Environmental Statement

Volume 2i: Main Environmental Statement

Chapter 2: Scheme description

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2. SCHEME DESCRIPTION

2.1 Introduction

2.1.1 The following chapter provides details regarding the proposed works in the Huddersfield to Westtown (Dewsbury) Scheme ("the Scheme"), together with information on the baseline route conditions.

2.1.2 The purpose of the Scheme is to deliver works for the upgrade and electrification of the existing railway serving the Transpennine route between Huddersfield and Westtown (Dewsbury), together with the delivery of station improvement works at Huddersfield and the construction or reconstruction of stations at Deighton, Mirfield and Ravensthorpe. The purpose of the Scheme is to increase capacity and improve journey time and performance reliability of rail services on the Transpennine route between Huddersfield and Westtown (Dewsbury) and Manchester, Leeds and York. The Scheme will also provide sustainability benefits because this section of the railway will be electrified.

2.1.3 The Scheme is a core part of a wider programme of works known as the Transpennine Route Upgrade (TRU). TRU is a series of railway upgrade projects between Manchester, Huddersfield, Leeds and York with the objective being to improve journey times and capacity between key destinations on the Transpennine route, improve overall reliability and resilience on the Transpennine route and provide environmental benefits through modal shift to rail and the part electrification of the Transpennine route. The Scheme is a key contributor towards the delivery of the objectives for the TRU programme as the Scheme addresses the main bottleneck on the Transpennine route that exists between Huddersfield and Westtown (Dewsbury) where significant capacity and performance issues are currently encountered.

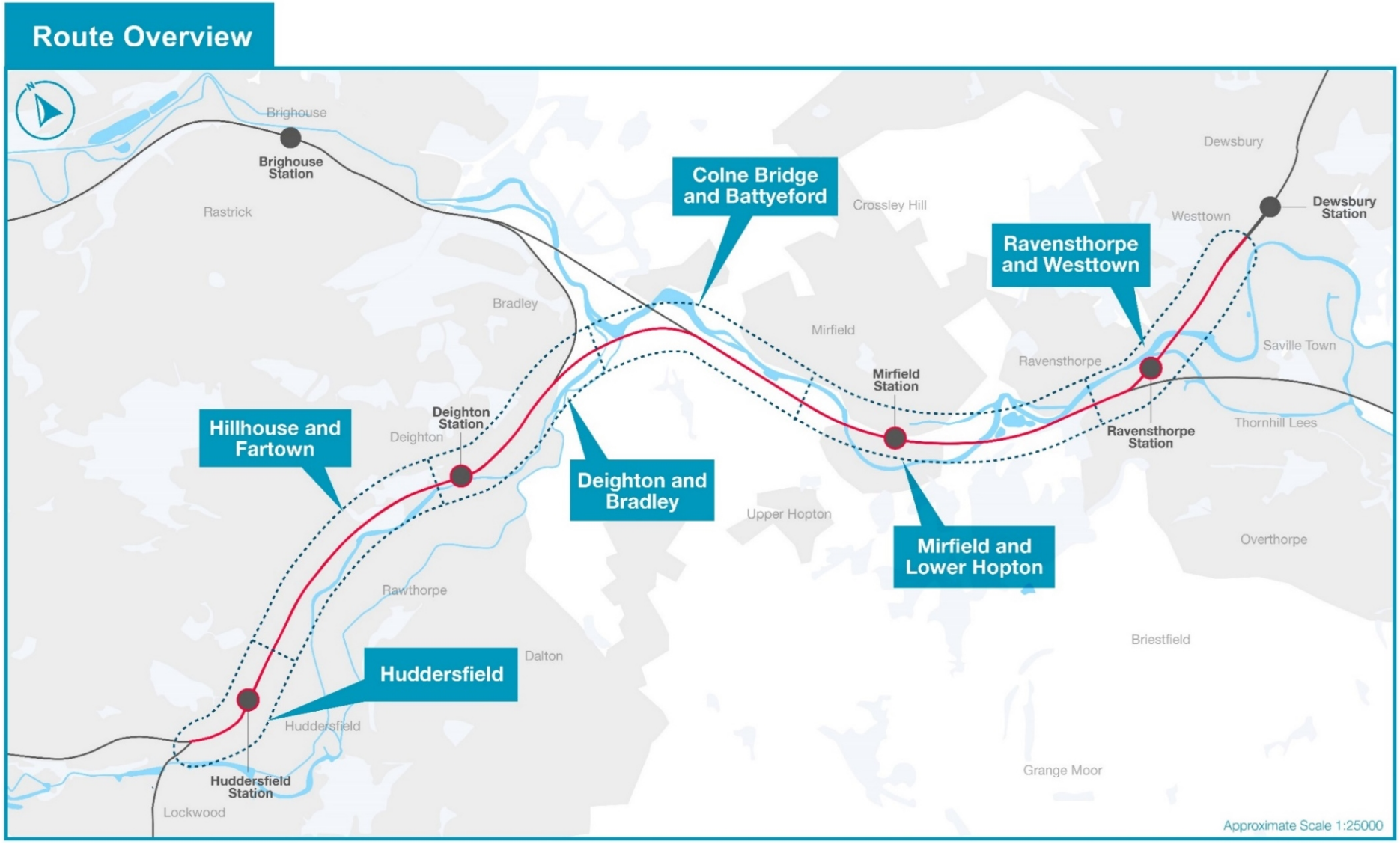
2.1.4 The Scheme consists of both operational railway land and land outside of Network Rail's ownership (third party land). The current operational railway generally consists of a two-track railway, albeit historically four tracking was provided through the majority of the Scheme area and therefore for the most part the railway corridor is sufficiently wide to accommodate the works proposed.

2.1.5 For the purposes of engineering and construction, the Scheme has been split into six sub-sections as set out below and presented indicatively on Insert 2-1 (and in more detail in Figure 1-1). This sectional split is carried through to the reporting in the ES.

- Route Section 1 – Huddersfield;
- Route Section 2 – Hillhouse to Fartown;
- Route Section 3 – Deighton and Bradley;
- Route Section 4 – Colne Bridge and Battyeford;
- Route Section 5 – Mirfield and Lower Hopton; and
- Route Section 6 – Ravensthorpe and Westtown.

2.1.6 Design of the Scheme is currently at single option development stage, essentially concept design stage, that gives sufficient detail on the design, construction, operation and land requirements to assess the environmental impacts of the Scheme. The design will continue to be refined in the time up to construction, this will be within the parameters of the Scheme assessed by the Environmental Impact Assessment (EIA) and reported in this Environmental Statement (ES).

2.1.7 The Scheme drawings are provided in Figure 2-1 in Volume 4 of the ES.



Insert 2-1 Route Sections

2.2 Scheme location

2.2.1 The Scheme is located within the administrative boundary of Kirklees Council and comprises 14km of existing railway between Branch Street (MVL3/84), 1.7km west of Huddersfield Station and Webster Hill, Westtown which is 280m west of Dewsbury Station.

