concluded that a full replacement of each single line section of the existing aqueduct was the best option when considering the future security, resilience and cost of the water supply.

Five route alignment options were developed for the replacement tunnel of the Proposed Bowland Section. These continued to be refined as engineering and environmental information became available, and through feedback from stakeholder engagement. A study of the route-alignment options was undertaken, which included a review of the information from an environmental, engineering, safety and cost perspective.

An initial design prepared in 2019 closely followed the alignment of the existing Haweswater Aqueduct. There were three intermediate shafts proposed and five construction compounds, included to reduce the overall length of a single tunnel drive. Further consultation resulted in the removal of three of the compounds allowing for a revised tunnel route alignment to be proposed, following a largely direct and straight alignment. There were further refinements to the two remaining construction compounds and access routes, which removed the risk of adverse community and environmental effects at these locations.

3. Environmental Impact Assessment

3.1 Assessment Method

The Proposed Bowland Section has been identified as requiring an Environmental Impact Assessment (EIA) under the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations). An EIA has been carried out to meet the requirements of planning legislation and policy.

The EIA has followed industry standard methods, along with topic-specific methods and guidance as appropriate. Each topic chapter of the Environmental Statement has been completed by competent experts.

The EIA has followed a series of key steps:

- Identification of the assessment area and the locations, features or communities to be assessed. These range from people, properties, designated sites and ecological species to the surrounding environment and its resources
- Information on the existing environment was collected using methods such as surveys, desk-based studies, and consultation with environmental groups and the public
- Where necessary, modelling was undertaken to support the prediction of effects
- Likely significant environmental effects were identified for each phase of the development (i.e. enabling works, construction, commissioning, and operation), considering whether effects would be beneficial or adverse, permanent or temporary taking agreed mitigation measures into account
- Identification of further mitigation measures required to avoid, reduce or offset potential adverse effects.

The Environmental Statement also takes into account the cumulative effect of the Proposed Bowland Section being constructed at the same time as other proposed developments in the area, including the other sections of the Haweswater Aqueduct Resilience Programme.

3.2 Engagement and Consultation

Extensive engagement and consultations have been undertaken with local planning authorities, regulatory authorities, people with an interest in the land and affected communities. Engagement and consultation have helped to identify issues and concerns regarding the Proposed Bowland Section, its design and the EIA process.

Extract from the HARP consultation website

3.3 Approach to Environmental Mitigation and Monitoring

Mitigation is divided in to three types:

- Embedded mitigation: measures that form part of the engineering design, developed through the iterative design process. For example, the temporary surface water drainage solution for Newton-in-Bowland Compound was amended from a surface water outfall into an existing watercourse that flowed through Gamble Hole Farm Pasture Biological Heritage Site and which potentially fed a number of offsite ponds to an outfall into an existing drain associated with the existing aqueduct
- Good practice: standard approaches and actions typically used by construction companies to avoid or reduce effects on local communities and the environment, such as the prevention of pollution incidents and temporary closures and diversions of Public Rights of Way
- Essential mitigation: specific measures needed in particular areas of the Proposed Bowland Section to avoid or reduce environmental effects, such as monitoring of protected ecological species during construction.

The environmental topic chapters within the Environmental Statement have assessed the proposals taking into account embedded mitigation and good practice. The outcome of these assessments then informed the need for additional essential mitigation, which is identified in the topic chapters and summarised in Appendix 20.1 of the Environmental Statement. Good practice mitigation measures are contained within the Construction Code of Practice which forms Appendix 3.2 of the Environmental Statement and the Construction Traffic Management Plan.

4. Lower Houses Compound

4.1 Description of Development

The Lower Houses Compound is the northern compound and would provide a connection point from the existing Haweswater Aqueduct into the new aqueduct. This compound would cover an area of approximately 10.8 hectares (ha) and comprise a 15 m diameter, 10 m to 15 m deep reception shaft to remove the tunnel boring machine being driven from the Newton-in-Bowland Compound. The connection to the existing infrastructure would be via four 1.2 m (internal diameter) pipes, laid within a single trench approximately 165 m long.

Construction of the compound would start in 2024 at the earliest and it would be required until the tunnel boring machine arrives from Newton, which is expected to be in 2029. There would be significant periods of inactivity at the compound, with approximately two and a half years of construction-related activities in total. Landscaping and reinstatement works would start following completion of construction and commissioning works on site. There are expected to be between four and eight additional vehicle movements per hour. This may increase as tunnelling finishes and the tunnel boring machine is being removed, and during connection and commissioning works.

4.2 Baseline

The Lower Houses Compound location is approximately 4 km south-east of Wray and 1.6 km north-west of Low Gill. Cod Gill and two other minor watercourses partially flow through the compound. There are a number of dispersed farms on higher moorland areas, and the small, rural village of Lowgill located on the rising valley side above the River Hindburn. It is located within the Forest of Bowland Area of Outstanding Natural Beauty, with sheep farming the predominant land use in the immediate area. Site access would be from Park House Lane in the north-east with site traffic exiting by the unnamed road on the western side of the compound.

The closest residential property is Lower House Farm, located 340 m north-east of the shaft, 300 m from the northern edge of the compound, 190 m from the connection works site and 75 m from the access road. A number of Public Rights of Way are present in the vicinity of the compound and would be temporarily affected by the proposed works, including Footpath 1-38-FP 22 and National Cycle Network routes 69 and 90.

There are a number of designated wildlife sites located within 5 km proximity of the Lower Houses Compound, the closest of which is the Far Holme Meadow Site of Special Scientific Interest, 680 m to the east. There are a further 22 locally important wildlife habitats within 2 km of the compound, the closest being Over Houses Great Wood BHS, 190 m to the east. The Bowland Fells Special Protection Area is located 4.2 km south of the compound. The main habitat identified within the Lower Houses Compound is poor semi-improved grassland with some 34 scattered broadleaved trees.

Current View south-west from Park House Lane towards the Lower Houses Compound location

4.3 Description of Effects

Landscape and Arboriculture

Construction activity would introduce an obvious and notable change, resulting in temporary changes to views (termed 'visual effects') and to landscape character (termed 'landscape effects'). Construction activity would affect sensitive landscape features including trees and woodland within the Forest of Bowland Area of Outstanding Natural Beauty, with temporary changes to the characteristics of the landscape.

The Environmental Masterplan shows replacement planting proposed in the Environmental Statement (Volume 3 Figure 20.1). Significant effects on landscape and views are as follows:

- Upper Hodder, Bowland Gritstone Fringes, Upper Hodder Valley, Park House and Hindburndale Landscape Character Areas would be affected due to noticeable and uncharacteristic change in the landscape during enabling works, construction and commissioning phases
- North Bowland Valleys, Goodber Common, Bowland Limestone Fringes, Beatrix to Collyholme, Central Bowland Fells, North Bowland Fringes and Tatham Landscape Character Areas would be affected due to noticeable and uncharacteristic change in the landscape during the construction phases
- North Bowland Valleys, Goodber Common, Newton and Birket, Beatrix to Collyholme, Central Bowland Fells Landscape Character Areas, would be affected due to noticeable and uncharacteristic change in the landscape during the commissioning phases
- Residents of Lower Houses Farm and users of local footpaths, Park House Lane and Local Moor Road and areas of Open Access Land would experience visual disturbance across a large part of the view during both enabling works, construction and commissioning phases.

These effects are temporary and once construction activity has been completed, trees and woodland would be reinstated, which would reduce the visual and landscape effects. However, some temporary significant effects may remain until the reinstated vegetation and other landscape features are sufficiently established.

Water Environment

A series of embedded mitigation measures has been proposed to help manage pollution risk and reduce the potential impacts of the Proposed Bowland Section on the water environment. These mitigation

measures include, but are not limited to, following good construction practice as defined in the Construction Code of Practice, appropriate design and groundwater borehole monitoring.

During enabling works, ground compaction, topsoil stripping and construction of access tracks could affect groundwater levels and flows leading to potentially significant effects to Lower House Cottage wildlife habitat that is dependent on local groundwater conditions. To minimise the impacts, mitigation would include avoiding topsoil stripping in the Lower Houses Compound immediately upgradient of the site, and any activity that would have a significant impact on habitats, minimising the duration of dewatering and monitor weather forecast and suspended solids. With proposed mitigation no residual significant effects are predicted.

One private water supply (PWS3-16) is located within the compound. Ground disturbance and compaction due to soil stripping and earthworks associated with construction of the compound could reduce the flow to this water supply during enabling works. Also, during the construction phase, there is the potential for changes to groundwater quality due to sediment mobilisation from ground disturbance during connection and overflow works, and from accidental spillages. Where contractor assessment identifies that a private water supply is at significant risk of impact then an enhanced monitoring regime would be agreed with the landowner to ensure that any issues are identified and actioned as soon as possible. Should any unforeseen active private water supply pipe networks or other associated infrastructure be disrupted by the proposed work, these would be repaired or replaced, and an alternative source of water would be provided until the impacted private water supply is brought back into operation. With proposed mitigation no residual significant effects are predicted.

Cod Gill is a tributary of the River Hindburn. An increase in flow in Cod Gill during the commissioning phase could have a potentially significant effect on the River Hindburn and could cause localised erosion where they meet. In addition, the increase in fine sediment load mobilised on Cod Gill could smother the highly sensitive features observed on the River Hindburn during enabling works and commissioning works. Mitigation would take the form of monitoring during the commissioning phase, with remediation works delivered in conjunction with landowners and the Environment Agency if required. With proposed mitigation no residual significant effects are predicted.

