



**Haweswater Aqueduct Resilience Programme - Proposed Marl Hill
Section**

Environmental Statement

Volume 1

Non-Technical Summary

June 2021



Haweswater Aqueduct Resilience Programme - Proposed Marl Hill Section

Project No: B27070CT
Document Title: Proposed Marl Hill Section Environmental Statement
Volume 1 Non-Technical Summary
Document Ref.: RVBC-MH-ES-Non Technical Summary
Revision: 0
Date: June 2021
Client Name: United Utilities Water Ltd

Jacobs U.K. Limited

5 First Street
Manchester M15 4GU
United Kingdom
T +44 (0)161 235 6000
F +44 (0)161 235 6001
www.jacobs.com

© Copyright 2021 Jacobs U.K. Limited. The concepts and information contained in this document are the property of Jacobs. Use or copying of this document in whole or in part without the written permission of Jacobs constitutes an infringement of copyright.

Limitation: This document has been prepared on behalf of, and for the exclusive use of Jacobs' client, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and the client. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this document by any third party.

Contents

1.	Introduction	1
1.1	Background to the Development	1
1.2	Purpose of this Document.....	2
1.3	The Environmental Statement.....	3
1.4	This Non-Technical Summary.....	3
2.	Development Overview	5
2.1	Proposed Marl Hill Section	5
2.2	Construction Programme and Phasing	6
2.3	Commissioning and Operational Phase.....	8
2.4	Design Evolution and Alternatives Considered.....	9
3.	Environmental Impact Assessment	10
3.1	Assessment Method.....	10
3.2	Engagement and Consultation.....	10
3.3	Approach to Environmental Mitigation and Monitoring	11
4.	Bonstone Compound	12
4.1	Description of Development	12
4.2	Baseline.....	12
4.3	Description of Effects	13
5.	Braddup Compound	21
5.1	Description of Development	21
5.2	Baseline.....	21
5.3	Description of Effects	22
6.	Off-Site Highway Works	28
6.1	Description of Development	28
6.2	Description of Effects	29
7.	Proposed Ribble Crossing	31
7.1	Description of Development	31
7.2	Baseline.....	31
7.3	Description of Effects	31
8.	Cumulative Effects and Interaction of Effects	36
8.1	Intra-Project Effects	36
8.2	Inter-Project Effects.....	37
9.	Summary of Likely Significant Residual Effects	38
9.1	Compound Areas	38
9.2	Off-Site Highway Works.....	38
9.3	Proposed Ribble Crossing.....	39
9.4	Conclusion	39

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 Marl Hill 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.

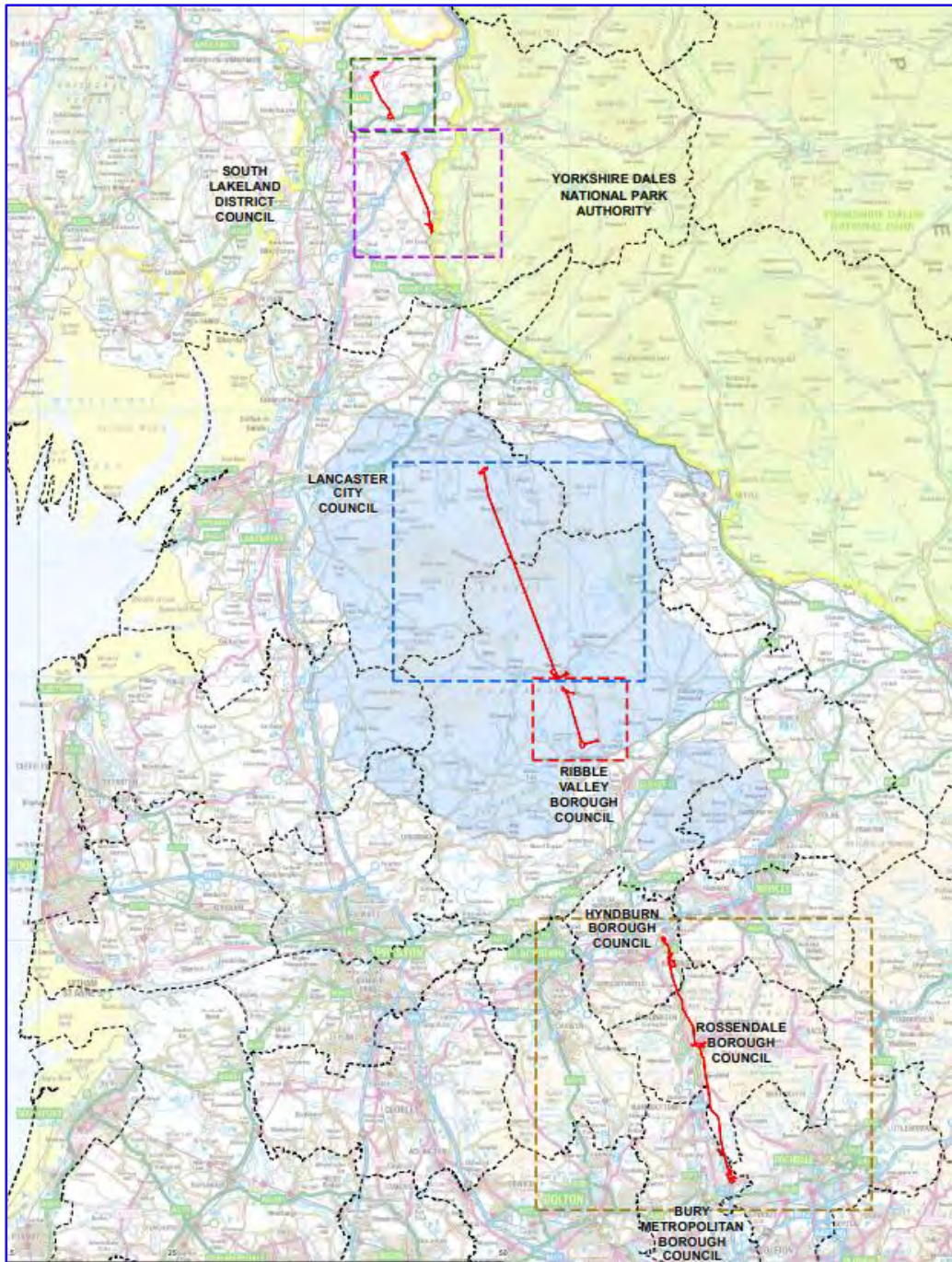
Haweswater Reservoir



The replacement aqueduct 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 Marl Hill Section is towards the central part of the aqueduct and would involve replacing 4.1 km of water supply pipes from Bonstone, south of the River Hodder near Newton-in-Bowland, to an area of agricultural land approximately 1 km north of Waddington.

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

1.2 Purpose of this Document

This Non-Technical Summary provides an easily readable summary of the Environmental Statement for the Proposed Marl Hill 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 Marl Hill 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.

Volume 2 of the Environmental Statement, Chapters 1-5, provide an introduction to the Proposed Marl Hill section and the EIA process, while Chapters 6-18 describe environmental assessments of technical topics such as ecology and flood risk. Cumulative effects, mitigation summaries and a summary of likely significant effects is then provided in Chapters 19-21.

Each environmental topic chapter explains the subject, describes the existing environment (referred to as 'baseline conditions'), assesses the impact of the Proposed Marl Hill Section on the existing environment, identifies measures to protect communities and the environment (mitigation), and then reports the significance of any remaining environmental effects (referred to as 'residual' effects). The NTS also contains a summary of the potential cumulative effects of the Proposed Marl Hill Section, considered in conjunction with the overall HARP Proposed Programme of Works (i.e. all five proposed replacement sections), and also taking account of other anticipated major developments in the region.