2.2.2 The Scheme area includes the physical extent of the permanent works including maintenance rights, together with land required temporarily to construct the works and is delineated by the Scheme boundary. The location of the Scheme and extent of the Scheme boundary are provided in Figure 1-1.

2.2.3 Letter references are used to describe sections of route and structures within the Scheme area, these are based on references used to describe the UK rail network. The following track sections are affected by the Scheme and therefore referenced in this ES.

- MDL – Manchester Diggle and Leeds line;
- MVL – Manchester Victoria and Huddersfield line;
- MVN - Manchester Victoria to Normanton line; and
- BBW - Bradley Junction to Bradley Wood Junction Curve line.

2.2.4 The railway within the Scheme (existing and proposed) is orientated broadly south-west (Huddersfield) to north-east (Dewsbury).

2.2.5 The railway is at an elevation of approximately 110m Above Ordnance Datum (AOD) at its south-western extent, decreasing to around 45m in the north-east. The area to the west of the Scheme slopes downwards from north-west to south-east, while to the east land is generally flatter within the valley of the River Calder.

2.2.6 The predominant land use within the Scheme area presently comprises a majority of settlement and urban land use. Overall, the Scheme area is defined by its two urban centres, Huddersfield and Dewsbury, and the associated urban fringe and peri-urban[1] landscape. Within the settlement fringes, some industrial developments are located. Several leisure facilities are located within the Scheme area, including several sports complexes and areas of open space. Within the northern extent of the Scheme area there is a substantial area of good agricultural land.

2.2.7 Several water courses run parallel to and/or cross the railway, at various locations (shown in Figure 11-1), this includes;

- Huddersfield Broad Canal;
- Huddersfield Narrow Canal;
- River Colne;
- Calder and Hebble Navigation;
- River Calder;
- Unnamed Watercourse at Bradley Culvert;
- Blackhouse Dike;
- Unnamed Watercourse at Heaton Lodge Junction; and
- Unnamed Watercourse at Colnebridge Culvert.

2.2.8 The area is underlain by Pennine Lower Coal Measures Formation and South Wales Lower

[1] The area between urban and rural landscapes

Coal Measures Formation (undifferentiated) and the bedrock is classified as a Secondary A aquifer by the Environment Agency (EA). The underlying superficial drift deposits are primarily Secondary A aquifer, mostly following the Main Rivers in the study area (River Colne, River Calder and others) with areas of Secondary (undifferentiated) around Huddersfield and Mirfield.

2.3 Current and proposed rail services

2.3.1 At present, this line serves a mix of fast express services, local stopping services and freight trains.

2.3.2 This section sets out the current rail service provision within the Scheme area, together with information on the proposed frequency and type of services that could be operated following the upgrade works.

2.3.3 The Scheme and the wider TRU, are the engineering programme of works which will result in the increased capacity and line speeds that enable more train services to be operated across the Scheme area and the Transpennine route. However, train operating companies are ultimately responsible for the operation of passenger services on the Transpennine route.

2.3.4 The ES assesses the potential operational scenarios which may be provided as a result of the Scheme and is not a guarantee of future services or train speeds.

2.3.5 As highlighted, the Scheme works include the electrification of the railway across the Scheme area. However, following delivery of the Scheme the electrified railway within the Scheme area will also be used by train services that operate on routes outside of the Scheme area which are not electrified. Therefore, there will be a need for bi-modal trains (trains which may run on both electrified and non-electrified lines) to operate through the Scheme area. Bi-modal trains are electric trains with the means to move independently of the electrification infrastructure i.e. they can also be powered either by battery or diesel.

Daytime train services

2.3.6 Table 2-1 presents data on the number of trains that currently run across the Scheme area (split by railway route sections) together with proposed train numbers (i.e. what would be capable of running following completion of the Scheme). The numbers of trains along each route section are for the core 16-hour daytime period between 7.00am and 11.00pm. The number of services stated are the total for both directions, with an approximately 50/50 split between each direction.

2.3.7 For this purpose, the Scheme area has been split into five railway route sections separated by the locations or junctions where trains can enter, leave, or continue along the Scheme area.

2.3.8 Table 2-1 also details the type of service e.g. express service or stopping service as well as the likely fuel source for the trains.

Night-time train services

2.3.9 During night-time periods (23.00 to 07.00), services will remain relatively unchanged with approximately two stopper services per hour in each direction to and from Manchester Airport.

Freight train services

2.3.10 There are currently freight services operating within freight corridors along the Scheme area during daytime and night-time periods. The Scheme will not affect the freight movements through the Scheme area, but freight will be routed along the dedicated slow lines provided as

part of this Scheme and therefore will not conflict with the express services. The number of freight services vary but one service in each direction per hour during night-time periods is considered a typical scenario. During daytime periods 16 freight services from Dewsbury to Huddersfield and nine freight services from Huddersfield to Dewsbury is considered a typical scenario.

Table 2-1 Existing and proposed train service numbers – within the Scheme area

Scenario	Type of service	Fuel type	Scheme Area Split by Railway Route Sections				
			West of Huddersfield	Huddersfield to Bradley Junction	Bradley Junction to Heaton Lodge Junction	Heaton Lodge Junction to Ravensthorpe West Junction	Ravensthorpe West Junction to Dewsbury
Existing	Express	Diesel	160	160	160	160	128
	Stopping –	Diesel	32	64	64	96	64
	Other (non - core travel)	Diesel	86	32	-	16	-
	TOTAL		278	256	224	272	224
Proposed	Express	Electric/bimodal	192	192	192	192	192
	Stopping	Electric/bimodal	-	96	96	96	64
	Other (non-core travel),	Electric/bimodal & diesel	130	32	-	48	32
	TOTAL		**322**	**320**	**288**	**336**	**288**

Capacity changes

2.3.11 The TRU programme proposes the following:

- Capability to operate 8 'express services' an hour on the route (four in each direction). This represents an increase of one "fast" path compared with current conditions; and
- Capability to operate 6 'local services' an hour on the route. This represents an increase in one "stopping" path compared with current conditions.

2.3.12 This Scheme delivers on this capacity improvement aim by removing the existing bottleneck through the provision of four-tracking throughout the Scheme Route (separating out the fast and slow lines), removing conflicting train movements by enabling direct trains to bypass existing junctions for example at Heaton Lodge where the fast lines run to the south of the existing MVL/MVN junction, thereby reducing service conflicts at this point. The vertical grade separation at Thornhill Junction Ravensthorpe removes conflict at the MVL/MVN junction (Wakefield Line). The Scheme will also improve train movement capacity at Huddersfield Station through the provision of additional platform capacity and track layouts.

Train speeds

2.3.13 The works within the Scheme area will enable faster train journey times by increasing line speeds through the Scheme area. These line speed increases through the Scheme area will contribute substantially to the TRU Programme's objective of delivering's overall journey time improvements between key destinations on the Transpennine Route, see paragraph 2.3.17.

2.3.14 Train speeds within the Scheme area are currently between 70-75mph with similar speeds seen throughout the existing Transpennine route, albeit the speed of the stopper services can be seen to slow down and speed up as they approach/leave the stations within the Scheme area.