Cod Gill

Flood Risk

There is potential for a significant effect to occur from an increase in flood flows of Cod Gill, a tributary of the River Hindburn during the commissioning phase. Further detailed analysis to assess the actual level of flood risk impacts to Cod Gill would be undertaken to determine appropriate discharge rates and any further mitigation required. With proposed mitigation no residual significant effects are predicted.

Terrestrial Ecology

The enabling works phase would result in habitat loss and disturbance to wildlife. Permanent habitat losses would be limited to the footprints of the permanent above ground new structures, comprising new buildings and associated access tracks.

Potential was identified for some significant effects on ecology during the enabling works phase including:

- Loss or degradation of marsh within the compound due to changes to groundwater quality, flows or levels
- Temporary habitat losses including ten trees
- Vegetation clearance could result in the destruction or disturbance of nesting habitats for one pair of curlew, one pair of mallard and one pair of oystercatcher. Vegetation clearance could also result in the loss of foraging and resting habitats for birds
- Disturbance impacts to birds.

Additional mitigation measures have been identified which include avoiding soil stripping at the north-eastern edge of the compound near to the area of marsh, to minimise groundwater flow and quality impacts. Retained habitats would be segregated from working areas using appropriate fencing with informative warning signs attached.

Potential was identified for significant effects on ecology during construction works. Artificial lighting introduced during the construction phase could cause disturbance of foraging and commuting bats. Flight routes that may be affected include the linear woodland located to the northeast of the Lower Houses Compound. Disturbance from noise, light, vibration or visual effects could result in the displacement of breeding birds and wintering birds from retained habitats.

Embedded mitigation measures and good practice mitigation outlined in the Construction Code of Practice would reduce the risk of these impacts occurring.

Aquatic Ecology

The enabling works, construction, and commissioning phase works at the Lower Houses Compound may result in pollution and increased sedimentation in the tributaries of the River Hindburn that would receive site drainage and are crossed by the access track. In the absence of additional mitigation this could result in temporary significant effects to sensitive aquatic communities and otter populations in the River Hindburn and tributaries and the River Hindburn BHS. Additional mitigation measures related to water quality, sediment management, timing of commissioning discharges, pre-commencement surveys for otters, and timing of in river works would be implemented and overseen by an experienced Environmental Clerk of Works. Reinstatement of watercourse substrate and banks following removal of the crossing and temporary drainage outfall would also be implemented to prevent erosion along the affected watercourse. With proposed mitigation no residual significant effects are predicted.

Soils, Geology and Land Quality

There are two historical stockpiles identified adjacent to the Lower Houses Compound. These stockpiles are likely to comprise tunnel arisings from the construction of the existing Haweswater Aqueduct, but the presence of construction waste such as temporary worker accommodation demolition materials or other waste materials cannot be ruled out.

Any existing contamination would be identified by the ground investigation with appropriate remedial measures undertaken. Should unforeseen contamination be encountered, the unexpected contamination plan would be implemented to mitigate the risks to construction workers and adjacent land users.

Public Access and Recreation

A number of Public Rights of Way would be affected by the Lower Houses Compound during the enabling works, construction and commissioning phase. Potential for significant effects on Public Rights of Way are as follows:

- Footpath 1-38-FP 22 would be impacted for the duration of the works and would require a diversion. This would either be the creation of a crossing point where it intersects with the construction access track and a diversion around the edge of the construction compound; or a diversion along footpath1-38-FP 23 avoiding the construction access track and diverting along the field boundary to re-join the existing alignment of footpath1-38-FP 22
- National Cycle Network route 69 passes through the centre of Wray following the B6480 Hornby Road before following Main Street, to the junction with Long Lane, turning right at Fairheath Road and bearing left onto Mewith Lane. National Cycle Network route 90 follows the same route as National Cycle Network route 69 to Fairheath Road, then the route follows Spen Brow, passing through Slaidburn, Bolton by Bowland and Grindleton, carrying along Grindleton Road / West Bradford Road passing through the centre of Waddington to join Belle Vue Lane. The construction traffic route for the Lower Houses Compound has the potential to cause a significant impact due to the disruption to both National Cycle Network route 69 and National Cycle Network route 90 from an increase in construction traffic.

Due to the need for temporary closures and diversions, a significant impact has been identified. For this reason, consultation with Public Rights of Way officers and local groups would be carried out so that all closures and diversions can be agreed, publicised and the disturbance minimised.

Footpath 1-38-FP22

Transport Planning

For the Lower Houses Compound two construction access routes have been proposed depending on the type of construction vehicles:

- Route 1 – Abnormal loads and HGVs over 9.5 m long would be via the M6 Junction 34, along the A683 and B6480, then through the village of Wray via Main Street to continue via Helks Brow for approximately 3 km. This route is approximately 17 km long and consists of A-roads, B-roads and single track

- Route 2 – General construction traffic (HGVs less than 9.5 m long and light vehicles) via the M6 Junction 34, along the A683 and B6480 through Wennington and towards Low Bentham. Vehicles would then follow Eskew Lane and Long Lane before turning onto Fairheath Road, Spen Brow,

Furnessford Road reaching Park House Lane. Access from the Lower Houses Compound would then follow a one-way system with vehicles travelling along Helks Brow towards Wray before re-joining Long Lane towards Low Bentham, and turning onto the B6480 towards Wennington and Wray. This route is approximately 30 km long and consists of A-roads, B-roads and single track.

During the peak of construction activity, traffic modelling has identified an increase of up to:

- An additional 41 two-way movements of HGVs against a background flow of 23 over 12 hours
- An additional 72 two-way movements of HGVs against a background flow of 11 over 12 hours along Long Lane / Eskew Crescent / Eskew Lane
- An additional 36 two-way movements of HGVs along the Fairheath Road / Spen Brow / Furnessford Road / Park House Lane
- An additional 76 two-way movements of HGVs against a background flow of 88 over 12 hours along the B6480.

To monitor, mitigate and manage any adverse effects on local roads, a Construction Traffic Management Plan would be implemented. Highway works would also be carried out along the proposed routes to and from the proposed compounds to improve safety for construction traffic and general road users. These mitigation approaches would enable pedestrians, local road users and public transport services to avoid being adversely affected by construction traffic, and no residual significant effects are predicted.

Noise and Vibration

Construction noise and road traffic noise are not predicted to give rise to significant effects at sensitive receptors close to the Lower Houses Compound. Typical methods to control noise and vibration impacts during construction are included in the Construction Code of Practice and would be adopted by the construction contractor to further mitigate noise impacts. These would include the use of temporary barriers during the use of rock breakers and access road construction in the vicinity of Lower Houses Farm.

Construction road traffic is not anticipated to result in significant noise effects during the construction phase of the Proposed Bowland Section.

Air Quality

Diesel generators could be used at the Lower Houses Compound. Computer modelling indicates that emissions to air from the diesel generators located within the compound, and additional road traffic are unlikely to result in any potentially significant air quality effects at nearby residential properties, recreational areas or at designated wildlife sites identified in the assessment. Typical methods to control air quality during construction are included in the Construction Code of Practice and would be adopted by the contractor.

Major Accidents

A precautionary assessment of potential risk of storage of diesel fuel at the Lower Houses Compound, necessary to power plant and equipment including electricity generators, has been undertaken. However, it is considered that only relatively small volumes of diesel would be needed at the compound due to its function as a reception site. The storage of diesel would be in compliance with good practice and regulatory requirements. Therefore, no major accident threat to the environment has been identified, and no significant residual effects are therefore predicted.

Communities

On any major infrastructure project such as HARP, there is potential for community disturbance and disruption, damage to natural and built features, and harm to the environment. However, United Utilities would implement a Construction Code of Practice, which sets out good practice and widely recognised

guidelines that aim to either avoid community disturbance or environmental harm occurring in the first instance, or reduce these impacts to acceptable levels.

5. Newton-in-Bowland Compound

5.1 Description of Development

The Newton-in-Bowland Compound would be the launch site for the tunnel boring machine and would provide the connection point to the existing Haweswater Aqueduct at this location. This compound, including the haul route corridor, would cover an area of approximately 24 ha. A launch portal would be created at the compound and the tunnel boring machine would be directed from this portal into the hillside to start the tunnel boring. The portal would comprise a significant cutting into the existing sloping ground to create a level working area and expose a vertical face for the tunnel boring machine to tunnel into. The portal would be constructed using a suitable rock excavation technique (such as blasting) which would be undertaken at agreed times and intervals to minimise disruption to local residents.

The connection to the existing infrastructure would be via four 1.6 m (internal diameter) pipes, laid within a single trench approximately 300 m long.

Construction would start with enabling works in 2023, including proposed modifications to the local highway network and the proposed Ribble Crossing (in the event it is taken forward as part of an approved scheme). The main tunnel construction works would follow, lasting approximately five and a half years, with completion anticipated in 2028. The compound would then be reinstated once connection and commissioning works are complete, thus resulting in the compound being in place in some form for approximately seven years. Reinstatement of associated highway modifications and the Ribble Crossing (if required) would then be carried out. The expected vehicle movements on the highway network between the A59 and the Newton-in-Bowland compound are set out below. The Proposed Marl Hill Section (subject to a separate planning application and ES) would share the same haulage route(s) as the Proposed Bowland Section. For this reason, the numbers below represent movements in connection with both the Proposed Bowland and Marl Hill Sections.

- Between the A59 and our access to the Braddup compound (Proposed Marl Hill Section) there would be typically between three and nine vehicle movements per hour with a peak averaging up to 16 per hour
- Between the access to the Braddup compound (Proposed Marl Hill Section) and Waddington Fell Quarry there would be typically between five and 15 vehicle movements per hour with a peak averaging up to 25 per hour
- Between Waddington Fell Quarry and the access to the Bonstone compound (Proposed Marl Hill Section) there would be typically between 10 and 20 vehicle movements per hour with a peak averaging up to 35 per hour
- Between the access to the Bonstone compound (Proposed Marl Hill Section) and the access to the Newton-in-Bowland compound there would be typically between five and 15 per hour with a peak averaging up to 30 per hour.