The full Environmental Statement can be viewed on the Ribble Valley Borough Council website:

- <https://www.ribblevalley.gov.uk/planningApplication/search>.

1.4 This Non-Technical Summary

Within the Environmental Statement, likely significant effects are described by environmental topic. Within this Non-Technical Summary, however, the relevant information is reported by each individual element of the Proposed Marl Hill Section: the main construction compounds (Bonstone and Braddup), proposed off-site highways works (i.e. highways works such as road widening and junction modifications away from the main construction compounds), and the Proposed Ribble Crossing. This approach has been adopted for the Non-Technical Summary to help members of the public and other non-specialist readers find the local information they are most likely to be interested in.

The following environmental topics are included within this Non-Technical Summary:

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

- Air quality and climate change

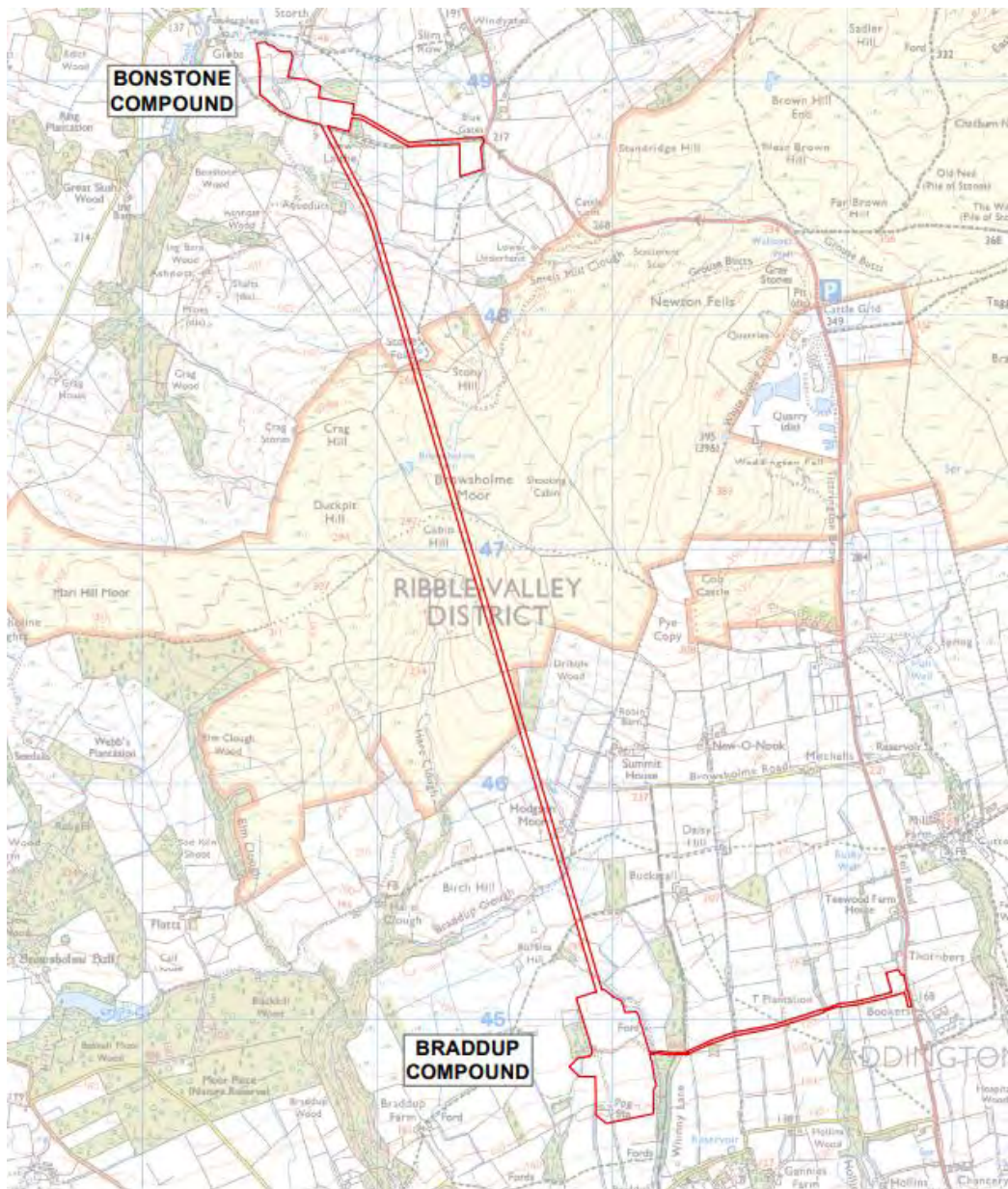
The absence of information for a particular topic within the Non-Technical Summary generally indicates that no likely significant environmental effects were identified during the EIA process. Further information on each topic and full details of impacts identified and assessed can be found in the relevant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

2. Development Overview

2.1 Proposed Marl Hill Section

The route of the Proposed Marl Hill Section would pass through and below a mixture of moorland, woodland and agricultural areas within the Forest of Bowland Area of Outstanding Natural Beauty (AONB). The Proposed Marl Hill Section would extend from the agricultural area of the Hodder Valley southwards under the moorland area of Waddington Fell, before reaching an agricultural area with woodland fringes about 1 km north of Waddington. The planning application boundary for the main compounds and tunnel of the Proposed Marl Hill Section is shown below.

Proposed Marl Hill Section



2.2 Construction Programme and Phasing

Construction of the Proposed Marl Hill Section is due to commence in 2024, with completion of the main construction works anticipated in 2026. This programme does not include reinstatement works, which would continue beyond the completion of construction. Key programme 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:

- Bonstone Compound
- Braddup Compound.

These 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. The tunnel drive would be 'launched' from the Braddup Compound to a reception location at Bonstone Compound, where the tunnel boring machine would be lifted from the tunnel shafts and dismantled prior to removal from site. Launch and reception facilities would be constructed as shafts down to the depth of the tunnel drive. The maximum depth of the tunnel would be approximately 120 metres (m) below ground level, where it passes below Waddington Fell.

Some 80,000 cubic metres (m³) of material would be removed from the tunnel during construction and brought to the surface at the Braddup Compound. The material may require some form of processing such as dewatering within the construction compound. Where appropriate, surplus excavated materials would be re-used on-site. 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 at the quarry (subject to a separate planning application).

Tunnelling and above ground activities at the launch shaft at Braddup Compound would require 24 hours a day 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



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

Two new valve house buildings would be required, one at the Bonstone Compound and another at the Braddup Compound. These buildings would be approximately 12 m long and 11 m wide, with tarmac or stone access roads and hard standings.

Air valves would be installed in buried chambers local to the new valve house buildings to release any trapped air. 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; they would be backfilled and covered for reinstatement.

Overflows

The existing overflow structures and pipelines protect the existing infrastructure from excessive pressure by allowing excess water flows to pass over an overflow weir at Ribblesdale north well. This weir allows water to flow over it and an overflow pipeline then conveys the excess flows to Bashall Brook. A new north well structure would be constructed and would include an overflow weir for the same purpose. The outlet from the new overflow weir would be connected to the existing overflow pipeline.

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 Volume 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. Some of the off-site highways works are located within the AONB.

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

A holding facility for HGVs is 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 Marl Hill compounds. 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 Marl Hill compounds. These facilities would also be used for the Proposed Bowland Section (an adjacent section of replacement HARP tunnel, subject to a separate planning application). These facilities are both located outside the AONB in existing developed sites.