2.3.15 The express services, which in the main do not stop between Huddersfield and Dewsbury, also have a current speed of 70-75mph through the Scheme area once they leave Huddersfield Station. This is in part due to the speed restrictions in place in various locations along the Scheme area, with a significant restriction in the Heaton Lodge area, between Ravensthorpe and Dewsbury stations and in part due to the current railway infrastructure and alignment.

2.3.16 Through the Scheme's provision of two additional lines (i.e. a four-tracked railway) direct trains will be able to bypass the stopper services, a constraint which currently leads to delays on the network. This passing provision, coupled with improvements to track alignments in the Scheme area, results in tracks with a current maximum line speed of 75mph (as existing) achieving lines speeds of up to 110mph following the Scheme works.

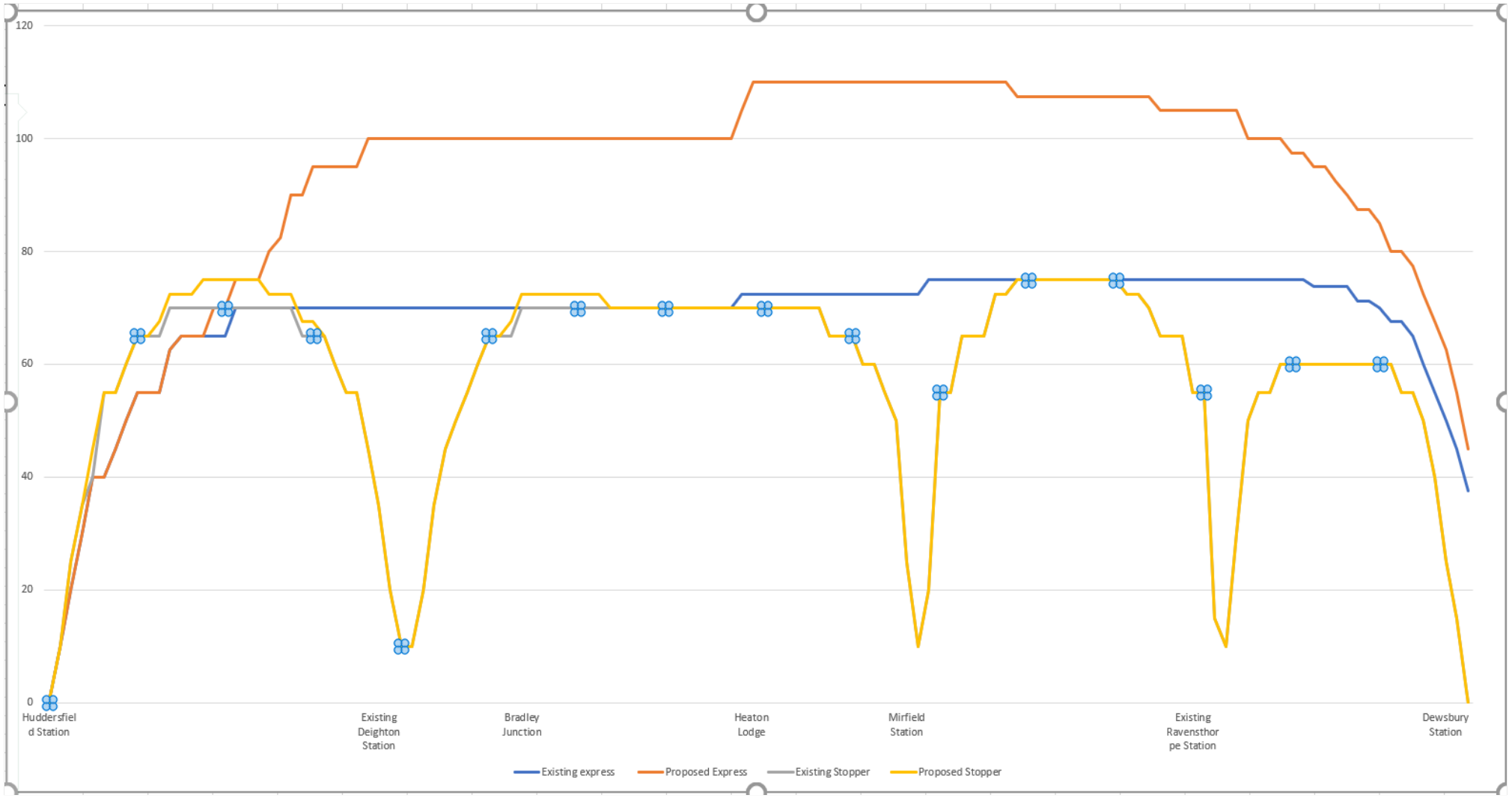
2.3.17 Therefore, the delivery of the Scheme will contribute significantly to the overall TRU aims of realising the following journey time improvements:

- An improved journey time for Leeds – Manchester Victoria of 43-44 minutes; and
- An improved journey time for York to Manchester Victoria of 67-69 minutes.

2.3.18 These journey time improvements compare with current timetable conditions of 49 and 74 minutes respectively i.e. a benefit of 5 minutes.

2.3.19 Insert 2-2 provides summary details of the current and proposed line speeds for the Scheme area. Information is supplied for both stopping and express services (where the existing stopper service is not shown this is because the proposed Scheme will remain consistent with

present and there is an overlap on the graph lines).



Insert 2-2 Current and proposed line speeds

2.4 Proposed works

Summary

2.4.1 The entire Scheme will be subject to electrification. These electrification works start to the West of Huddersfield Station at Branch Street (MVL3/84).

2.4.2 The track works for the Scheme also commence west of Huddersfield Station at Branch Street (MVL3/84) through the existing Gledholt and Huddersfield railway tunnels. Within the tunnels track lowering works are required to facilitate the provision of electrification equipment. At Huddersfield Station the railway is remodelled to support an electrified four-track railway with works planned within the station itself to support such remodelling works including alterations to platforms and roof structure (for more detail see paragraphs 2.4.47 to 2.4.48). East of Huddersfield Station a four-track railway is reinstated from the Huddersfield Viaduct across the Scheme area to the west of Westtown. This will allow for the segregation of fast and slow trains. There are works planned to reconstruct Deighton and Mirfield Stations including the relocation of platforms. A new station will be built at Ravensthorpe to the west of the site of the existing Ravensthorpe Station and the planned grade separation of the railway. The existing Ravensthorpe Station will be demolished. The railway grade separation (Flyover Intersection RBA/1) at Ravensthorpe will enable the fast and slow trains to pass over the existing Wakefield lines and cross the River Calder and the Calder and Hebble Navigation in this area.

2.4.3 At Heaton Lodge, in the centre of the Scheme, the fast lines are separated from the slow lines in a new cutting which will facilitate line speed increases and deconflict trains with those joining from the Calder line.

2.4.4 Throughout the Scheme area there are works to various existing bridge structures these can vary from increasing the parapet height to reconstruction to accommodate the 4 tracks and electrification of the route. This will result in works to key highway routes within the Scheme area.