5.2 Baseline

The Proposed Newton-in-Bowland Compound is situated 500 m to the west of Newton-in-Bowland village, located along the River Hodder and within the Forest of Bowland Area of Outstanding Natural Beauty. The compound would be accessed via a temporary haul road from the B6478, to the south of Newton village. The temporary haul road would require the construction of clear span bridge crossing the River Hodder. The compound comprises two areas, situated to the north and south of Newton Road, the main portal shaft working area being situated to the north and parking, welfare, office, materials laydown and other ancillary development situated to the south.

The closest residential property is Fober Farm, located 300 m south of the compound and 160 m north-west of the workers welfare facilities and car park. A number of Public Rights of Way would be temporarily affected by the proposed works, including three footpaths; and Hodder Way and Clitheroe 60K long distance footpaths.

The western and northern areas of the Newton-in-Bowland Compound contain minerals and aggregates that are potentially suitable for reuse. These minerals and aggregates are safeguarded by local council designations. Much of the compound area is also located on poor quality agricultural land.

There are a number of statutorily designated wildlife sites located within 5 km proximity of the Newton-in-Bowland Compound, the closest of which are the North Pennine Dales Meadows Special Area of Conservation and Myttons Meadows Site of Special Scientific Interest both 2.2 km to the northeast. The Bowland Fells Special Protection Area is located 2.6 km north of the compound and is designated for the upland breeding birds it supports. There are a further 21 locally important wildlife habitats within 2 km of the compound, the closest being Gamble Hole Farm Pasture BHS, which partly falls within the compound area and supports a rich variety of plants characteristic of fen habitat and the River Hodder BHS which is crossed by the access route and which supports otter and is an important salmonid river. In addition to the fen habitat within the BHS there is a small area of marsh/swamp habitats crossed by the access road within the planning application area.

The River Hodder and five unnamed watercourses flow through the compound area. To the north of the compound area, unnamed watercourse 385 flows north and unnamed watercourse 384 flows south crossing Newton Road. To the south of the compound area, unnamed watercourse 386 and the River Hodder cross the temporary access corridor. Unnamed watercourse 391 and unnamed watercourse 1312 are located within the periphery of the compound area.

View north from a local footpath 3-29-FP 31 towards the Newton-in-Bowland Compound location

5.3 Description of Effects

Landscape and Arboriculture

Construction activity would introduce an obvious and notable change, resulting in temporary changes to views (termed 'visual effects') and to landscape character (termed 'landscape effects'). Construction activity would affect sensitive landscape features including trees and woodland within the Forest of Bowland Area of Outstanding Natural Beauty, with temporary changes to the characteristics of the landscape.

The Environmental Masterplan shows replacement planting proposed in the Environmental Statement (Figure 20.1). Identified significant effects on landscape and views are as follows:

- Upper Hodder, Bowland Gritstone Fringes, Upper Hodder Valley, Park House and Hindburndale Landscape Character Areas would be affected due to noticeable and uncharacteristic change in the landscape during enabling works, construction and commissioning phases
- North Bowland Valleys, Goodber Common, Bowland Limestone Fringes, Beatrix to Collyholme, Central Bowland Fells, North Bowland Fringes and Tatham Landscape Character Areas would be

affected due to noticeable and uncharacteristic change in the landscape during the construction phases

- North Bowland Valleys, Goodber Common, Newton and Birket, Beatrix to Collyholme, Central Bowland Fells Landscape Character Areas, would be affected due to noticeable and uncharacteristic change in the landscape during the commissioning phases
- Residents of the Heaning Farm, Fober Farm, Long Stripes Farmhouse, Crawshaw Farm, Farrowfield and surrounding properties, Newton settlement edge, Newton Hall and users of local footpaths and Easington Road, Hallgate Hill and Slaidburn Road, would experience visual disturbance across a large part of the view during both enabling works, construction and commissioning phases.

These effects would be temporary and once construction activity has been completed, trees and woodland would be reinstated, which would reduce the visual and landscape effects. However, some temporary significant impacts may remain until the reinstated vegetation and other landscape features would be sufficiently established.

Water Environment

During enabling works, ground compaction, topsoil stripping and construction of access tracks and the shaft, could affect groundwater levels and flows leading to potentially significant effects to wildlife habitats that are dependent on local groundwater conditions (Gamble Hole Farm Pasture, The Coach House, River Hodder North).

During the construction phase, Gamble Hole Farm Pasture could also be affected by dewatering to create the portal and through open-cut trenching. Also, during the operational phase, backfilling materials within the trenches and ground settlement could affect groundwater flows and levels in the long term.

Additional mitigation to reduce impacts to Gamble Hole Farm Pasture include reduced topsoil stripping, bridging the access road over Gamble Hole Farm Pasture, clay bunds to prevent backfilled open-cut trenches from acting as a groundwater drain and reducing compaction effects by spreading the load of heavy vehicles and plant along access areas. However, even with these measures some residual significant effects may remain.

Similarly, The Coach House and River Hodder North could be impacted during the enabling works by ground compaction, topsoil stripping and construction of access tracks. Additional mitigation to reduce impacts to the wildlife habitats that are dependent on local groundwater conditions include minimising topsoil stripping, keeping minimum dewatering durations and spreading the load of heavy vehicles and plant to reduce compaction effects. However, even with these measures some residual significant effects may remain for River Hodder North. With proposed mitigation no residual significant effects are predicted for The Coach House.

The Lowland Fen wildlife habitat (identified at the same location as Gamble Hole Farm Pasture) that is dependent on surface water conditions, could also be affected during construction. It would lie within the drainage area of the access track and could be impacted by sediment runoff and chemical pollution. The access track would also cut across the habitat and there could be potential issues relating to water flow to the habitat. Through consideration of the additional mitigation measures to reduce impacts to Gamble Hole Farm Pasture the following additional mitigations would be required and include minimising excavation and avoid repeated tracking over the habitat, installing drainage pipes beneath the track to maintain water flows and installing splash guards along the edge of the track to avoid material / silt-laden water running off the track and smothering the habitat. With proposed mitigation no residual significant effects are predicted.

Three private water supplies (PWS3-8, PWS3-14 and PWS3-15) are located within the compound. Ground disturbance and compaction due to soil stripping and earthworks associated with construction of access tracks, and from accidental spillages during enabling works, could reduce the flows to these water supplies. Also, during the construction phase, there is the potential for changes to groundwater quality due to sediment mobilisation from ground disturbance during connection and overflow works, and from accidental spillages.

One of the private water supplies (PWS3-8) could also be affected by groundwater contamination associated with a historic stockpile at the Newton-in-Bowland Compound, that could be mobilised and flow towards the private water supplies during construction.

Where Contractor assessment identifies that a private water supply is at significant risk of impact then an enhanced monitoring regime would be agreed with the landowner to ensure that any issues are identified and actioned as soon as possible. Should any unforeseen active private water supply pipe networks or other associated infrastructure be disrupted by the proposed work, these would be repaired or replaced, and an alternative source of water would be provided until the impacted private water supply is brought back into operation. With proposed mitigation no residual significant effects are predicted.

There is the potential for a significant effect from disturbance of the channel bed and banks from the two temporary outfalls, and for sediment laden runoff into the River Hodder, during enabling works, construction, operational and decommissioning phases. Additional measures are proposed to reduce the impacts, and include relocating the outfalls so that they are not opposite each other, river bed and bank stabilisation measures, river bed and bank monitoring, and supervision by a geomorphologist or Environmental Clerk of Works during enabling works and construction phases. However, even with these measures some residual significant effects may remain.

During the construction phase, there is the potential for a significant effect to an Unnamed Watercourse. The reduction in groundwater flow from dewatering activities at the portal, and excavations for the connection and overflow structure could lead to channel instability. To mitigate these effects, treated construction water would be discharged at low rates upstream of the portal. With proposed mitigation no residual significant effects are predicted.

River Hodder

Flood Risk

There is potential for a significant effect to occur to surrounding agricultural land and a United Utilities package treatment plant only, from an increase in flood flows from the construction of the temporary River Hodder crossing. These effects would only occur during the operational life of the Hodder Crossing, which would be removed on completion of the construction phase. Such effects would be mitigated through agreement with landowners to compensate them for any temporary loss of productivity or damages incurred, as a direct result of the crossing. With proposed mitigation no residual significant effects are predicted.

Terrestrial Ecology

The boundaries at the Newton-in-Bowland Compound were adjusted to exclude the north-west section of the Gamble Hole Farm Pasture BHS. The temporary surface water drainage solution was also amended from a surface water outfall into the watercourse that flowed through the BHS, to an outfall into an existing drain associated with the existing aqueduct. In addition, the temporary access track is offset from the River Hodder (except at the crossing) to avoid disturbing habitats and species associated with the river corridor.