Ribble Crossing

The construction of the Proposed Marl Hill 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, the Proposed Ribble Crossing. This haulage route would be open only to construction traffic, and would cross 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. The Ribble Crossing is located outside the AONB but adjacent to its southern boundary.

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.

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 Bonstone and Braddup Compounds.

Following the decommissioning of the existing aqueduct, groundwater is expected to drain into the old tunnels. It is proposed this groundwater would be discharged to the Bashall Brook through the existing outfall location.

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 within the existing aqueduct 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 over the very short available timescales within which operational flows could 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.

Two route alignment options were considered for the replacement tunnel for the Proposed Marl Hill 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. One of the route alignments was discounted and the preferred route alignment was selected.

An initial design prepared in 2019 was based on a majority tunnel route, with a small section of approximately 200 m open cut to connect to the existing infrastructure. Following further design development at the Braddup Compound, the overflow was removed from the west of the compound, the corridor for the construction access track was reduced in width, and the extent of the compound size was reduced in the north and extended in the south. This design forms the basis of the planning application for the Proposed Marl Hill Section.

3. Environmental Impact Assessment

3.1 Assessment Method

The Proposed Marl Hill 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 technical 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 likely significant 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 effects of the Proposed Marl Hill Section being constructed at the same time as other proposed developments in the area, including other sections of HARP.

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 Marl Hill 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 an iterative design process. For example, adjustment of boundaries at the Braddup and Bonstone Compounds have been made to avoid direct impacts on significant trees
- 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 and temporary closures and diversions of public rights of way
- Essential mitigation: specific measures needed in particular areas of the Proposed Marl Hill Section to avoid or further reduce environmental effects after good practice mitigation has been implemented, such as protection of specific sections of watercourse 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 technical chapters and summarised in Appendix 20.1 of the Environmental Statement. Good practice mitigation measures are contained both within the Construction Code of Practice which forms Appendix 3.2 of the Environmental Statement, and also the Construction Traffic Management Plan.

4. Bonstone Compound

4.1 Description of Development

The Bonstone 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 9.3 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 Braddup Compound. The connection to the existing infrastructure would be via four 1.6 m internal diameter pipes, laid within a single trench approximately 200 m long.

The compound would be in place for approximately four years, with an estimated 18-month period of actual construction activity. Between Waddington Fell Quarry and the access to the compound, there are expected to be an average of between 10 and 20 additional vehicle movements per hour, with a peak of up to 35 movements. These may increase as tunnelling commences and during connection and commissioning works. Predicted movements south of Waddington Fell Quarry are outlined in Section 5.1.

4.2 Baseline

The landscape surrounding the compound is characterised by undulating lowland and river valley, with more distant moorland and rolling upland with occasional rocky outcrops. The compound is located in the south-east of the Forest of Bowland AONB. The predominant land use is permanent pasture for livestock. The topography ranges from approximately 130 m Above Ordnance Datum (AOD) along the river valley to 340 m AOD at Standridge Hill.

Public Rights of Way connect settlements within the surrounding countryside, including National Cycle Network route 90. There are three public footpaths which are intersected by the proposed access into the compound.

There are no designated sites of ecological importance within or in the immediate vicinity of the compound. Notable habitats present within the compound include scattered trees, hedgerows, areas of semi-improved neutral grassland and marshy grassland habitats interspersed with standing water features. Fields in the east are used by ground-nesting birds and barn owls roost in surrounding habitats.

View south from Easington Road towards the Bonstone Compound location



4.3 Description of Effects

Landscape and Arboriculture

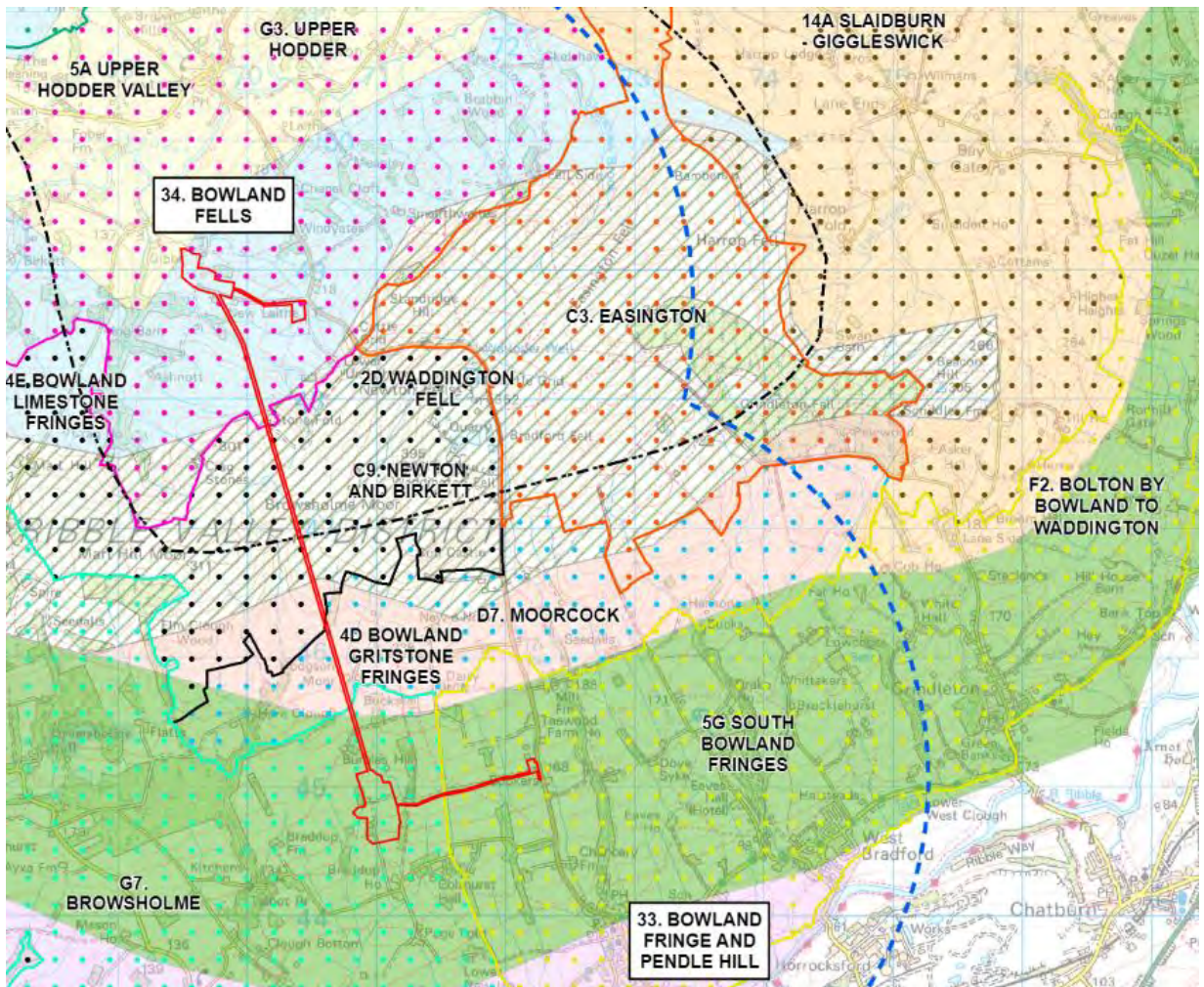
The Proposed Bonstone Compound is located in an area identified by CPRE, The Countryside Charity as having very low levels of light pollution at night. There are two 'Dark Sky Discovery Sites' within the Bonstone Compound assessment area, Clerk Laithe Lodge approximately 1.7 km away and Slaidburn visitor car park approximately 3.8 km north-east. A Lighting Management Plan has been developed to minimise the impact of light emissions on the surrounding environment.