2.4.5 There are also works to existing railway embankments and cuttings along the Scheme area to accommodate and support the new railway infrastructure.

2.4.6 Finally, there are various temporary construction compounds and new permanent access points to the railway along the Scheme area as well as utilities diversions and provision of ancillary railway equipment to support the safe operation of the railway.

Railway (track) works

2.4.7 The following section outlines the proposed works to the railway line though the Scheme area. In the main the works are aimed at delivering a four-track railway as well as realignment of tracks and associated works e.g. ballast relaying to achieve the required line speed increase.

2.4.8 Most of the new track works can be incorporated within the existing rail corridor (Network Rail operational railway land). Two areas of new track are proposed, these are located in the Heaton Lodge and Ravensthorpe areas.

2.4.9 Where the track works impact on existing structures either under or over the railway details are provided in the structures section of this chapter (see Table 2-2 for further details).

2.4.10 The track works commence west of Huddersfield Station at Branch Street (MVL3/84) through the existing Gledholt and Huddersfield railway tunnels. This section of the Scheme will remain as a two-track railway.

2.4.11 Within the Gledholt and Huddersfield railway tunnels (and areas of cutting between these tunnels) horizontal track realignment works are required to facilitate the provision of electrification equipment. These horizontal track realignment works will consist of track lowering to ensure there is sufficient space between the pantograph[2] and the tunnel/structure walls. Due to spatial constraints no additional tracks are proposed to the west of Huddersfield Station.

2.4.12 Due to the proposed works to lower track alignments within the Huddersfield Tunnel, there is a need to excavate down into the bedrock by up to 500mm and so as a stability and strengthening measure rock anchors (metal bars) will be drilled into the surrounding rock on the sides of the tunnel, these anchors will extend approximately 5m beyond the tunnel and will be spaced at approximately 10m intervals.

2.4.13 At Huddersfield Station (which is Grade I Listed) works for the four tracking of the railway will commence. The current station arrangement is three through platforms and three bay platforms. A new track layout is proposed which together with new signalling arrangements will allow for the deconfliction of services passing and stopping at the station. An additional through platform will be provided to the north of the station, this will involve removal of the existing sidings which will be re-provided at the Hillhouse site.

2.4.14 To the east of Huddersfield Station is Huddersfield Viaduct (MVL3/92) which is Grade II listed. Realignment of the existing track is required as a five-track railway will be constructed as the Scheme exits the station; this will reduce to four tracking as it continues across the viaduct. It should be noted that the railway from Huddersfield Station is on a historic five-track bed as far as Hillhouse, then a historic four-track bed beyond.

2.4.15 A new temporary platform is to be constructed at Hillhouse; this will enable passenger train services to continue to operate during the planned closures (blockade) at Huddersfield Station during the construction phase. Overnight stabling sidings (3No.) will be constructed to replace the removed sidings provision at Huddersfield Station. Following construction works, the temporary platform will be removed, this area of the site will be used to provide an access track to the railway access maintenance point ((Road Rail Access Point (RRAP[3])) near to Red Doles Road Underbridge (MVL3/96). The stabling sidings (3No.) will remain as part of the operational phase.

2.4.16 From Hillhouse to Deighton Station four-tracking is proposed within the existing rail corridor.

2.4.17 At Deighton Station, the track currently runs through two side platforms. The works will see the existing Deighton Station platforms relocated to the west of their current position. The new track alignment will see the slow lines serviced by an island platform. No platforms will be provided to the fast lines at this location as express services do not call at Deighton Station.

2.4.18 Four tracking continues through Bradley. The alignment through this section of the Scheme is heavily constrained by tight land boundaries, watercourse crossings, low clearance overbridges, adjacent properties and a steep ruling gradient.

2.4.19 Bradley junction is located between the Bradley's No.2 (BBW/1) Overbridge (MVL3/105) and the Bradley abutment (MVL3/106). This junction links the Manchester Victoria and Huddersfield line (MVL) and Bradley Junction to Bradley Wood Junction Curve line (BBW) lines. A small section of the BBW line is included within the Scheme area to cover the necessary overrun on the Overhead Line Equipment (OLE) infrastructure but no track works

[2] Device fitted to the top of the train that collects electric current from the overhead contact wire to power the train.
[3] RRAPs allow workers to gain access to the nearest work site by road, without the problems of special routing. They protect the track structure by absorbing traffic impact loads

are required to facilitate these works.

2.4.20 Four tracking continues along this Bradley section of the corridor to Heaton Lodge. Again, the alignment of the railway in this area is constrained by watercourse crossings, low clearance overbridges as well as commercial properties adjacent to the railway.

2.4.21 A section of new railway track (1km in length) is proposed at Heaton Lodge to facilitate provision of the fast lines.

2.4.22 Currently the railway passes through Heaton Lodge Junction which is formed from the MVL lines running north east, with the Manchester Victoria to Normanton line (MVN) joining from the north-west. The Scheme will deliver two new lines to the south of the junction which will contribute to the Scheme aims of deconflicting train services as direct (express services) will be able to bypass the junction thereby improving journey time. The fast lines will be within a cutting (up to 12m deep) and will require the acquisition of third-party land. The slow lines will remain within the existing operational railway boundary with the line from Huddersfield to Leeds (down line) passing on its existing alignment through Cooper Bridge Junction and under the location of the existing Heaton Lodge Footbridge (MVL4/4) and the up line (to Huddersfield) running on the southern-most existing line and passing over the location of the existing Helm Lane Underbridge (MVN2/188). The fast lines will continue to run on existing third-party land to the south of the operational rail boundary until Wood Lane Underbridge (MVN2/190), where the proposed new lines re-join the existing rail corridor.

2.4.23 Four tracking and track alignment works will be carried out on the existing railway between Wood Lane Underbridge (MVN2/190) and Mirfield Station. Through this corridor the railway passes under Woodend Lane Overbridge (MVN2/191) and across Mirfield Viaduct (MVN2/192).

2.4.24 Mirfield Station is currently formed from an island platform (and side platform (Platform 3) adjacent to the car park. The new track alignment will see the slow lines serviced by an island platform. No platforms will be provided to the fast lines at this location as express services do not call at Mirfield Station.

2.4.25 As the Scheme passes into the Ravensthorpe area the fast lines are positioned to the south of the proposed railway alignment throughout (new railway for a length of 1.3km), To achieve this layout, the fast lines need to cross over the slow lines towards Wakefield (MVN) and are therefore on a rising gradient at the location. The grade separated junction is formed from a concrete intersection structure (Flyover Intersection (RBA/1)) and earthwork embankments which carry the railway alignment onto the new Baker Viaduct Underbridge (RBA/2). The works for the grade separated junction and subsequent levels change in the railway at this location will also mean that works are needed to re-align the Calder Road Overbridge (MVN2/202).

2.4.26 The multi-span Baker Viaduct Underbridge (RBA/2) is proposed to carry the fast and slow lines over the Calder and Hebble Navigation Canal, and the River Calder.