The enabling works phase would result in habitat loss and disturbance to wildlife. Permanent habitat losses would be limited to the footprints of the permanent above ground new structures, comprising new buildings and associated access tracks. Potential was identified for significant effects on ecology during the enabling works phase including:

- Temporary loss of Gamble Hole Farm Pasture habitats comprising 0.04 ha fen and 0.05 ha semi-improved grassland habitat (3.6 % of the total BHS area)
- Fen habitat dependent on local groundwater conditions within the Gamble Hole Farm Pasture BHS and an area of marsh at River Hodder North could be at risk of impact resulting in the loss through changes to groundwater quality, flows or levels; accidental leaks/spills of fuel and chemicals; and mobilisation of sediment. In addition, there is a risk of impact as a consequence of groundwater disruption due to compaction-related construction activities and earthworks, such as topsoil stripping and construction of the temporary access track
- Temporary habitat losses including 0.03 ha of semi-natural broadleaved woodland, 0.08 ha broadleaved and mixed plantation, 0.12 ha of semi-improved neutral grassland, 0.35 ha of marshy grassland, 0.11 ha of semi-improved acid grassland, 0.04 ha basic flush (area where water from underground flows out onto the surface to create an area of saturated ground), 75 trees including those with bat roost suitability, 0.76 km of hedgerow
- Vegetation clearance could result in the destruction or disturbance of habitats and loss of foraging and shelter habitats for breeding and wintering birds, mammals, amphibians, reptiles, insects.

Potential significant effects on the Gamble Hole Farm Pasture BHS could occur during construction works. Degradation of fen habitat within the compound as a result of pollution or erosion from vehicles using temporary access track across fen habitat; ground compaction caused by heavy vehicles and plant, could create a local barrier to groundwater flows; temporary dewatering operations may result in a drawdown in groundwater levels.

Artificial lighting introduced during the construction phase could cause disturbance of foraging and commuting bats. Flight routes that may be affected by the line of woodlands, ponds and wetland immediately west of the compound. Disturbance from noise, blasting, light, vibration or visual effects could result in the displacement of breeding birds and wintering birds from retained habitats.

During the operational phase, backfilling of trenches and overflow structures could lead to permanent changes in groundwater flows and effect wildlife habitats that are dependent on local groundwater conditions, within Gamble Hole Farm Pasture BHS, potentially causing a significant effect.

Embedded mitigation measures outlined in the Construction Code of Practice would reduce the risk of these impacts occurring but additional mitigation measures would be required. However, some residual significant impacts on Gamble Hole Farm Pasture BHS may remain and would be offset by a compensation package to be agreed with the Local Planning Authority and relevant statutory consultees.

Further mitigation measures have been identified to reduce the effects on other wildlife habitats that are dependent on local groundwater conditions within and surrounding the compound, and on habitats and trees. With proposed mitigation no further residual significant effects are predicted.

Aquatic Ecology

The enabling works, construction, and commissioning phase works at the Newton-in-Bowland Compound may result in pollution and increased sedimentation in the river Hodder and Tributaries and the River Hodder BHS that will receive site drainage and are crossed by the proposed site access route.

In the absence of additional mitigation this could result in temporary significant effects to sensitive aquatic communities and otter populations in the River Hodder and tributaries and the River Hodder BHS. Additional mitigation measures related to water quality, sediment management, timing of commissioning discharges, pre-commencement surveys for otters, and timing of in-river works would be implemented and overseen by an experienced Environmental Clerk of Works. Reinstatement of watercourse substrate and banks following removal of crossings and temporary drainage outfalls would also be implemented to prevent erosion along the affected watercourse. No residual significant effects are anticipated for aquatic ecology following implementation of the identified mitigation.

Cultural Heritage

The Waddington Conservation Area is located at the convergence of haulage route options prior to the construction traffic route continuing in a northerly direction along the Slaidburn Road. Construction traffic passing through the village over an extended period of time is likely to introduce general disturbance, noise and visual intrusion into the setting of the conservation area, with the potential to result in a significant effect. To monitor, mitigate and manage any adverse effects on Waddington Conservation Area, a Construction Traffic Management Plan including measures to reduce overall vehicle movements, for example by having the park and ride facility near Ribblesdale Cement Works, would be implemented. However, even with these measures some residual significant effects may remain, although they would be reversible on completion of the construction works.

Soils, Geology and Land Quality

Mineral safeguarding areas cover part of the compound, although there are no current or planned operational mineral extraction. On the basis that only small areas would be impacted permanently, and therefore no likely significant effects on minerals and aggregates are predicted.

There are two historical stockpiles identified adjacent to the Newton-in-Bowland Compound. These stockpiles are likely to comprise tunnel arisings from the construction of the existing Aqueduct, but the presence of construction waste such as temporary worker accommodation demolition materials or other waste materials cannot be discounted.

Any existing contamination would be identified by the ground investigation with appropriate remedial measures undertaken. Should unforeseen contamination be encountered, the unexpected contamination plan would be implemented to mitigate the risks to construction workers and adjacent land users.

Public Access and Recreation

A number of Public Rights of Way would be affected by the Newton-in-Bowland Compound during the enabling works, construction and commissioning phase. Potential for significant effects on Public Rights of Way are as follows:

- Footpath 3-29-FP 31 would be impacted for the duration of the construction works and a diversion required around the compound boundary
- Footpath 3-29-FP 26 would be impacted by the construction access into the compound as it would cross the construction access track. A controlled crossing point would be installed to minimise disruption
- Footpath 3-29-FP 35 would not be directly affected by the compound. However, it would experience disruption where it joins onto footpath 3-29-FP 26 at the controlled crossing point
- Hodder Way and Clitheroe 60K are both long distance footpaths that cross the compound access track. To prevent closure or use of a diversionary route, a controlled crossing would be implemented.

Consultation with Public Rights of Way officers and local groups would be carried out so that all closures and diversions can be agreed, publicised and the disturbance minimised. With proposed mitigation no residual significant effects are predicted because no footpaths would need to be closed, only diverted or managed through crossing control points.

Footpath 3-29-FP-31

Transport Planning

Two haulage route options have been proposed for the Newton-in-Bowland Compound. Haulage Route Option 1 comprises two complimentary public highway routes that would be operated concurrently, with routes being used according to construction vehicle types:

- Route 1 for general construction traffic (HGVs under 3.5 m in height and light vehicles): Access to Newton-in-Bowland via the M6 Junction 31, along the A59, then Pimlico Link Road, Chatburn Road and through Clitheroe along the B6478 Well Terrace / Waddington Road / Clitheroe Road / Slaidburn Road / Hall Gate Hill to continue via the Proposed Hodder Crossing to the south of Newton-in-Bowland. This route is approximately 39 km long and consists of A-roads and B-roads
- Route 2 for abnormal loads and HGVs over 3.5 m in height: Access to Newton-in-Bowland compound via the M6 Junction 31, along the A59, then Pimlico Link Road, Clitheroe Road, Crow Trees Brow, Ribble Lane, Grindleton Road, West Bradford Road and along the B6478 Slaidburn Road / Hall Gate Hill to continue via the Proposed Hodder Crossing to the south of Newton-in-Bowland. This route is approximately 42 km and consists of A-roads and B-roads.

These routes collectively make up Haulage Route Option 1. Haulage Route Option 2 (the Proposed Ribble Crossing) is outlined in Section 7.

Surplus material transfer from the Newton-in-Bowland compound to Waddington Fell Quarry would be via the Proposed Hodder Crossing to the south of Newton-in-Bowland, then along the B6478 Hallgate Hill / Slaidburn Road to Waddington Fell.

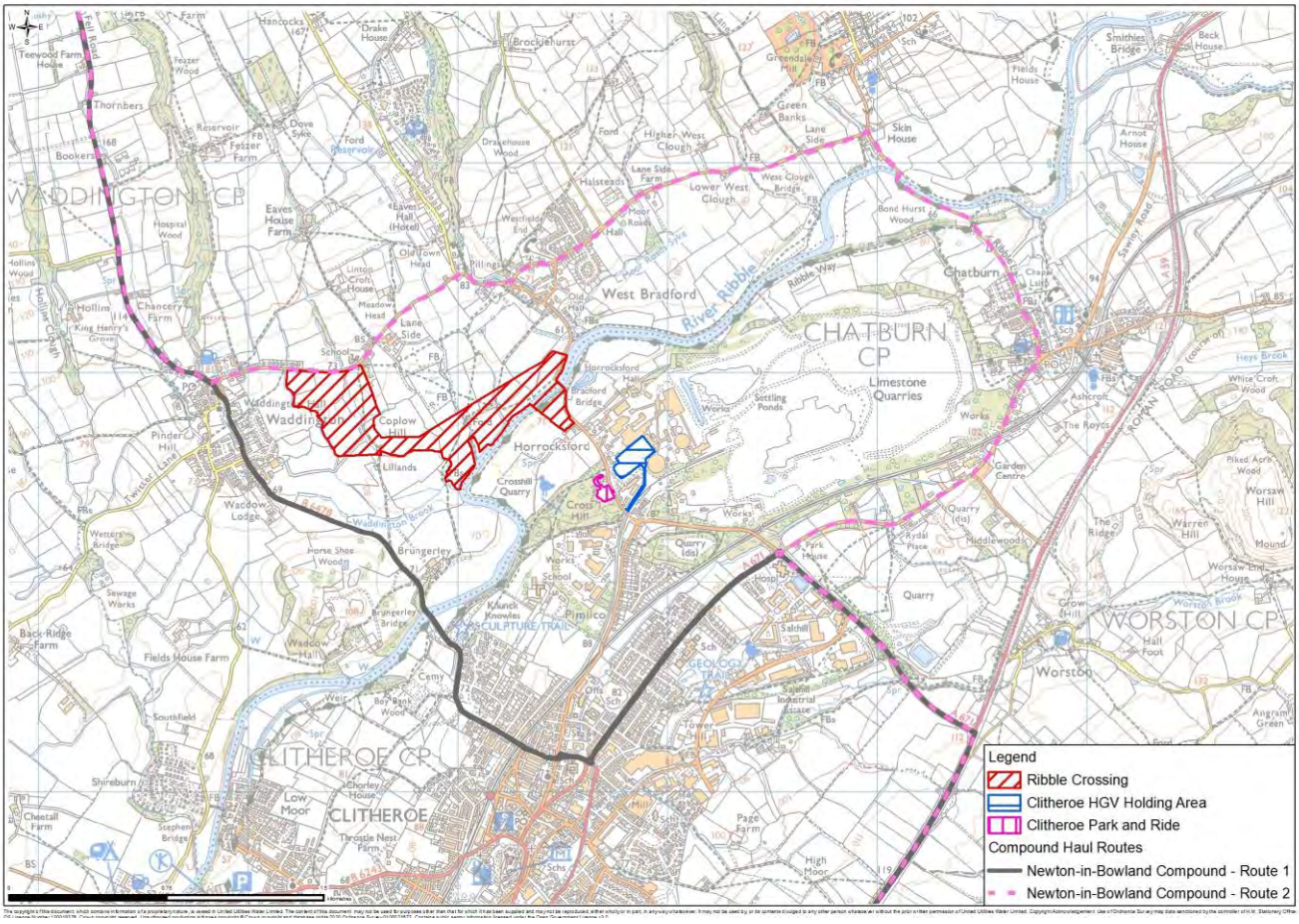
During the peak of construction activity, traffic modelling has identified an increase of up to:

- An additional 242 two-way HGV movements against a background flow of 212 over 12 hours along the B6478 Slaidburn Road
- An additional 70 two-way HGV movements against a background flow of 54 over 12 hours along West Bradford Road
- The total vehicles on the Grindleton Road would increase from 1,735 to 1,806 per 12 hours. HGVs per 12 hours would increase from 125 to 195
- The total vehicles on Ribble Lane would increase from 1,842 to 1,912 per 12 hours. HGVs per 12 hours would increase from 228 to 299.

During the construction phase, the potential for significant driver delays have been identified along the B6478 Waddington Road, West Bradford Road, B6478 Slaidburn Road, Ribble Lane and Grindleton Road. In addition, pedestrian delays along B6478 Waddington Road could give rise to significant effects.

To monitor, mitigate and manage any adverse effects on local roads, a Construction Traffic Management Plan and Interim Travel Plan would be implemented. Highway modifications would also be carried out along the proposed routes to and from the proposed compounds to improve safety for general road users. These mitigation approaches would enable pedestrians, local road users and public transport services to avoid being adversely affected by construction traffic, and no residual significant effects are predicted.

Haulage Routes for the Newton-in-Bowland Compound



Noise and Vibration

Construction noise at the Newton-in-Bowland Compound is not predicted to give rise to likely significant effects at nearby residential properties. Typical methods to control noise and vibration impacts during construction are included in the Construction Code of Practice and would be adopted by the construction contractor to further mitigate noise impacts. These would include the use of temporary barriers during the use of rock breakers and access road construction in the vicinity of Fober Farm.

Construction road traffic is not anticipated to result in significant effects during the construction phase of the Proposed Bowland Section.

Blasting is likely to be required at the Newton-in-Bowland Compound. An assessment of likely impacts would be made by the specialist contractor and used to design a suitable blasting strategy prior to works commencing. With adherence to the appropriate limits for blasting then no significant adverse effects would be anticipated.

Air Quality

Diesel generators could be used at the Newton-in-Bowland Compound. Computer modelling techniques indicate that emissions to air from the diesel generators located within the compound, and additional road traffic are unlikely to result in air quality effects at nearby residential properties, recreational areas

or at sensitive ecology sites. Typical methods to control air quality during construction are referred to in the Construction Code of Practice and would be adopted by the construction contractor.

Major Accidents

A precautionary assessment of potential risk of storage of diesel fuel at the Newton-in-Bowland Compound, necessary to power plant and equipment. Relatively high diesel volumes may be required for the electricity generators needed to power the tunnel boring machine at the launch shaft. The storage of large volumes of diesel would be necessary at the Newton-in-Bowland Compound and would be stored in compliance with good practice and regulatory requirements. Measures would be submitted and agreed with the Environment Agency. Taking into account this mitigation, no major accident threat to the environment has been identified, and no significant residual effects are therefore predicted.

Communities

There is the potential for significant disturbance effects to the communities of Clitheroe, Waddington, West Bradford, Chatburn and Grindleton during enabling works and construction phases. In these locations, the volume, duration, and nature of traffic associated with access to the Proposed Bowland Section has the potential to give rise to significant disturbance effects. To mitigate and manage any adverse effects on local roads, United Utilities has developed Construction Traffic Management Plans, outlining measures to be implemented to further mitigate community disturbance. Furthermore, through ongoing consultation with local people, local councils and highways authorities, United Utilities has developed alternative access proposals for some of the main HARP construction compounds. For example, the Proposed Ribble Crossing (outlined in Section 7) could alleviate impacts on communities in the Chatburn, Grindleton and West Bradford areas; the Proposed Hodder Crossing would remove construction traffic from Newton-in-Bowland village centre; the proposed Park and Ride facility at the Ribblesdale Cement Works would alleviate the volume of private vehicles travelling beyond the Clitheroe area.

On any major infrastructure project such as HARP, there is potential for community disturbance and disruption, damage to natural and built features, and harm to the environment. However, United Utilities would implement a Construction Code of Practice, which sets out good practice and widely recognised guidelines that aim to either avoid community disturbance or environmental harm occurring in the first instance, or reduce these impacts to acceptable levels.

6. Off-Site Highway Works

6.1 Description of Development

In consultation with Lancashire County Council Highways, the need for off-site highways works (i.e. roadworks to be built away from the two main construction compounds) was identified. This would be to enable the safe movement of construction vehicles and other road users on the public highway while the Proposed Bowland Section is built. The highway works associated with the Proposed Bowland Section comprise carriageway widening at 50 locations, and the construction of eight passing places. They would be delivered during the enabling works phase.

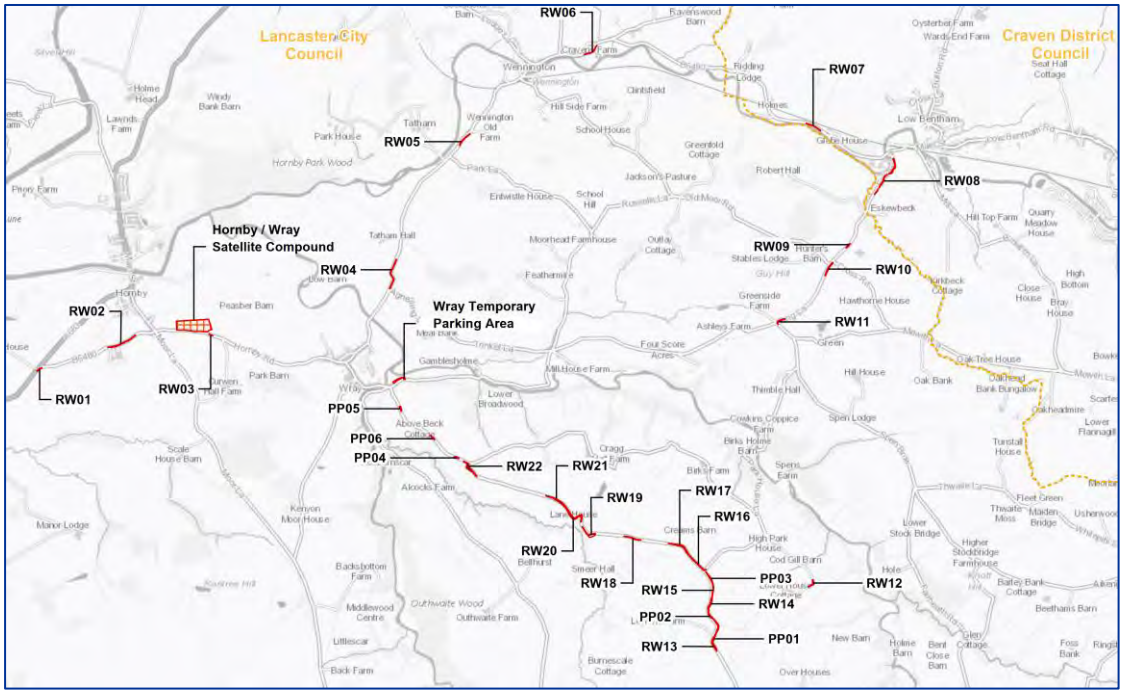
Volume 5 of the Environmental Statement examines the likely significant effects of the proposed off-site highways works. Because the Newton-in-Bowland compounds would broadly share the same haulage routes as the Proposed Marl Hill Section (an adjacent section of the Proposed Programme of Works which forms a separate planning application), Volume 5 covers both the Proposed Marl Hill Section and the Newton-in-Bowland compound serving the Proposed Bowland Section.

The off-site highway works also include three 'satellite' compounds, located away from the main construction compounds. One satellite compound is a proposed construction vehicle holding area within the Ribblesdale Cement Works, where construction vehicles would be held for short periods of time before being released back onto the haulage routes towards the Newton-in-Bowland Compound. This would reduce traffic flows on the local road network during busier times of the day. The second satellite compound would be a park and ride facility making use of the existing Ribblesdale Cement Works staff car park on the west side of West Bradford Road. The purpose of the park and ride facility would be to reduce flows of private cars and light goods vehicles further north on the local road network by offering a shuttle bus service to and from the Newton-in-Bowland Compound.