Construction activity would introduce an obvious and notable change in the landscape, 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 AONB, with temporary changes to the characteristics of landscape features.

Significant effects on landscape and views are as follows:

- Bowland Limestone Fringes, South Bowland Fringes, Bolton by Bowland to Waddington, Upper Hodder and Browsholme Landscape Character areas would be affected due to noticeable and uncharacteristic change in the landscape during the enabling works, construction and commissioning phases. Newton and Birket Landscape Character Area would be affected by disturbance during the enabling works phase. Upper Hodder Valley Landscape Character Area would also be affected by disturbance during the construction phase
- Users of local footpaths, the Hodder Way and Tops of the North long-distance footpaths would experience visual disturbance during the enabling works, construction and commissioning phases. Residents of Long Stripes Farmhouse, residential properties Farrowfield and surrounding properties, Newlaithe Farm, Ing Barn, Newton settlement edge, The Heaning, Fober Farm, Crawshaw Farm and Wyndfell Farm would be affected by disturbance during enabling works, construction and commissioning phases.

Landscape Character Areas around the Proposed Marl Hill Section



These effects are temporary and once construction activity has been completed, trees would be reinstated, and the diverted local Public Rights of Way would be reopened. This would reduce visual and landscape effects. However, some temporary significant effects may remain until the reinstated vegetation and other landscape features are sufficiently established. The Environmental Masterplan shows replacement planting proposed in the Environmental Statement (Volume 3 Figure 20.1).

At the Bonstone Compound, 11 tree features are at risk of removal or partial removal, this includes one potential veteran hawthorn tree that is located within the indicative open-cut section within the planning application boundary.

Potential veteran hawthorn tree to be removed at the proposed Bonstone Compound



Water Environment

A series of embedded mitigation measures has been proposed to help manage pollution risk and reduce the potential impacts of the Proposed Marl Hill 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.

Dewatering would be required to construct the shaft working platform, and excavations would be needed to construct access tracks during the enabling works phase. The disruption to groundwater flow supporting wildlife habitats that are dependent on local groundwater conditions, and changes in any potential pollution from spills and ground disturbance, would result in the potential for significant effects. However, the measures contained within the Construction Code of Practice are designed to prevent such events occurring and include minimising excavation footprints and vegetation clearance, staggering excavation activities, not excavating during heavy rainfall, groundwater monitoring and reducing the duration of dewatering.

One private water supply is present approximately 450 m south of the Bonstone Compound access track and could be affected during excavations, causing disruption to the supply. 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.

The New Laithe wildlife habitat adjacent to the compound access track is dependent on local groundwater conditions and would be impacted during the enabling works due to ground compaction, topsoil stripping and construction of access tracks. To mitigate this, it is recommended that compaction effects are reduced by spreading the load of heavy vehicles and plant along access areas. However, even with these measures some residual significant effects may remain.

The baseflow in Bonstone Brook and Unnamed Watercourse 403 would be affected by dewatering. To mitigate this, flow monitoring would be implemented. However, even with these measures some residual significant effects may remain.

The flow and sediment transport in Unnamed Watercourse 402 would be affected by discharge of flows from the aqueduct during the commissioning phase. To mitigate this, monitoring would be required for changes in the bed and banks for erosion. With proposed mitigation in place no residual significant effects are predicted.

Bonstone Brook



Flood Risk

There is potential for a significant effect to occur from an increase in flood flows within Unnamed Watercourse 402 during the commissioning phase, depending on the commissioning solution that is adopted by the Contractor. Further detailed analysis to assess the actual level of flood risk impacts to the watercourses would be undertaken to determine appropriate discharge rates and any design changes needed. With proposed mitigation no residual significant effects are predicted.

Terrestrial Ecology

Enabling works would result in habitat loss and disturbance to wildlife. Permanent habitat losses would be limited to the footprints of the permanent, new, above-ground structures, comprising a valve house building, air valve chambers and associated maintenance tracks. With the exception of the potential loss of one veteran tree, these losses are unlikely to be significant. The significant loss of one veteran tree is based on a precautionary approach. Supplementary work is expected to show avoidance of this loss through embedded mitigation or appropriate construction methods. Temporary habitat losses include approximately two hectares of semi-improved neutral grassland, less than 0.01 ha of marshy grassland and 96 m of species-poor hedgerow.

Embedded and essential mitigation measures have been identified to avoid or reduce significant adverse ecological effects during the enabling phase, including pollution prevention measures, minimising soil stripping, using arisings from vegetation clearance to create habitat piles for wildlife, installing bat boxes if potential roosting habitat is lost and protecting retained habitats or features from working areas using appropriate fencing.

Habitat reinstatement works would be implemented following the construction phase. This would result in the reversal of the majority of temporary effects arising from habitat loss and fragmentation that occurs during the enabling phase.

The construction phase activities may result in a potential for further significant effects on ecology including noise, light, vibration or visual disturbance causing the displacement of birds, mammals, and insects from retained habitats. Embedded and essential mitigation measures have been identified to avoid or reduce significant adverse ecological effects during the construction phase. If pre-commencement surveys or evidence collected during watching briefs identify potential for significant disturbance risk, then visual/sound screening or exclusion buffers would be employed. With proposed mitigation and following habitat reinstatement, no residual significant effects are predicted with the exception of the removal of one veteran tree for which a compensation package would be developed.

Aquatic Ecology

The enabling works, construction, and commissioning works for the Bonstone Compound may release pollution and increased sediment into nearby watercourses in the absence of mitigation, and also require temporary habitat loss for installation of a drainage outfall. This could result in temporary significant effects to sensitive aquatic communities in the Unnamed Watercourse 388 and Unnamed Watercourse 402 (tributaries of the River Hodder). Additional mitigation measures related to water quality, sediment management, timing of commissioning discharges, and timing of in-river works would be implemented and overseen by an Environmental Clerk of Works. Reinstatement of watercourse substrate and banks following removal of the temporary drainage outfall would also be implemented to prevent erosion along the affected watercourse.

The enabling works and construction phase activities may result in a potential for further significant effects on otters, if resting places are present, including noise, light, vibration, or visual disturbance causing the displacement of otter from retained habitats. Embedded and essential mitigation measures have been identified to avoid or reduce significant adverse ecological effects during the enabling works and construction phase including pre commencement surveys where vegetation removal is required.

No residual significant effects are predicted for aquatic ecology following implementation of the identified mitigation.

Cultural Heritage

Construction vehicle movements through Waddington conservation area would represent a significant effect on the character of the designated village, irrespective of which haulage route option is selected. Significant volumes of construction traffic would need to pass through Waddington village when travelling to or from the Proposed Marl Hill Section 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. While mitigation measures such as the Construction Traffic Management Plan would be implemented, some residual significant impacts would remain, although they would be reversible on completion of the construction works.

Soils, Geology and Land Quality

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

Public Access and Recreation

No significant effects have been identified at the Bonstone Compound. However, two public rights of way and National Cycle Network route 90 would be temporarily affected by the proposed works. At Footpath 3-29-FP 42 fencing would be used to separate users from the access track. Footpath 3-29-FP 43 would require the use of a controlled crossing point where the footpath crosses the access track before joining a fenced off pedestrian walkway to separate users from construction traffic. National Cycle Network route 90 would be impacted through an increase in HGV numbers on the local road network.