2.4.27 The existing railway over the River Calder floodplain up to Thornhill Road (approx. 1.5km) is to be decommissioned as operational railway. This includes the Grade II listed cast iron viaduct structures, Calder & Hebble Canal Underbridge (MDL1/6) and River Calder Underbridge (MDL1/8)). No future plans for these structures have been identified and at present should be assumed to be closed and retained by NR as redundant assets.

2.4.28 Track realignment works are still necessary in the area to the east of the new viaduct with the railway alignment moved to the north for line speed improvement. The railway returns to the existing rail corridor at the Watergate Road Underbridge (MDL1/13) and reverts back to two tracks at this location.

Works to tunnel, viaduct, overbridge & underbridge structures

2.4.29 Works are required as part of the Scheme to a number of existing tunnel, viaduct, overbridge and underbridge structures. These viaduct, overbridge or underbridge works will include:

- Demolition of existing bridge decks or construction of new deck; to accommodate OLE or to allow required clearances to allow safe operation of the railway;
- Works to parapet heights to ensure safe operation of the railway;
- Strengthening works to accommodate increase traffic volumes; and
- Full demolition and reconstruction of bridges.

2.4.30 An underbridge is defined as a structure which carries the railway over a highway, footpath or other amenity. An overbridge is defined as a structure which carries a highway, footpath or other amenity over the railway.

2.4.31 The Scheme requires interventions to 34 existing tunnel, viaduct, overbridge and underbridge structures (hereafter referred to as “structures”) as a result of changes to track geometry, line speed, installation of overhead electrification equipment as well as clearances for overhead electrification equipment. The Scheme will require demolition and rebuild of seven structures. In addition, four new overbridges (footbridges) will be delivered at stations in the Scheme.

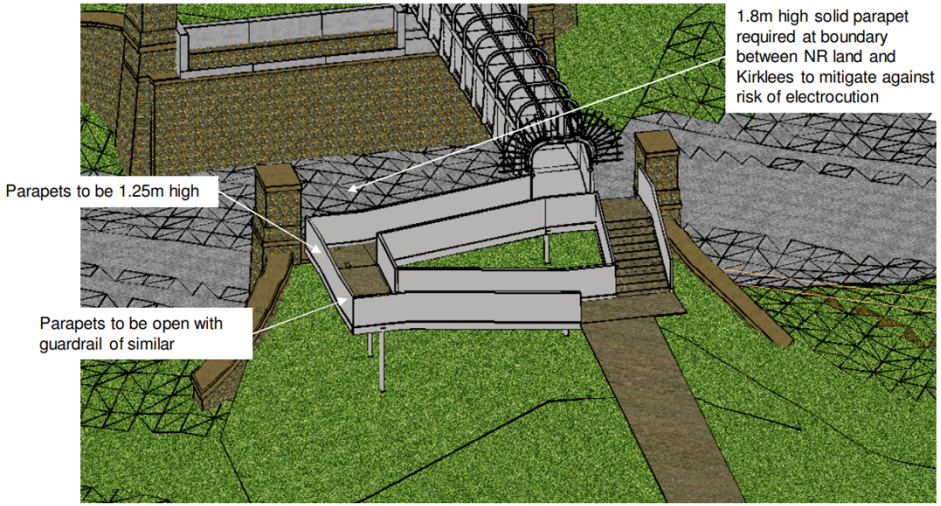
2.4.32 Where new or reconstructed highway bridge structures are proposed, works are also likely to be required to the approaching highway to ensure it ties into the existing highway network and surfacing, while meeting appropriate highway design and safety standards further information on these works is set out within Table 2-2 and considered within Chapter 14 (Traffic and transport) of the ES.

2.4.33 Table 2-2 summarises the works to structures within the Scheme area.

Table 2-2 Proposed works to structure

Route Section	Structure number and name	Proposed works
1 – Huddersfield	Gledholt Tunnels (MVL3/86 (north) & MVL3/87 (south))	• Track lowering required in both tunnel bores to allow for construction of OLE (up to 300mm) • Lighting and emergency signage to be provided throughout the tunnel • Localised grouting works will be required to be undertaken • Western portal of the tunnel is Grade II listed – no works planned which will impact on this listed asset • Ventilation of the tunnels will be required during the construction works which will be provided via a forced air ventilation system using the existing train shafts at Springwood Road
1 – Huddersfield	Huddersfield Tunnels (MVL3/88 (north) & MVL3/89 (south))	• Track lowering required in both tunnel bores to allow for construction of OLE (up to 300mm) • Lighting and emergency signage to be provided throughout the tunnel • Rock anchors required to provide additional support/strengthening throughout the tunnel. Anchors will extend up to 5m beyond tunnel wall • Ventilation of the tunnels will be required during the construction works which will be provided via a forced air ventilation system using the existing air shafts at Springwood Road • Works to reposition the Yorkshire Water asset (main sewer) which runs beneath Westgate in the roof of Huddersfield Tunnel
1 – Huddersfield	Westgate Overbridge (MVL3/90)	• Bridge is located at the eastern end of Huddersfield Tunnel • The height of the parapet on the bridge will be increased to railway standards to allow overhead line equipment to pass safely underneath • The existing bridge copers will be removed and replaced with concrete copers to achieve a 1.85m parapet height (currently 1.5m in height) • Anti-climb measures will be installed on top of utility boxes (on the eastern side of the bridge) the exact details of the measures are to be confirmed and agreed with the Local Planning Authority (LPA) prior to construction
1 – Huddersfield	Huddersfield Viaduct (MVL3/92)	• Strengthening works are required along the length of viaduct together with localised repairs to arches where necessary, these works includes pinning and grouting • Access will be from the top of the viaduct i.e. from the railway. However, scaffolding will be erected along the viaduct to allow access from road level • Specific works to particular spans of the Viaduct are set out in more detail below • Structure is Grade II listed
1 – Huddersfield	Huddersfield Viaduct – Span 1 –	• As part of the Huddersfield Station works, there is a requirement to extend a number of the platforms over the John William Street Bridge. The current structural arrangement of the bridge clashes with the proposed