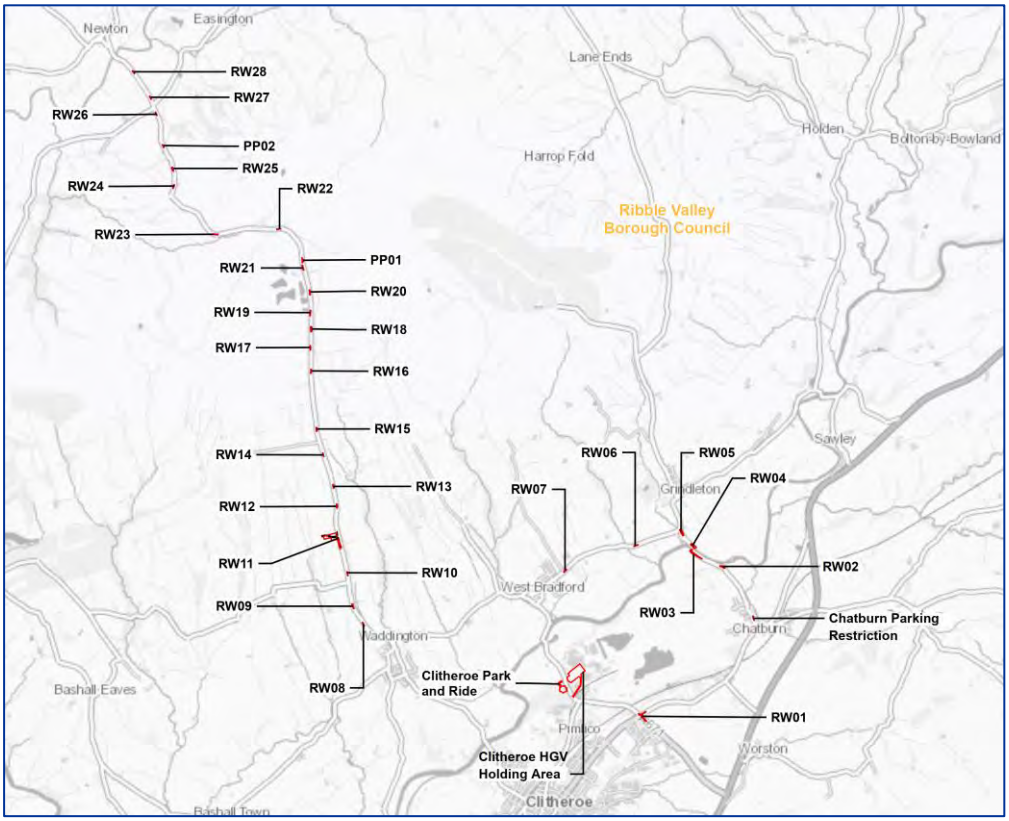
A temporary satellite compound is also proposed on agricultural land to the east of Hornby and the west of Wray, off the B6480. The proposed satellite compound would allow abnormal load vehicles seeking access to the Lower Houses Compound to be held until being cleared to proceed. In addition, the compound would act as a park and ride facility, enabling works construction personnel to safely park their private vehicles and vans before being shuttled to the Lower Houses Compound, thus reducing the volume of light vehicles and parking demand on the local road network surrounding Wray. A temporary residents parking area is also proposed at Bridge House Farm Tea Rooms at the southern end of Main Street to provide alternative parking during periodic temporary restrictions on Main Street.

While the majority of the works would be constructed within highways land, some would require access to and / or construction on third party land. This may require the temporary removal of field boundaries such as dry-stone walls, and the removal of trees and hedgerows. Tree and hedgerow reinstatement plans would be developed in conjunction with the landowners.

Proposed Bowland Section: Off-Site Highways Works Serving the Lower Houses Compound



Off-Site Highways Works Serving the Newton-in-Bowland Compound



6.2 Description of Effects

An environmental assessment of likely significant effects has been undertaken of the off-site highway works. Opportunities to identify measures to prevent, reduce and where possible offset any significant adverse effects on the environment have been presented. The assessment assumed the following:

- All passing places would be reinstated
- Sections of road widening involving third-party land would be reinstated
- Sections of road widening within the highway boundary would be retained permanently following completion of the construction works. Hedgerows and / or walls removed to accommodate temporary works would be reinstated
- All temporary satellite compounds would be reinstated.

Lower Houses Compound Traffic Route Highways Works

A total of 18 out of 30 passing places and road widening locations along the route were identified as having at least one likely significant effect prior to the implementation of good practice and additional essential mitigation measures. The majority of likely significant effects relate to adverse landscape, visual and arboriculture (tree and hedgerow) impacts. Landscape and visual effects would be significant during construction, operation and reinstatement works due to the potential loss of trees, tree groups and other vegetation as well as other features such as dry stone walls and fences. However, these effects are of relatively short duration and would be mitigated by the replacement planting and reinstatement of permanent features. The removal of any mature trees would result in a longer-term impacts. A total of 21 tree and hedgerow features could be removed and 36 partially removed.

The following likely significant effects were also identified:

- Users of public footpaths at five of the road widening locations and the remote compound close to Hornby, due to footpath diversions. However, this would be for a short duration during the construction works with the implementation of mitigation measures as proposed in the Construction Code of Practice and Construction Traffic Management Plan
- Visual effects to users of Public Rights of Way, residents and road users at two passing places, eight road widening locations and the remote compound during construction. However, these effects are of relatively short duration and would be mitigated by the replacement planting and reinstatement of permanent features. There would also be likely significant visual effects to residents at seven road widening locations, one passing place and the communities of Hornby and Low Bentham. However, these effects are of relatively short duration and would be mitigated by replacement planting and reinstatement of permanent features
- The partial removal of ridge and furrow (a type of historic field system of cultural heritage interest) during construction at one passing place and one road widening location
- Disturbance effects in local communities, arising from combinations of different impacts which are not necessarily significant in their own right but which together may cause general disturbance.

Newton-in-Bowland Compound Traffic Route Highways Works

A total of 14 out of the 33 passing place and road widening works locations along the route were identified as having at least one potential significant effect prior to the implementation of good practice and essential mitigation measures. The majority of likely significant adverse effects relate to landscape and arboriculture. Visual effects may be significant during construction, operation and reinstatement works due to the potential loss of trees, tree groups and other vegetation together with other features such as dry stone walls and fences. However, these effects are deemed to be of relatively short duration and would be mitigated by the replacement planting and reinstatement of permanent features. The removal of any mature trees would result in a longer term impact. A total of 13 tree and hedgerow features could be removed and 22 could be partially removed.

The following other potentially significant effects were identified:

- Potential for increased fine sediment input into Bonstone Brook at one road widening location during construction, an adverse effect that could be mitigated through remedial works in the watercourse
- Users of public footpaths at two of the road widening locations due to diversions over the duration of the construction works
- Visual effects to Public Rights of Way users at one passing place and four road widening locations during construction. There would also be likely significant visual effects to the community of Grindleton during the construction of two road widening locations, and residents of properties in the vicinity of a further four road widening locations
- The highways works would give rise to temporary disruption and disturbance to five residential properties and the settlement of Waddington, together with multiple properties along Ribble Lane and Chatburn, three farms and Clitheroe Community Hospital due to noise during construction and reinstatement
- Disturbance effects in local communities, arising from combinations of different impacts which are not necessarily significant in their own right but which together may cause general disturbance
- There would be loss of verge habitats associated with Waddington Fell Road, Roadside Verges Biological Heritage Site. A precautionary approach concludes there is potential for degradation of wildlife habitats that are dependent on local groundwater conditions associated with Bradford Fell, Easington Fell and Harrop Fell Biological Heritage Site, which could have a significant effect on the designation. A precautionary assessment assumes that cumulatively across the Newton-in-Bowland off-site highways works there would be locally significant permanent losses of trees and woodland but an arboricultural method statement would assess this in detail and identify protection measures
- There is potential for significant effects to the sensitive aquatic ecology, and otter populations in the Bonstone Brook and Unnamed Watercourse 2096 due to off-site highways works activities. However, significant effects would be mitigated following implementation of ecological mitigation measures.

The adverse effects described above could be mitigated by a combination of measures including implementation of the recommendations contained in the Construction Code of Practice and the Construction Traffic Management Plan. In addition, further development of arboricultural method statements and landscape reinstatement plans with tree officers, landscape officers design teams are anticipated to reduce both adverse arboricultural and landscape effects.

7. Proposed Ribble Crossing

7.1 Description of Development

The Proposed Ribble Crossing would be a new temporary haulage route, including a bridge crossing over the River Ribble. The Proposed Ribble Crossing would allow construction traffic to access the Slaidburn Road towards the Newton-in-Bowland Compound without passing through most of the communities in the local area that would otherwise be affected by construction traffic using the public highway. The haulage route would cross agricultural land forming open countryside to the north of Clitheroe, leaving the West Bradford Road near the Ribblesdale Cement Works and crossing the River Ribble via a temporary bridge in proximity to the existing West Bradford Bridge. The route would head west and then north to re-join West Bradford Road between Waddington and Waddington and West Bradford Primary School.

The Proposed Ribble Crossing would be a two-lane carriageway some 7.7 m wide and approximately 1.5 km in length. The road and bridge would be temporary structures in place for the duration of the construction of the Proposed Bowland Section. The road would be fully removed, and the land reinstated once the tunnel construction works have been completed. During the construction works the road would be reserved for the use of all construction traffic, and would be suitable for HGV use, including exceptional loads.

7.2 Baseline

The Proposed Ribble Crossing is located in a predominantly rural area, north of Clitheroe and east of Waddington. The land is generally under permanent pasture and is located to the south of the Waddington-West Bradford road which forms the boundary of the Forest of Bowland Area of Outstanding Natural Beauty.

The River Ribble is a main river that flows through North Yorkshire and Lancashire. The river starts close to the Ribblehead Viaduct in North Yorkshire and flows westwards towards the sea. The River Ribble is part of the wider Ribble Catchment which covers an area of over 750 square miles and contains more than 3,479 miles of watercourses.