Access track which joins footpath 3-29-FP 42 and footpath 3-29-FP 43



Transport Planning

The proposed construction traffic route to the Bonstone Compound would be via Junction 31 of the M6, then via the A59 and Pimlico Link Road. Vehicles over 3.5 m in height would be unable to pass below the railway bridge in Clitheroe. They would therefore use Pimlico Link Road and Chatburn Road, passing through Chatburn, Grindleton and West Bradford before joining Slaidburn Road at Waddington. For vehicles less than 3.5 m in height, the proposed route would take Pimlico Link Road and Chatburn Road through Clitheroe and Waddington. These two routes collectively comprise Haulage Route Option 1. Haulage Route Option 2 (the Proposed Ribble Crossing) is described in Section 7.

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

- An additional 242 two-way movements of HGVs along the B6478 Slaidburn Road over a 12 hour period, against a background flow of 212
- An additional 70 two-way movements of HGVs along West Bradford Road over 12 hours, against a background flow of 54
- An additional 71 movements of total two-way traffic and 70 two-way movements of HGVs along the Grindleton Road, against background flows of 1,735 for total traffic and 125 for HGVs
- An additional 70 movements of total two-way traffic and 71 two-way movements of HGVs along the Ribble Lane, against background flows of 1,842 for total traffic and 228 for HGVs.

To monitor, mitigate and manage any adverse effects on local roads, a Construction Traffic Management Plan would be implemented. Off-site highways 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 is not predicted to give rise to significant effects at the closest residential properties to the compound, being New Laithe Farm, Storth Farm and Gibbs Farm. No additional mitigation is required for the works, as it is anticipated that the guidance in the Construction Code of Practice would eliminate any potential for significant effects.

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

Significant effects to residents of New Laithe Farm could occur during short durations of vibratory soil compaction works, if required. Typical methods to control vibration impacts during compaction are included within the Construction Code of Practice and would be adopted by the construction Contractor to mitigate potential effects.

Air Quality

Diesel generators could be used at the Bonstone Compound. Computer modelling indicates that emissions to air from the diesel generators located within the compound, combined with additional road traffic, are unlikely to result in any significant air quality effects at nearby residential properties 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 diesel fuel storage at Bonstone 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. There is the potential for disturbance effects to the communities of Clitheroe, Waddington, Chatburn, West Bradford and Grindleton during enabling and construction phases. (The nature and scope of effects would depend upon which haulage route option is selected.) In these locations, the volume, duration, and nature of traffic associated with access to the Proposed Marl Hill Section has the potential to give rise to significant effects. To mitigate and manage any adverse effects on local roads, United Utilities has developed a Construction Traffic Management Plan, outlining measures to be implemented to 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 could alleviate impacts on communities in the Chatburn, Grindleton and West Bradford areas.

5. Braddup Compound

5.1 Description of Development

The Braddup Compound would be the launch site for the TBM and would provide the connection point to the existing Haweswater Aqueduct at this location. This compound would cover an area of approximately 15.4 ha and comprise a 15 m diameter, 10 m to 15 m deep launch shaft. The connection to the existing infrastructure would be via four 1.6 m diameter pipes, laid within a single trench.

The compound would be in place for approximately four years. Between the A59 and the access to the compound, there are expected to be an average of three to nine additional vehicle movements per hour, with a peak of up to 16 movements per hour. Between the access to the compound and Waddington Fell Quarry there are expected to be an average of between five and 15 additional vehicle movements per hour, with a peak of up to 25 movements per hour. These may increase as tunnelling commences and during connection and commissioning works.

5.2 Baseline

The landscape surrounding the compound is characterised by undulating lowland, moorland and rolling upland with occasional rocky outcrops. The compound is located within the south-east of the Forest of Bowland AONB, in an agricultural area with hedgerows and woodland fringes alongside the Sandy Ford Brook. It is approximately 4.5 km north-west of Clitheroe. The landscape comprises very gently rising topography between Waddington village to the south and Waddington Fell to the north, with Cabin Hill, Duckpit Hill and Marl Hill in the local area. The undulating topography ranges from approximately 80 m AOD near Waddington to 311 m AOD at Marl Hill.

There are several Public Rights of Way connecting settlements within the surrounding countryside, including National Cycle Network route 90. There is one public footpath and one bridleway which are intersected by the proposed access into the compound.

The southern part of the Braddup Compound and associated overflow contains minerals and aggregates that are potentially suitable for commercial extraction. These minerals and aggregates are safeguarded by local council designations. Much of the compound area is located on poor quality soils.

There are no designated sites of ecological importance within or in the immediate vicinity of the compound. The site is predominately grazed species-poor semi-improved grassland although there are areas of marshy grassland within the site and woodland along and adjacent to the compound boundaries. Watercourses and scattered broad-leaved trees, including five veteran trees, provide further biodiversity interest at the site.

View north from Cross Lane towards the Braddup Compound location



5.3 Description of Effects

Landscape and Arboriculture

The Proposed Braddup Compound is located in an area identified by CPRE, The Countryside Charity as having very low levels of light pollution at night. A Lighting Management Plan has been developed to minimise the impact on the surrounding environment.

Construction activity would introduce an obvious and notable change to the landscape, 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 hedgerows within the Forest of Bowland AONB, with temporary changes to the characteristics of landscape receptors, including the Bowland Limestone Fringes, South Bowland Fringes, Bolton by Bowland to Waddington, Upper Hodder and Browsholme Landscape Character Areas.

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

- Bowland Limestone Fringes, South Bowland Fringes, Bolton by Bowland to Waddington, Upper Hodder and Browsholme Landscape Character areas would be affected due to noticeable and uncharacteristic changes in the landscape during the enabling works, construction and commissioning phases. Waddington Fell Landscape Character Area would be affected by disturbance during the enabling works phase. Moorcock and Upper Hodder Valley Landscape Character Areas would also be affected by disturbance during the construction phase. Waddington Fell and Bowland Gritstone Fringes Landscape Character Areas would be affected by the construction and commissioning phases
- Users of local footpaths and bridleways would experience visual disturbance during the enabling works, construction and commissioning phases. Travellers along Cross Lane and residential viewers including Summit House, residential properties near Hodgsons Moor, Bookers Farm, Bookers Barn, Ravelston House, Colthurst bungalow, Oak cottage, Daisy Hill Farm and Colthurst Farm would also experience visual disturbance during enabling works, construction and commissioning phases.

These effects would be temporary and once construction activity has been completed, trees, hedgerows and woodland would be reinstated, and the diverted local public rights of way would be reopened. This 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.

At the Braddup Compound, seven tree features are at risk of removal or partial removal, this includes two potential veteran trees that are located on northern verge of existing access track.

Potential at risk tree on the northern verge side of existing access track



Water Environment

A series of embedded mitigation measures have been proposed to help manage pollution risk and reduce the potential impacts of the Proposed Marl Hill 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.

Dewatering would be required to construct the shaft working platform and excavations would be needed to construct access tracks during the enabling works phase. The disruption to groundwater flow supporting wildlife habitats that are dependent on local groundwater conditions, and changes in any potential pollution from spills and ground disturbance, would result in the potential for a significant effect. However, the measures contained within the Construction Code of Practice are designed to prevent such events occurring and include minimising excavation footprints and vegetation clearance, staggering excavation activities, not excavating during heavy rainfall, groundwater monitoring and reducing the duration of dewatering.

Three private water supplies are present within approximately 1 km of the Braddup Compound and could be affected during excavations, causing disruption to the supply. 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.