Route Section	Structure number and name	Proposed works
	John William Street Underbridge (MVL3/92(2))	track and platform works, therefore the existing bridge deck will be removed and replaced with a new single span bridge deck. The works will also necessitate the widening of the John William Street Bridge deck • Structural survey works are ongoing. The cast iron parapets will be reused or replaced dependent on their condition (exact details to be set out in the Conservation Implementation Management Plan (CIMP) which will be approved in accordance with a condition attached to the Listed Building Consent for Huddersfield Viaduct (NR17) • Minimum vertical road clearance of 5.128m is to be maintained • A fire escape route is also to be provided from the north end of the new and extended platform 2 over John William Street Bridge • Temporary Highway and footway closures will be required during the works • Structure is Grade II listed
1 – Huddersfield	Huddersfield Viaduct – Span 4 – Fitzwilliam Street Underbridge (MVL3/92(3))	• Refurbishment works are required to this asset which include: ○ Substructure repairs including removal and reinstatement of the pier to the south-western corner of the structure ○ Strengthening to cross girders ○ Removal of parapet and replacement with replica in cast iron • Temporary Highway and footway closures will be required during the works • Structure is Grade II listed
1 – Huddersfield	Huddersfield Viaduct – Span 29 Bradford Road Underbridge (MVL3/92(9))	• Existing bridge deck to be removed and replaced with prestressed concrete beams. • Additional masonry pilasters/buttresses will be formed at the corners of the new abutments into which the concrete parapet will join • New concrete abutments to be built with stone facing in front of existing sandstone at both ends and, on both elevations, • The masonry arch in the centre of span 29 will be retained • Temporary Highway and footway closures will be required during the works • Structure is Grade II listed
2 – Hillhouse and Fartown	Red Doles Road Underbridge (MVL3/96)	• Track works include provision of additional two tracks and track realignment • The new tracks will be installed to the south of the existing tracks (within the existing railway corridor) • Two new bridge decks will be installed to span Red Doles Road to accommodate these new tracks. • Proposal is for a painted steel u-deck (to match existing structure). The bridge will be constructed using the historic abutments. • Temporary highway, footway and Public Right of Way (PRoW) closures will be required during the works

Route Section	Structure number and name	Proposed works
2 – Hillhouse and Fartown	Field House Overbridge (MVL3/98)	• To provide sufficient vertical clearance for OLE below the structure, the new footbridge deck level needs to be higher thereby affecting the tie-ins into the approach paths • Works include removal of existing bridge deck to be replaced with new 16m span weathering steel footbridge • On the northern approach the new footbridge ties into the existing footpath within the bridge span. On the southern approach 10 steps and a ramp are proposed. • Galvanised steel canopy to be fixed to footbridge to prevent trespass/vandalism. • Footpath width is to be retained at 3m as per existing • Due to physical space constraints an access ramp complaint Department of Transport Design Standards for Accessible Station guidelines (maximum 1 in 20 slope) cannot be provided on the southern side. The proposal is to install a non-compliant ramp (maximum 1 in 9 slope) and access steps from south (to note the existing access from the bridge is a 1 in 4 slope so whilst not complaint with the standards it is a betterment to the existing. • The exact form of the ramped structure is not yet confirmed, the current design assumption is that this will be a steel ramp built on piers). An artist's impression of the likely works is shown below. • Temporary PRoW closures will be required during the works • A 2m high fence is to be installed to prevent unauthorised access to the area under the ramp. 

Route Section	Structure number and name	Proposed works
2 – Hillhouse and Fartown	Ridings Underbridge (MVL3/99)	• The current underbridge comprises two adjoining structures: a metallic span to the north side and a stone arch to the south side. • The metallic bridge deck on the north side of the existing railway is not wide enough to carry the additional tracks required by the Scheme. The metallic bridge deck requires replacement with a wider structure. • Existing metallic deck and girders are to be removed and the structure to be infilled. • Precast concrete arch sections to be installed prior to infilling to provide arch profile outside metallic deck along PRoW • Reinforced soil wall required to north • Temporary PRoW closures will be required during the works • Agreed (with Kirklees Council) that minimum footpath height is to be no lower than existing • Utilities protection or diversion works required in relation to existing electricity cabling and fibre broadband. • Construction access will predominantly via the greenway (National Cycle Network (NCN) Route 69) however access will also be gained from the south via Peace Pit Lane. Access from the south will be restricted to light goods vehicles and small plant due to the constraints of the canal bridge. A construction compound/materials storage area associated with the works will be located on the Leeds Road Sport Complex.
2 – Hillhouse and Fartown	Peel's Pit Underbridge (MVL3/100)	• Existing structure is an arch underbridge • The Scheme will result in the alignment of the new tracks running outside the footprint of the existing bridge. New lines will utilise the existing area of embankment (to the north) • Southern elevation of arch is to be closed off using a blockwork wall and foam concrete • Embankment regrading works are proposed to the north of the structure to retain the existing railway embankment • Temporary PRoW closures will be required during the works • Removal of northern parapet • Diversion or protection works to existing buried services
4 – Colne Bridge and Battyeford	Bradley's No.2 (BBW/1) Overbridge (MVL3/105)	• The addition of OLE to the railway corridor results in the need to raise the structure parapets to ensure that OLE can pass safely underneath • The parapet (using galvanised perforated steel angle bolted on top of existing copers) will be raised to minimum height of 1.85m over the railway and 1.55m on the approaches • Removal of historic abutment

Route Section	Structure number and name	Proposed works
4 – Colne Bridge and Battyeford	B6118 Bridge Road Overbridge (MVL3/107)	• Existing 4 span masonry arch – railway passes through one arch only. Clash both vertically and horizontally with permanent way (p-way[4]) and OLE. • Other arches not used, or used for access • A new bridge will be constructed offline to the east of the existing structure. Clear span of circa 20m with composite deck structure weathering steel beams, precast concrete deck sections and steel parapet. External finishes are to be confirmed and will be agreed with relevant stakeholders • Two central arches of the existing structure will require demolition. The two other spans are to be infilled and will abut the new structure • Existing abutments will be retained as part of permanent works • Temporary Highway and footway closures will be required during the works • The highway width is to be increased to 7.3m in line with modern standards. One 2.0m footway will be provided (to the east) to tie into the existing provision. • Vehicle restraint systems to be provided on bridge approach. • Structure is Grade II listed
4 – Colne Bridge and Battyeford	Huddersfield Broad Canal (MVL3/108 and MVL3/108S)	• The new fast lines will be constructed to the south side of the existing railway corridor and use the redundant MVL3/108S span to cross the canal. • Works will involve reconstruction of 17.75m steel deck superstructure on the existing substructure at MVL3/108S. • Slow lines will continue across existing MVL3/108 bridge • The new structure will extend approximately 2.3m further south than currently to facilitate the fast track alignment and pipe bridge • The existing Yorkshire Water sludge main requires diversion due to works to construct new bridge deck. A separate pipe crossing will be provided to carry the Yorkshire Water pipe and to provide a safe walking route for railway maintenance personnel. Weathered steel parapets are proposed which will encompass the bridge, pipe bridge and maintenance walkway to give the visual impression of a single structure. • Temporary closures of towpath and canal will be required during the works • The existing headroom to the canal (3.35m) will be retained.

[4] The system of earthworks, drainage, structures, and trackwork (but excluding signalling and communications systems) completed to the required clearance, grade and alignment in readiness for rail traffic.