The River Ribble is a locally designated Biological Heritage Site important for fish and used by otter. Habitats are dominated by agriculturally improved grazed pasture of generally low ecological value. In addition to the Ribble, features or biodiversity interest are found at the field boundaries of hedgerows, scattered trees and ditches and streams.

View west from West Bradford Road towards the River Ribble and the route of the Ribble Way Long-distance path (south of the River Ribble)

7.3 Description of Effects

Landscape and Arboriculture

The Proposed Ribble Crossing would have an effect on landscape character areas and would alter people's views during the all phases of the works. It is anticipated that due to the scale and nature of the

Proposed Ribble Crossing, there would be the potential for significant effects on landscape character and visual amenity during the construction and operation phases.

These effects would be temporary and once construction activity has been completed, trees and woodland would be reinstated, which would reduce the adverse landscape and visual effects.

View west from Clitheroe Road along the River Ribble (north of the River Ribble)

Water Environment

The enabling works phase of the Proposed Ribble Crossing would include vegetation clearance along the proposed temporary haul route which could lead to bank erosion , potentially causing a significant effect.

Potential significant effects during the construction phase include:

- An increase in fine sediment from runoff from the haulage route could affect sensitive features observed in the River Ribble, Greg Sike and Coplow Brook
- The construction of four outfalls and the temporary bridge could disturb bed and bank features and cause compaction of the riverbed on the River Ribble.
- Piling associated with the construction of the temporary bridge over the River Ribble has the potential to create new vertical pathways for any surface contamination to migrate into the underlying groundwater aquifers.

During the decommissioning phase, the removal of the temporary haul route and associated structures could cause fine sediment to be mobilised and reach the River Ribble, Greg Sike and Coplow Brook, potentially causing a significant effect.

Mitigation measures would be implemented and these would include reinstatement of natural bed features (as necessary), stabilisation of the bank during reinstatement using geotextiles and prioritising re-planting of vegetation along the River Ribble. With proposed mitigation, no residual effects would be anticipated. To mitigate the impact on groundwater aquifers, a piling risk assessment would be carried out to further assess these potential impacts and identify mitigation measures (if required) during detailed design of the Proposed Ribble Crossing. With proposed mitigation no residual significant effects are predicted.

Flood Risk

During construction and operation, there is potential for a significant effect to occur to the River Ribble from constriction of floodplain flood flows increasing in flood levels upstream, and from the loss of floodplain storage increasing flood depths. A detailed assessment would be carried out to inform the design and identify additional mitigation measures. If this is not possible then additional mitigation measures would be considered including floodplain compensation storage and agreement with

landowners for any financial losses resulting from the impacts of the bridge. With proposed mitigation no residual significant effects are predicted.

Terrestrial Ecology

Potential was identified for significant effects on ecology during the enabling works phase including the removal of up to 12 trees and 130 m of native hedgerow, loss of foraging and shelter habitats of brown hare and wintering birds, disturbance of breeding birds and wintering birds. Habitat reinstatement works would be implemented during the decommissioning phase of the Ribble Crossing. This would result in the reversal of the majority of temporary effects arising from habitat loss and fragmentation that occurs during the enabling works phase. Additional mitigation measures have been identified to minimise impacts to sensitive habitats. With proposed mitigation no residual significant effects are predicted.

Potential was identified for significant effects on bat roosts and bat flyways, breeding birds and wintering birds from disturbance during construction. Habitat reinstatement measures would replace foraging habitats and flyways used by local bat populations and no residual significant effects are predicted.

Aquatic Ecology

The enabling works, construction, operation, and decommissioning phase works for the Proposed Ribble Crossing have the potential for significant effects to aquatic communities through the release of pollution, increased sediment into nearby watercourses, and disturbance (noise light and vibration). This could result in temporary significant effects to sensitive aquatic communities in the River Ribble and tributaries crossed by the access route.

The creation of the access track and drainage outfalls would result in temporary habitat loss or degradation of the watercourses crossed by the route. This would increase the risk of habitat fragmentation for migratory fish and otter. The enabling works and construction phase activities have potential for further significant effects on otters, including noise, light, vibration, or visual disturbance causing the displacement of otter from retained habitats and potential resting places identified on the River Ribble.

Additional mitigation measures have been identified to avoid or reduce significant adverse ecological effects during enabling works, construction, operation, and decommissioning phase works including pre commencement surveys where vegetation removal is required. Additional mitigation measures related to water quality, sediment management, timing of in-river and high vibration works would be implemented and overseen by an Environmental Clerk of Works. Works that cause vibration would be undertaken outside of the peak salmonid migration and spawning period and avoiding night-time to allow fish passage. Reinstatement of watercourse substrate and banks following removal of the bridges and temporary drainage outfalls would also be implemented to prevent erosion along the affected watercourses. With proposed mitigation no residual significant effects are predicted.

Soils, Geology and Land Quality

No potential for significant effects were identified on soils and geology resources. Mitigation measures have been embedded in the design of the Proposed Ribble Crossing. In addition, good practice measures were identified for Soils, Geology and Land Quality within the Construction Code of Practice.

Public Access and Recreation

No significant effects have been identified at the Proposed Ribble Crossing. However, four footpaths would be affected during the construction period and would require temporary diversions. One National Cycle Network route and two recreational cycle routes would experience disruption from construction traffic along West Bradford/Waddington Road.

Transport Planning

The construction traffic route for all construction vehicles to the Newton-in-Bowland Compound is proposed via Junction 31 of the M6, then the A59, Pimlico Link Road / West Bradford Road,

Proposed Ribble Crossing, West Bradford Road, B6478 through Waddington and Proposed Hodder Crossing. During the peak of construction activity, traffic modelling has identified an increase of up to:

- An additional 242 two-way HGV movements against a background flow of 212 over 12 hours along Slaidburn Road
- An additional 141 two-way HGV movements against a background flow of 54 over 12 hours along West Bradford Road
- Along the Pimlico Link Road / West Bradford Road, vehicles per 12 hours would increase from 2,741 to 2,961 at the peak of construction. HGVs per 12 hours would increase from 294 to 435
- Along the West Bradford Road / Clitheroe Road, vehicles per 12 hours would increase from 2,741 to 2,910 at the peak of construction. HGVs per 12 hours would increase from 294 to 435.

During the construction phase, the potential for driver delays has been identified along the B6478 Waddington Road, West Bradford Road, B6478 Slaidburn Road, Ribble Lane and Grindleton Road. In addition, pedestrian delays along B6478 Waddington Road could give rise to potential effects.

To monitor, mitigate and manage any adverse effects on local roads, a Construction Traffic Management Plan would be implemented. This would include mitigation approaches that would enable pedestrians, local road users and public transport services to avoid being adversely affected by construction traffic, and no residual significant effects are predicted.

Noise and Vibration

The construction of the Proposed Ribble Crossing has the potential for significant noise and vibration effects on Lilands Barn and Waddington and West Bradford Church of England School. Specific measures to mitigate vibration on Lilands Barn include an alternative non-vibratory form of compaction would be used in close proximity to the barn. Potential significant noise impacts at the school would be mitigated through the deployment of established mitigation techniques and physical noise reduction solutions. Wherever reasonably practicable, the noisiest activities would be undertaken outside normal school hours or during the school holidays. United Utilities is committed to ongoing discussions with environmental health officers and the school's governors and management team well in advance of the works commencing. Construction road traffic is not anticipated to result in significant effects during the operation of the Proposed Ribble Crossing.

Air Quality

The Proposed Ribble Crossing would not have a significant effect on air quality. Appropriate good practice dust mitigation measures would prevent significant effects occurring at off-site locations. Such measures are considered to be normal good practice that would be adopted by the contractor meeting the requirements of the air quality mitigation measures within the Construction Code of Practice. These would also be agreed with the local authority prior to construction works commencing.

Major Accidents

There is one site identified as a high hazard site (Control of Major Accident Hazard; COMAH site) by the Health and Safety Executive (HSE). This is the Johnson Matthey facility in Clitheroe, whose consultation zone encompasses the Proposed Ribble Crossing. Major accident risks comprise fire and accidental release of dangerous substances which could temporarily impact on construction and operation activities on the Ribble Crossing. However, it is anticipated that the planning authority will consult with the Health and Safety Executive in connection with the planning application for the Proposed Bowland Section and its relationship with this site. In addition, United Utilities will also enter into consultations with Johnson Matthey. With such measures in place, there is no potential for significant effects.

There is one site identified as a major accident hazard pipeline (MAHP). This is a high-pressure ethylene pipeline which runs along the Ribble Valley and would be crossed by the Proposed Ribble Crossing. A design solution would be developed to enable the Proposed Ribble Crossing to be constructed safely over the existing ethylene pipeline without compromising the safe day-to-day operation of the infrastructure. With this in place, no additional potential for major accidents was identified.

8. Cumulative Effects and Interaction of Effects

Within the ES two types of cumulative effect have been considered:

- *Intra-project effects*: when a resource or receptor is affected by more than one type of environmental impact from the same development. In the context of the Proposed Bowland Section, this approach also considers how the separate environmental effects of different elements of the development in different locations may act cumulatively, especially noting the sensitivity of the AONB in which they occur.
- *Inter-project effects*: when an environmental resource or receptor is affected by more than one development. For example, several separate developments within the same area could lead to more a significant surplus of material arisings than if the developments were considered in isolation, as indicated in Illustration .

8.1 Intra-Project Effects

Chapter 14 of the Environmental Statement considers the intra-project cumulative effects of the Proposed

In addition, the Proposed Bowland Section also comprises several significant elements – the main construction compounds, the satellite compounds, the Proposed Ribble Crossing and the off-site highways works – all within a nationally-designated AONB landscape. Likely significant intra-project effects are anticipated in relation to landscape and arboriculture, and communities. The following describes how separate elements of the Proposed Bowland Section could give rise to significant cumulative effects across a wider area of the AONB when considered in combination.