The Braddup House, Whinny Lane East and Slaidburn Road West wildlife habitats that are dependent on local groundwater conditions may be impacted during the enabling works due to ground compaction, topsoil stripping and construction of access tracks and during the construction phase due to dewatering and ground compaction. To mitigate this, it is recommended that topsoil stripping would be minimised, that the opportunity to move the overflow pipe and connection (associated with the Braddup Compound) would be considered, that compaction effects would be reduced by spreading the load of heavy vehicles and plant along access areas, that widening of the existing access road would be

undertaken and a clay bund would be used to prevent backfilled open-cut trenches from acting as a groundwater drain. However, even with these measures some residual significant effects may remain.

The baseflow in Cow Hey Brook may be affected by dewatering. To mitigate this, flow monitoring would be implemented. However, even with these measures some residual significant effects may remain.

The discharge of the commissioning flows may impact on water quality in Bashall Brook. To mitigate the potential adverse effects, flow monitoring would be implemented and supervised by an Environmental Clerk of Works. During the decommissioning the discharge of groundwater ingress may impact on water quality in Bashall Brook. Therefore, a water quality monitoring plan for decommissioning flows is proposed. However, even with these measures some residual significant effects may remain.

During the enabling works and construction works Sandy Ford Brook, Unnamed Watercourse 430, Unnamed Watercourse 463 and Unnamed Watercourse 433 may be affected by increased fine sediment, disturbance of the channel bed and banks and channel instability. To mitigate this, it is recommended that the coarser sediment is added to the channel, traffic management is employed to prevent vehicles driving close to the edge of the access track and causing erosion, consideration is given to lengthening the culverts to increase the distance between the access tracks and the watercourses and undertaking reinstatement works on the channel. With proposed mitigation no residual significant effects are predicted.

Sandy Ford Brook



Flood Risk

There is potential for a significant effect to occur from an increase in flood flows within Sandy Ford Brook during the commissioning phase, depending on the type of commissioning undertaken at the time. Further detailed analysis to assess the actual level of flood risk impacts to the watercourses would be undertaken to determine appropriate discharge rates and design changes needed. With proposed mitigation no residual significant effects are predicted.

Terrestrial Ecology

Enabling works 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 a valve house building, air valve chambers and associated maintenance tracks. These losses are unlikely to be significant, temporary habitat losses include 1.14 ha of marshy grassland, 0.21 ha of semi-improved neutral grassland and 121 m of species-poor hedgerow. The locally significant potential loss of up to

five veteran trees is precautionary and supplementary work is expected to show avoidance of veteran losses through embedded mitigation and construction methods.

Embedded and essential mitigation measures have been identified to avoid or reduce significant adverse ecological effects during the enabling works phase, including pollution prevention measures, minimising soil stripping, using arisings from vegetation clearance to create habitat piles for wildlife, installing bat boxes if potential roosting habitat is lost and protecting retained habitats or features from working areas using appropriate fencing.

Habitat reinstatement works would be implemented following the construction phase. 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.

The construction phase activities may result in a potential for further significant effects on ecology including noise, light, vibration or visual disturbance causing the displacement of birds, mammals, and insects from retained habitats. Embedded and essential mitigation measures have been identified to avoid or reduce significant adverse ecological effects during the construction phase. If pre-commencement surveys or evidence collected during watching briefs identify potential for significant disturbance risk, then visual/sound screening or exclusion buffers would be employed. With proposed mitigation and following habitat reinstatement, no residual significant effects are predicted with the exception of the loss of five veteran trees for which a compensation package would be developed in the event that impacts cannot be avoided through embedded design mitigation and construction methods.

Aquatic Ecology

The enabling works, construction, and commissioning works for the Braddup Compound may release pollution and increased sediment into nearby watercourses in the absence of mitigation. This could result in temporary significant effects to sensitive aquatic communities in the Bashall Brook catchment. The proposed upgrades to the access track to the Braddup Compound would result in habitat loss in the watercourses crossed by the route and a risk of increased habitat fragmentation. However, this is not considered to be significant due to the small scale, and location in the catchment and existing access track. Additional mitigation measures related to water quality, sediment management, timing of commissioning discharges, 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.

The enabling works and construction phase activities may result in a potential for further significant effects on otters, if present, including noise, light, vibration, or visual disturbance causing the displacement of otter from retained habitats. Embedded and essential mitigation measures have been identified to avoid or reduce significant adverse ecological effects during the enabling works and construction phase including pre commencement surveys where vegetation removal is required.

No residual significant effects are predicted for aquatic ecology following implementation of the identified mitigation.

Cultural Heritage

Construction vehicle movements through Waddington conservation area would represent a significant effect on the character of the designated village, irrespective of which haulage route option is selected. Significant volumes of construction traffic would need to pass through Waddington village when travelling to or from the Proposed Marl Hill Section 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. While mitigation measures such as the Construction Traffic Management Plan would

be implemented, some residual significant impacts would 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 is 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.

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

Public Access and Recreation

No significant effects have been identified at the Braddup Compound. However, two Public Rights of Way and National Cycle Network route 90 would be temporarily affected by the proposed works. Footpath 3-43-FP 8 and bridleway 3-5-BW 1 would both require the use of a controlled crossing points where they cross the access track. National Cycle Route 90 would be temporarily impacted by an increase in construction traffic numbers.

View of footpath 3-5-BW 1 off Cross Lane



Transport Planning

The proposed construction traffic route to the Bonstone Compound would be via Junction 31 of the M6, then via the A59 and Pimlico Link Road. Vehicles over 3.5 m in height would be unable to pass below the railway bridge in Clitheroe. They would therefore use Pimlico Link Road and Chatburn Road, passing through Chatburn, Grindleton and West Bradford before joining Slaidburn Road at Waddington. For vehicles less than 3.5 m in height, the proposed route would take Pimlico Link Road and Chatburn Road through Clitheroe and Waddington. These two routes collectively comprise Haulage Route Option 1. Haulage Route Option 2 (the Proposed Ribble Crossing) is described in Section 7.

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

- An additional 141 two-way HGV movements over 12 hours along the B6478 Slaidburn Road, against a background flow of 210
- An additional 70 two-way HGV movements over 12 hours along West Bradford Road, against a background flow of 54

- An additional 71 movements of total two-way traffic and 70 two-way movements of HGVs along the Grindleton Road, against background flows of 1,735 for total traffic and 125 for HGVs
- An additional 70 movements of total two-way traffic and 71 two-way movements of HGVs along the Ribble Lane, against background flows of 1842 for total traffic and 228 for HGVs.

To monitor, mitigate and manage any adverse effects on local roads, a Construction Traffic Management Plan and 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.

Noise and Vibration

Construction noise at Braddup compound is not predicted to give rise to likely significant effects at the closest residential properties to the compound, these being Bookers Farm, Buckstalls and Peter Barn. No additional mitigation is required for the works, as it is anticipated that the guidance in the Construction Code of Practice would eliminate any potential for significant effects.

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

Significant vibration effects to residents of Bookers Farm could occur in the absence of mitigation during short durations of vibratory soil compaction works, if required. However, typical methods to control vibration impacts during compaction are included within the Construction Code of Practice and would be implemented by the construction Contractor to mitigate these potentially significant effects.

Air Quality

Diesel generators could be used at the Braddup Compound. Computer modelling techniques indicate that emissions to air from the diesel generators located within the compound, in combination with additional road traffic, are unlikely to result in air quality effects at sensitive human locations or at the designated sites identified in the assessment. Typical methods to control air quality impacts during construction are referred to in the Construction Code of Practice and would be adopted by the Contractor.