Route Section	Structure number and name	Proposed works
4 – Colne Bridge and Battyeford	Colne Viaduct Underbridge (MVL3/109)	• The structure carries the existing railway lines over the River Colne. It is a 3-span gritstone structure with one span having been replaced in steel. • There is no public access to land either side of the river in this location. • New fast lines will be constructed to the south side of the existing railway corridor and use the existing redundant spans to cross the river. In order to support the two new fast lines, the metallic deck needs to be modified and will be replaced with a new reinforced concrete deck • Diversion of Yorkshire Water sewer main required - Two existing structures (masonry and steel) will both be modified to include cantilever structure for walkway and for diverted main to south of line.
4 – Colne Bridge and Battyeford	Parks Overbridge (MVL3/110 and MVL4/1)	• Structures are wrought iron girder bridges with brick abutments which form a private access to the Calder Valley Yorkshire Water site. The proposed track alignment clashes with the existing bridge supports and there is insufficient clearance to allow OLE to pass beneath. • Works will require construction of a new 2 to 3 span bridge comprising a weathering steel deck. • Works will involve an offline construction directly to the east of existing structure to enable continued access to Calder Valley Yorkshire Water site during construction • Existing services will also be diverted to the new bridge. • Following construction of the new bridge, the existing structure will be demolished.
4 – Colne Bridge and Battyeford	Cooper Bridge Intersection (MVL4/2)	• Majority of existing substructure (abutments and foundations) to be retained • Replacement of existing masonry arch with new 2 span continuous precast concrete twin deck 6m in span • Precast portal deck frames proposed for deck construction • Disused south bore to be retained to provide maintenance access through existing refuges along pier, as currently.
4 – Colne Bridge and Battyeford	Heaton Lane Footbridge (MVL4/4) & Helm Lane Underbridge (MVN2/188)	• Both structures carry a PRoW • The existing footbridge does not provide adequate vertical or horizontal clearance to safely accommodate OLE for the existing line. • The Scheme will replace the current stepped footbridge with a new stepped footbridge to modern railway standards. This includes a 2m clear width walkway and a solid parapet 1.8m in height. The bridge including the parapet will be formed from weathering steel. The inside face of the parapet will be painted (colour to be confirmed). • The replacement of Heaton Lodge Footbridge means that Helm Lane Underpass (MVN2/188) will need to be relocated and extended. The underpass will be formed from two short concrete portal structures each about 10m in length. The northerly structure combines pedestrian and maintenance vehicle access and has a clear height of 3.25m. The southerly structure is for pedestrian use only and has a clear height of 2.60m.

Route Section	Structure number and name	Proposed works
		Both of these clearances provide significant benefit over the existing structure which at its shallowest provides less than 1.70m of vertical clearance for users. • Offline construction of replacement new subway 100m east of existing underpass. New location allows more space for grading of approaches. • The existing underpass will be infilled • Temporary PRoW closures will be required during the works • The existing footbridge and underpass are both currently unlit and the existing footbridge is uncovered. These conditions will remain with the replacement structures.
5 – Mirfield and Lower Hopton	Woodend Road Overbridge (MVN2/191)	• The existing footbridge does not provide adequate vertical clearance to safely accommodate electrification of the existing line • Removal of existing bridge deck (not to be replaced) • Existing structure has been closed and there are no rights of access over the structure • Utilities to be diverted underground under the railway corridor • Bridge abutments will remain in-situ
5 – Mirfield and Lower Hopton	Mirfield Viaduct Underbridge (MVN2/192 and 192A)	• An additional track will be added to the southerly structure MVN2/192A to complete the proposed 4 track railway. • Strengthening works required along the viaduct • OLE provision including portal structures • Mirfield Viaduct Underbridge (MVN2/192) is Grade II listed (stone arches to north elevation only) • Temporary highway and footway closures will be required during the works
5 – Mirfield and Lower Hopton	Station Road Underbridge (MVN2/193)	• The existing underbridge does not provide adequate horizontal clearance for 4 tracking and works within the station, including relocation of platforms • Removal of eastern abutment • Existing deck is to be removed and replaced with a wrought iron bridge deck • Step free station access will be provided to the east of Station Road • Temporary Highway and footway closures will be required during the works
5 – Mirfield and Lower Hopton	Wheatley's Underbridge (MVN2/196)	• 5-span skew arch structure carrying the railway across the River Calder. • The viaduct currently carries three lines which is to be increased to 4 • Installation of OLE – two portals over the length of the structure. Infrastructure to be installed within the footprint of the existing parapet • Glass Reinforced Plastic (GRP) handrail to be installed on the north side of the structure due to sub-standard parapet height

Route Section	Structure number and name	Proposed works
		• Structure is Grade II listed
6 – Ravensthorpe and Westtown	Sands Lane Overbridge (MNV2/199)	• Single span overbridge • The height of the parapet on the bridge will be increased to railway standards to allow OLE to pass safely underneath. • The parapet will be raised to a height of 1.85m using concrete steeple copers. Chevaux de frise will be provided for safety and security. • Temporary PRoW closures will be required during the works • The existing pedestrian gate on the northern approach which provides access for railway maintenance staff will be retained. An additional pedestrian gate will be provided on the southern approach for rail.
6 – Ravensthorpe and Westtown	Hunger Hill Overbridge (MNV2/201)	• Single span overbridge which carries Bridleway DEW/1/10 over the railway. • The height of the parapet on the bridge will be increased to railway standards to allow OLE to pass safely underneath. • The parapet will be raised to a minimum height of 1.85m using steel angle-coloured to match the existing. On the southern approach existing stone copers will be replaced with new concrete steeple copers to a height of 1.55m (to ensure compliance with Equalities Act). • Chevaux de frise will be provided for safety and security • Temporary PRoW closures will be required during the works
6 – Ravensthorpe and Westtown	Calder Road Overbridge (MNV2/202)	• The current structure is too low to allow the change in vertical alignment of the tracks to facilitate construction of the Flyover Intersection (RBA/1). • Calder Road bridge is a concrete beam structure with brick parapets, it carries a two-lane carriageway and one 1.4m footway, located in the eastern side. There is currently no footway provision on the west side. • A new bridge will be constructed to the west of the existing bridge • The new overbridge is formed of two spans. A short span over the fast lines will be of concrete slab construction, and a longer span over the slow lines and station platform will be formed of weathering steel beams with a concrete deck slab. • The parapets will be formed of steel high containment barriers with painted steel infill panels. The colour of the parapet infill panels is to be agreed. • The proposed highway realignment includes a roundabout to the south of the railway before it ties back into Ravensthorpe Road. • The new station is accessed via the roundabout. • Temporary highway and footway closures will be required during the works • Temporary PRoW closures will be required during the works