Landscape and arboriculture

There is potential for significant effects on landscape quality, on open moorland areas of the AONB near the Proposed Lower Houses Compound and along rural lanes and within wooded valleys where features such as trees and hedgerows would be lost, affecting tranquility, remoteness and rural character. Potential for significant effects on landscape quality would also be obvious near the settlement of Newton-in-Bowland, also within the AONB, due to construction and operation of the proposed Hodder Crossing and off-site highway works and vehicle traffic on the B6478 Slaidburn Road. These effects would be reversible however, and the landscape areas would be returned to their original uses; trees would be planted and landscape features would be reinstated once construction activity ceases.

Residents, footpath users and road travellers would experience a noticeable change in views within the wider area due to the construction-related activity and vehicle movement, and removal of features such as trees, hedgerows and dry stone walls. The visual change would be most evident for residents and travellers through the rural areas such as along the B6478 Slaidburn Road and near Waddington, and footpath users with views of the River Hodder valley and River Ribble Valley due to the frequency of both construction-related activity for the off-site highway works and compounds, and the frequency of construction traffic movement during the construction phase. At the end of the construction phase, construction vehicle movement would cease and landscape features would be reinstated.

Communities

Likely significant intra-project cumulative effects have been identified for the proposed off-site highways works, main compound works and the Ribble Crossing, resulting in disruption and disturbance to receptors over a longer period of time and over a wider area within and adjacent to the AONB. This is largely due to disturbance caused by the off-site highways works followed by the movement of HGVs through settlements and past highways-fronting properties during the construction phase. In addition, other environmental effects, although not reported as significant individually, may still contribute to the overall significance of disturbance. These disturbance effects are likely to be focused in the areas of Clitheroe, Waddington, Chatburn, West Bradford and Grindleton, but this would depend on which haulage route option is selected.

8.2 Inter-Project Effects

The inter-project cumulative effects assessment considered relevant proposed developments and development plan land allocations within 5 km of the Proposed Bowland Section. In addition, inter- project cumulative assessment considered the Proposed Bowland Section in combination with the other separate developments included as part of the Haweswater Aqueduct Resilience Programme.

A number of nearby projects were identified in the Lancaster City Council, Craven District and Ribble Valley Borough Council areas, and considered in the inter-project effects assessment. Where cumulative effects with local proposed developments and land allocations were identified, none was expected to give rise to cumulative effects compared with what has already been addressed in the Environmental Statement. Therefore, no significant inter-project cumulative effects were identified.

In relation to the other four proposed sections of the Haweswater Aqueduct Resilience Programme, the combined potential habitat loss across the Proposed Programme of Works is expected to be over 150 ha. This combined habitat loss represents a likely significant effect prior to mitigation. To address this, United Utilities has committed to protecting certain habitats on construction compounds as well as habitat improvements equating to 10 % Biodiversity Net Gain. Given the mitigation in place across the Proposed Programme of Works and the overall net gain, the residual effect of the combined biodiversity loss would not be significant.

Finally, there is potential for environmental effects associated with the Proposed Bowland Section to act cumulatively with the Proposed Marl Hill Section development:

- Potential for a significant landscape effect on the Bowland Limestone Fringes Landscape Character Area during construction
- Potential for a significant effect on visual amenity from viewpoints in the vicinity of the Proposed Newton-in-Bowland Compound. Some residents of rural properties, farmsteads, users of the Public Rights of Way, including Long distance paths: The Pendle Witches Way, The Hodder Way, Tops of the North (Three Shire Heads to Carlisle); and travellers on the local road network would have combined views of the Proposed Newton-in-Bowland Compound and the Proposed Bonstone Compound in the foreground, the middle distance or long-distance views. The users of the local road network would have sight of the two proposed HARP developments.

9. Summary of Likely Significant Residual Effects

After taking in to account the embedded design measures, good practice, and proposed essential mitigation, significant residual effects arising from all phases are predicted in relation to the following.

9.1 Compound Areas

Landscape and Arboriculture

- There would be uncharacteristic changes to the Upper Hodder, Bowland Gritstone Fringes, Upper Hodder Valley, Park House and Hindburndale Landscape Character Areas during enabling works and construction and commissioning phases
- There would be uncharacteristic changes to the North Bowland Valleys, Goodber Common, Bowland Limestone Fringes, Beatrix to Collyholme, and Central Bowland Fells, North Bowland Fringes, and Tatham Landscape Character Areas during the construction phase
- There would be uncharacteristic changes to the North Bowland Valleys, Goodber Common, Newton and Birket, Beatrix to Collyholme and Central Bowland Fells Landscape Character Areas during the commissioning phase
- There would be uncharacteristic changes to the views across the proposed Lower Houses and Newton-in-Bowland Compound during the enabling works, construction and commissioning phases.

Water Environment

- Changes to groundwater flows and quality, ground compaction, topsoil stripping, construction of access tracks, portal and trench dewatering, effecting Gamble Hole Farm Pasture wildlife habitat that is dependent on local groundwater conditions
- Changes to groundwater flows and quality, ground compaction, topsoil stripping, construction of access tracks, leaks and spills of fuels and chemicals, effecting River Hodder North wildlife habitat that is dependent on local groundwater conditions
- Disturbance of the channel bed and banks from the two temporary outfalls, and for sediment laden runoff into the River Hodder, during enabling works, construction, operational and decommissioning phases.

Terrestrial Ecology

- The only significant adverse residual ecological effect associated with the main compounds are impacts on the Gamble Hole Farm Pastures BHS and impacts on fen and basic flush habitat associated with the Newton-in-Bowland Compound. This includes a small loss of fen habitat within Gamble Hole Farm Pastures BHS (0.04 ha) during the operational phase and some degradation to small areas of fen and flush due to ground compaction during the construction phase.
- Areas of fen to be lost during the operational phase will be turf stripped and translocated to other suitable locations, as well as 0.04 ha of fen replanted when the road is removed to mitigate for operational losses. Site specific measures will be put in place to reduce the compaction effects during construction works.
- 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.
- Potentially significant residual effects would remain as a result of the off-site highways works comprising loss of approximately a quarter of one of the two verges that form the Waddington Fell Road, Roadside Verges BHS and degradation of groundwater dependent habitats associated with Bradford Fell, Easington Fell & Harrop Fell BHS and permanent loss of trees and woodland. It is anticipated that further measures to avoid and mitigate losses could be employed to reduce these effects to insignificant.

Public Access and Recreation

- A residual effect remains relating to the National Cycle Network 69 due to the disruption from an increase in construction traffic. However, through consultation with Sustrans impacts would be minimised as far as reasonably practicable. The construction traffic route for the Lower Houses Compound has the potential to cause a significant impact due to the disruption to both National Cycle Network route 69 and National Cycle Network route 90 from an increase in construction traffic.

Noise and Vibration

- Blasting is likely to be required at the Newton-in-Bowland Compound. An assessment of likely impacts would be made by the specialist contractor and used to design a suitable blasting strategy prior to works commencing. With adherence to the appropriate limits for blasting then no significant adverse impacts would be anticipated.

9.2 Off-Site Highway Works

The majority of likely significant effects for the Off-Site Highway Works relate to Landscape and Arboriculture. Visual effects may be significant during construction, operation and reinstatement works due to the potential loss of trees, tree groups and other vegetation together with other features such as dry stone walls and fences. However, many of these effects would be of relatively short duration and would be mitigated by the replacement planting and reinstatement of permanent features. The removal of any mature trees would result in a longer term impact as the adverse impact of their loss could not be readily reversed through tree planting. A total of 21 tree features could be removed. However, an arboricultural method statement would assess the impact to individual trees and detail protection measures.

Permanent tree and woodland losses associated with road widening locations would be significant adverse at the local level. It may be possible to reduce these effects to not significant if detailed design can reduce losses and/or agreements for localised replanting can be reached. Any habitat losses would be offset through the commitment to 10% BNG.

Some disturbance local communities would arise mainly from the movement of heavy goods vehicles through settlements and past individual properties fronting onto the highway. A degree of this disturbance is an unavoidable consequence of constructing a major infrastructure project. Some of the community disturbance would be short-term and reversible, while other disturbance may continue throughout the duration of the construction programme.

United Utilities has developed Construction Traffic Management Plans (CTMP), outlining measures to further mitigate community disturbance. Through ongoing consultation with local people, local councils and highways authorities, United Utilities will continue to develop and refine mitigation proposals. It should be recognised that in some community areas, however, it may not be possible to fully eliminate adverse disturbance effects due to the scale of construction operations and associated vehicle movements. A precautionary position is therefore adopted in recognition of the nature, scope and duration of these adverse effects as it is anticipated that some communities would experience a disturbance effect that is significant in the context of the EIA Regulations.

9.3 Proposed Ribble Crossing

The majority of likely significant effects for the Off-Site Highway Works relate to Landscape and Arboriculture:

- There would be a noticeable and uncharacteristic change to the Lower Hodder and Loud Valley, Lower Ribble Valley, Bolton by Bowland to Waddington and Ribble Landscape Character Areas during enabling works, construction, operational and decommissioning phases
- A noticeable and uncharacteristic change to the views across the Proposed Ribble Crossing during the enabling works, construction, operational and decommissioning phases.

9.4 Conclusion

Although it is recognised that the construction of a project of this scale would involve a degree of disruption to both people and the environment, the development of the Proposed Bowland Section along with the mitigation, ensure that the impacts are largely temporary and acceptable and ultimately provide for a resilient, sustainable water supply to serve the needs of the North West.