Major Accidents

A precautionary assessment has been undertaken of potential risk arising from diesel fuel storage at the Braddup Compound, necessary to power plant and equipment. Relatively high diesel volumes may be required including electricity generators. The storage of large volumes of diesel would be necessary on the Braddup Compound and it 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

On any major infrastructure project such as HARP, there is potential for community disturbance and disruption. There is the potential for disturbance effects to the communities of Clitheroe, Waddington, Chatburn, West Bradford and Grindleton during enabling and construction phases. (The nature and scope of effects would depend upon which haulage route option is selected.) In these locations, the volume, duration, and nature of traffic associated with access to the Proposed Marl Hill Section has the potential to give rise to significant effects. To mitigate and manage any adverse effects on local roads, United Utilities has developed a Construction Traffic Management Plan, outlining measures to be implemented to 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 could alleviate impacts on communities in the Chatburn, Grindleton and West Bradford areas.

6. Off-Site Highway Works

6.1 Description of Development

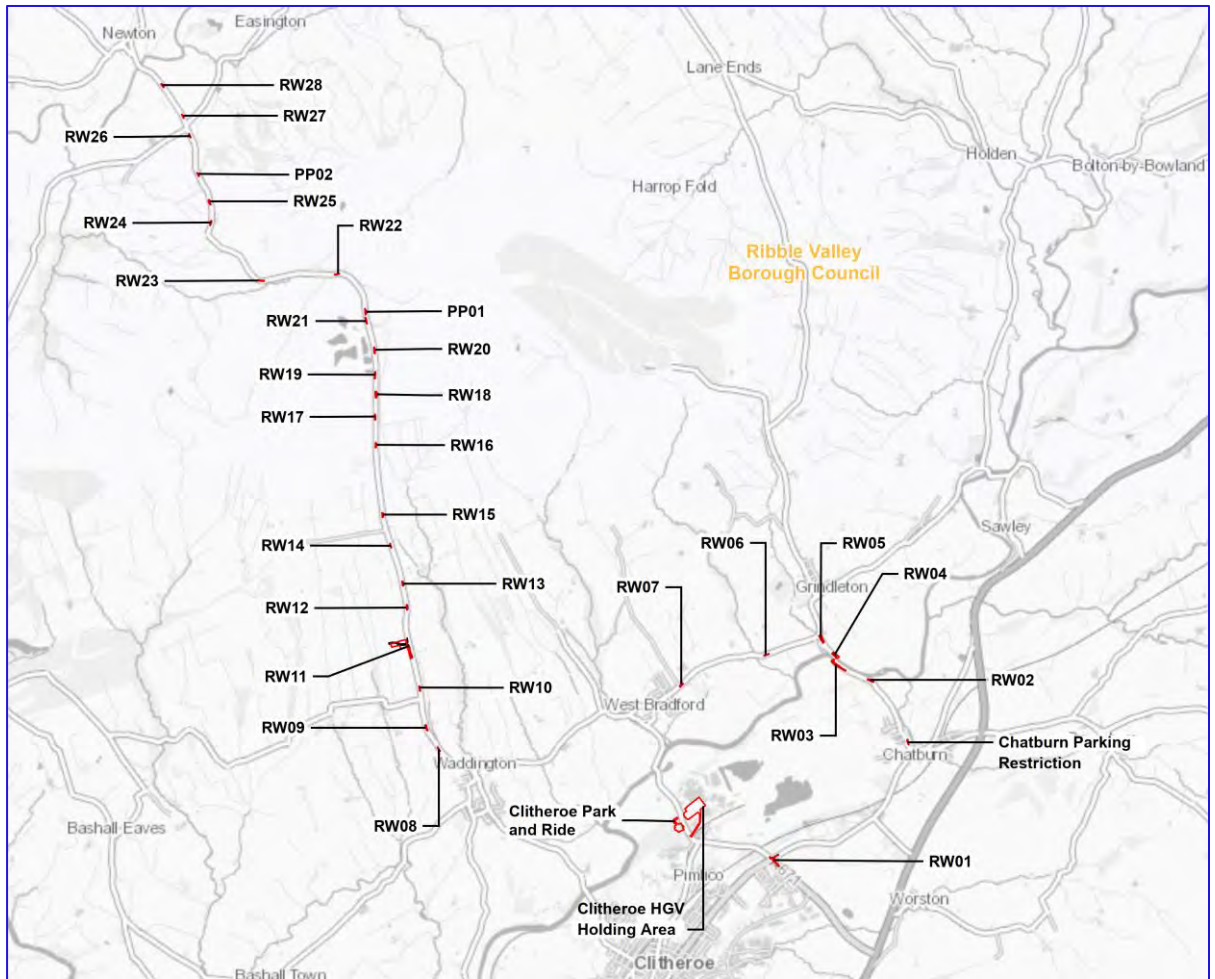
In consultation with Lancashire County Council Highways, the need for off-site highways works (i.e. roadworks to be built away from the two main construction compounds) was identified. This would be to enable the safe movement of construction vehicles and other road users on the public highway while the Proposed Marl Hill Section is built. The highway works associated with the Proposed Marl Hill Section comprise carriageway widening at 28 locations, two junction modifications, one temporary parking restriction and the construction of two passing places. These would be positioned over a length of approximately 14 km of highway and 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 Proposed Marl Hill Section would broadly share the same haulage routes as the Newton-in-Bowland Compound, 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 two '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 HGVs would be held for short periods of time before being released back onto the haulage routes towards the Bonstone and Braddup Compounds. 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 providing a shuttle bus service to and from the Bonstone and Braddup Compounds.

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 Marl Hill Section Off-Site Highways Works¹



6.2 Description of Effects

An environmental assessment of the likely significant effects of the off-site highways works has been undertaken. 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 as necessary.

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 potential 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 together with other features such as dry stone walls and fences. However,

¹ In the above proposed highways works illustration the prefix 'RW' denotes a road widening location and 'PP' and passing place. Refer to Volume 5 of the Environmental Statement for more details.

these effects would be reversible and would be mitigated by the replacement planting and reinstatement of permanent features such as field boundaries. 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 partially removed.

The following likely significant effects were also identified:

- Potential for increased fine sediment input into Bonstone Brook at one road widening location during construction. However, proposed mitigation measures would include the addition of coarse sediments where impacts may occur
- Visual effects to public rights of way users at one passing place and four road widening locations during construction. However, these effects are of relatively short duration and would be mitigated by replacement planting and reinstatement of permanent features. 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. However, these effects are of relatively short duration and would be mitigated by replacement planting and reinstatement of permanent features
- The highways works would give rise to temporary disruption and disturbance at some residential properties in proximity to the works, and some community facilities. However, measures contained in the Construction Code of Practice relating to control of construction noise, and in the Construction Traffic Management Plan in relation to construction traffic, would mitigate these effects
- Potential significant effects on wildlife habitats that are dependent on local groundwater conditions would be mitigated through the adoption of good practice techniques
- There is potential for significant effects to aquatic ecology and otter populations in the Bonstone Brook and Unnamed Watercourse 2096 due to road widening activities. However, potentially significant effects would be mitigated following incorporation of additional measures.

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 enable the movement of construction vehicles from the A59, through the Clitheroe area and northwards on to the two construction compounds serving the Proposed Marl Hill Section. 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 village to the west and Waddington and West Bradford Primary School to the east.

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 Marl Hill 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 heavy goods vehicle 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 AONB.

The River Ribble is a main river that flows through North Yorkshire and Lancashire. The river starts close to the Ribbleshead 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 salmonids (a family of fish that includes salmon and trout) and is 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 associated with hedgerows, scattered trees and within 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 a direct or indirect effect on landscape character areas and would alter people's views during all phases of the works. It is anticipated that due to the scale and

nature of the Proposed Ribble Crossing, there would be 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 which could affect sensitive features observed in the River Ribble, Greg Sike and Coplów Brook
- The construction of four outfalls and the temporary bridge which 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 which 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 Coplów 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 significant 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 in place there would be no significant residual effects.

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 giving rise to a potential increase in flood levels upstream, and from the loss of floodplain storage leading to increased flood depths. A detailed assessment would be carried out to inform the design and incorporate additional mitigation measures. If this is not possible then alternative 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

There would be 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, together with 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 on aquatic ecology 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 temporary haul route.

The creation of the temporary haul route 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 bridge 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 requiring additional mitigation was identified. Mitigation measures have been embedded in the design of the Proposed Ribble Crossing. In addition, good practice measures are 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

Should the Proposed Ribble Crossing haulage route be adopted, all construction traffic accessing the Bonstone and Braddup Compounds would travel via Junction 31 of the M6, then the A59, Pimlico Link Road / West Bradford Road, the Proposed Ribble Crossing, West Bradford Road and the B6478, through Waddington. During the peak of construction activity, traffic modelling has identified an increase of up to:

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

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 Primary 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 runs along the Ribble Valley and would be crossed by the Proposed Ribble Crossing. Embedded mitigation forming part of the design includes permanent protection in the form of a concrete raft extending over the complete width of the roadway and verges, as well as completing the works in accordance with pipeline operator's standard conditions. With these measures in place, no additional potential for major accidents was identified.

8. Cumulative Effects and Interaction of Effects

Within the Environmental Statement 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 how multiple environmental effects arising from the Proposed Marl Hill Section may act in combination to create disturbance effects within local communities.

In addition, the Proposed Marl Hill Section also comprises several significant elements – the main construction compounds, the satellite compounds in the Clitheroe area, the Proposed Ribble Crossing and the off-site highways works – some 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 Marl Hill 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 intra-project cumulative effects to arise on the Proposed Marl Hill Section. These cumulative effects would relate to the off-site highways works acting in combination with the landscape and visual effects reported for the main construction compounds and transport routes serving the main compounds, including the Proposed Ribble Crossing.

The highways improvement works and initial construction activity for the compounds are programmed to be delivered successively. Therefore, cumulative effects would occur in relation to the landscape of the wider area. Cumulative visual effects would occur in combination (i.e. where different elements of the Proposed Marl Hill Section are visible from the same viewpoint) and sequentially (i.e. where different elements are visible along a route (e.g. a local road or a recreational footpath)).

It is acknowledged that cumulative effects on landscape character and the wider landscape would arise due to disruption to settled rural areas caused by individual proposed highways works acting cumulatively within the AONB. It is anticipated that cumulatively, the works would give rise to an increased perception of disruption and contrast with the rural character of the affected landscapes. The cumulative effects from vegetation loss and removal of boundary features such as hedgerows, dry stone walls and fences would also adversely affect the wider landscape.

In combination visual effects would occur from visual disturbance of construction activity and movement of plant and equipment within the compounds, entering and exiting the compound, and along the nearby local road network. Sequential views would occur for travellers along the local road network and from the footpath network. Travellers along the local roads with proposed highways improvement works would experience frequently sequential views towards the construction of passing places and road widening sections. Some road travellers and footpath users would also experience occasionally sequential views and towards the construction compound.

On completion of the Proposed Marl Hill Section, highways works locations would generally be reinstated to original land uses; landscape features and field boundaries would also be reinstated in consultation with affected landowners and local authority officers. An environmental masterplan would

be developed jointly with stakeholders at a sufficient level of detail to identify site-specific reinstatement activities at individual works locations, while also addressing the broader, cumulative effects of the total highway works package on the landscape resource.

Cumulative tree losses associated with the main construction areas, the Proposed Ribble Crossing and the off-site highways works are notable – approximately 40 tree features (individual trees, tree groups or hedgerows) are at risk of removal, while a further 28 tree features are at risk of partial removal.

Communities

Local communities and settlements could experience significant cumulative effects when taking account of the off-site highways works, the two main compounds and the Ribble Crossing, resulting in disturbance 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 in the Environmental Statement as significant individually, may still contribute to overall disturbance effects. 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. Some of the community disturbance may be short-term and reversible, while other disturbance could extend into and throughout the duration of the construction phase. Through Construction Traffic Management Plans and Community Liaison Officers United Utilities will continue to work with highways authorities and local communities to mitigate the impacts of construction traffic.

8.2 Inter-Project Effects

The assessment of inter-project cumulative effects considered relevant proposed developments and development plan land allocations within 5 km of the Proposed Marl Hill Section. In addition, inter-project cumulative assessment considered the Proposed nearby Bowland Section and the other separate developments included as part of the Haweswater Aqueduct Resilience Programme. While some local proposed developments and land allocations were identified, it was concluded that none would give rise to additional significant effects over those already reported in the Environmental Statement.

In relation to the other 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 is considered to constitute an additional potentially significant effect. To address this, United Utilities has committed to protecting certain habitats on construction compounds as well as habitat improvements equating to approximately 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 is not considered to be significant.

There is potential for the landscape and visual effects associated with the Proposed Bowland Section to act cumulatively with the Proposed Marl Hill Section:

- Potential for a significant landscape effect on the Bowland Gritstone Fringes Landscape Character Area during construction
- Potential for a significant effect on visual amenity from viewpoints in the vicinity of the Proposed Bonstone 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 users of 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.

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 Limestone Fringes, Upper Hodder Valley, South Bowland Fringes, Bolton by Bowland to Waddington and Browsholme Landscape Character Areas during enabling works and construction and commissioning phases
- There would be uncharacteristic changes to the Waddington Fell, Bowland Gritstone Fringes, Moorcock and Newton and Birkett Landscape Character Areas during the construction phase
- There would be uncharacteristic changes to the views across the proposed Bonstone and Braddup Compounds during the enabling works, construction and commissioning phases.

Water Environment

- Changes to groundwater flows effecting New Laithe, Braddup House and Whinny Lane East wildlife habitats that are dependent on local groundwater conditions during the enabling works and construction phases
- Dewatering effecting the groundwater flows to Bonstone Brook, Unnamed Watercourse and 403 Cow Hey Brook
- Discharge of groundwater ingress from the decommissioned Haweswater Aqueduct into the Bashall Brook.

Terrestrial Ecology

- The predicted loss of at least three and up to six veteran trees during the enabling works is based on a precautionary approach. Further supplementary work is expected to show avoidance of veteran losses through embedded design mitigation and construction methods
- Locally-significant permanent loss of trees and woodland associated with off-site road-widening works are currently predicted. However, an arboricultural method statement would assess the impact to individual trees and detail protection measures
- The New Laithe wildlife habitat dependent on local groundwater conditions would be impacted during the enabling works at the Bonstone Compound due to ground compaction, topsoil stripping and construction of access tracks. Compaction effects would be mitigated by spreading the load of heavy vehicles and plant along access areas, although despite these measures some residual significant effects may remain
- The baseflow in Bonstone Brook and Unnamed Watercourse 403 would be affected by dewatering at the Bonstone Compound. This would be mitigated by implementing flow monitoring, although despite these measures some residual significant effects may remain.

Cultural Heritage

- Significant residual effects would remain through the construction programme at Waddington conservation area, due to the level of construction vehicle movements passing through the village.

9.2 Off-Site Highway Works

The majority of likely significant effects for the off-site highways 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 13 tree features could be removed and 22 tree features partially 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 of 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, 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

There would be no likely significant residual effects associated with the Proposed Ribble Crossing.

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 Marl Hill 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.