Route Section	Structure number and name	Proposed works
		• Four junctions are altered as part of the Calder Road works. Entrances to commercial properties to the north and south of the railway are reconfigured to provide access. The existing access road to Ravensthorpe Station will be stopped up, its entrance onto the new Calder Road alignment will be modified for its future use as a maintenance access road for the railway
6 – Ravensthorpe and Westtown	Calder Road River Bridge Overbridge (MDL1/3)	• To facilitate the works to Calder Road Overbridge (MVN2/202) there is a need to carry out minor highway modifications to the highway at Calder Road River Bridge Overbridge (MDL1/3). This includes tie-in from the new highway to the existing and an increase in the road surface on the bridge by approximately 0.5m maximum at its southerly abutment.
6 – Ravensthorpe and Westtown	Calder & Hebble Navigation Underbridge (MDL1/6) and River Calder Underbridge (MDL1/8)	• These two underbridges span the Calder and Hebble Navigation and River Calder respectively between Ravensthorpe and Dewsbury. • As these existing assets are unable to carry the proposed new four track arrangement due to horizontal space constraints and also from a loading perspective the railway will be diverted away from these structures and will cross the Calder and Hebble Navigation and River Calder on the new Baker Viaduct Underbridge (RBA/2). • Works planned included removal of the track bed across both structures • Fencing will be installed to prevent unauthorised access to the structures • Structures are Grade II listed. Following construction of the Scheme these structures will become redundant but will remain within Network Rail's ownership and will be subject to a future maintenance programme appropriate to their Listed designation.
6 – Ravensthorpe and Westtown	Flyover Intersection (RBA/1)	• To achieve the grade separated junction to enable the fast lines to cross over the slow lines towards Wakefield a new intersection structure will be constructed. The structure will be approximately 120m long of variable width (10m – 16m) and comprise a reinforced concrete box section.
6 – Ravensthorpe and Westtown	Baker Viaduct Underbridge (RBA/2)	• Construction of new 9-span viaduct to carry the fast and slow lines (new railway) (300-400m long) • A single span accommodates the Calder and Hebble Navigation and its towpath. • A back-span is provided to the west of the navigation to avoid a heavy abutment immediately adjacent to the waterway that could adversely affect setting. A separate span crosses the Spen Valley Greenway. • Sheet piles may be needed behind canal edge wall, no works are proposed in the canal. • It is necessary to position training walls in the banks of the River Calder due to the span width across the river. • The proposed new 9-span viaduct will cross public rights of way (Calder Valley Greenway and public footpath along the west bank for the River Calder) and permissive paths (Calder and Hebble Navigation towpath and Spen Valley Greenway). Temporary closures will be required during the works

Route Section	Structure number and name	Proposed works
		• Temporary closures of towpath and canal will be required during the works • Clearance from the Spen Valley Greenway to the viaduct is 3.25m, anti-climb plates will be installed to the bottom of the viaduct). Anti-climb plates will also be installed at the eastern abutment end. • The abutment to the east links to the retaining wall proposed at the recycling centre.
6 – Ravensthorpe and Westtown	Lees Hall Farm Underbridge (MVN2/204)	• Existing structure is a single-span masonry arch underbridge carrying the Wakefield line. • To facilitate the Flyover Intersection (RBA/1) at the Ravensthorpe junction, the railway lines will be realigned to the north of their current location • Proposal is to infill the structure. The southern side of the infill will have a masonry wall façade. On the north side, the widened embankment will be constructed up to the north face of the infilled structure. • No requirement for construction of any replacement or new structure at this location.
6 – Ravensthorpe and Westtown	B6117 Fall Lane, Thornhill Road Underbridge (MDL1/9)	• The new railway alignment moves the railway away from the current structure and therefore a new structure is required. • The existing structure carries two tracks over a single two-lane carriageway (B6117 Thornhill Road) and sits adjacent to the highway junction with Fall Lane. • The highway in this location also carries a large number of significant utilities which will need to be diverted during the highway works, this includes underground electricity cables, clean water supply, low pressure gas main and telecommunications cables. • Currently the width of the footways narrows on the approach and through the underbridge (approximately 1.2m at the minimum). No change to footway width is proposed through the Scheme • The proposed structure will approximately match the span and skew angle of the existing and will allow for the potential reuse of the existing B6117 Fall Lane, Thornhill Road Underbridge (MDL1/9) deck, albeit with modification to the steelwork. The new abutments will be located directly adjacent to the existing. A new single-span U-deck metallic underbridge will be installed. Cantilever walkways will be attached to both sides of the deck to maintain safe walking routes adjacent to both lines. • The structure will retain a minimum 5.3m headroom clearance between the finished highway level and the soffit of the new bridge. • Proposed footway width will be 2m • Temporary Highway and footway closures will be required during the works
6 – Ravensthorpe and Westtown	Occupation Underbridge (MDL1/10)	• Occupation Underbridge (MDL1/10) is a masonry arch bridge and provides private right of access to a single residential property from Thornhill Road. It is not accessible to the public. • Proposal is to infill this structure

Route Section	Structure number and name	Proposed works
		• Alternative access to be provided for the residential property which is currently accessed via the Occupation Underbridge. A new access will be provided to the south of the property from Calder Bank Road • Structure is Grade II listed
6 – Ravensthorpe and Westtown	Toad Holes Underbridge (MDL1/12)	• Bridge was partially infilled in circa 1970 to facilitate the widening of Watergate Road. • The Scheme proposes to infill the structure (southern side) due to its poor condition. • Existing parapets to be retained • Existing cast iron beams to be retained • Proposed retaining wall to southern elevation with masonry face – to match the existing wingwalls on this elevation • Structure is Grade II listed
6 – Ravensthorpe and Westtown	Ming Hill Underbridge (MDL1/14)	• Bridge was partially infilled in circa 1970 to facilitate the widening of Watergate Road. • The Scheme proposes to infill the structure (southern side) due to the potential future maintenance liability of retaining the structure • Existing parapets to be retained • Existing cast iron girders to southern elevation to be retained • Existing central bridge deck (steel girders and brick arches) to be removed • Proposed retaining wall to southern elevation with masonry face – to match the existing wingwalls on this elevation • Structure is Grade II listed

2.4.34 As highlighted in Chapter 1 (Introduction) of this ES, Network Rail has the right to carry out certain development on its operational land without having to make a planning application (Permitted Development Rights). As such the powers required to undertake these works are not included in the Order application but are also included in and assessed through the EIA, forming part of Scheme. These works include works to the following overbridges (as listed in Table 2-2):

- Demolition of the bridge deck at Woodend Road Overbridge (MVN2/191);
- Parapet works and access works at MNV2/199 Sands Lane Overbridge (MNV2/199); and
- Parapet works at Hunger Hill Overbridge (MNV2/201).

2.4.35 Works are proposed to a number of Listed Assets across the Scheme area. Listed Building Consent (LBC) Applications will be submitted to cover these works and will be submitted in tandem with the application for the Transport and Works Act Order (TWAO). The following applications will be made:

- NR17 – Listed Building Application – Huddersfield Station;
- NR18 – Listed Building Application – Huddersfield Viaduct (MVL3/92);
- NR19 – Listed Building Application – Wheatley's Overbridge (MVL3/103);
- NR20 – Listed Building Application – B6118 Bridge Road Overbridge (MVL3/107);
- NR21 – Listed Building Application – Mirfield Viaduct (MVN2/192);
- NR22 – Listed Building Application – Wheatley's Underbridge (MVN2/196);
- NR23 – Listed Building Application – Occupation Underbridge (MDL1/10)
- NR24 – Listed Building Application – Toad Holes, Dewsbury Underbridge (MDL1/12); and
- NR25 – Listed Building Application – Ming Hill Underbridge (MDL1/14).

2.4.36 As these LBC applications, made to the LPA in accordance with the requirements of the Planning (Listed Buildings and Conservation Areas) Act1990 , are required in consequence of proposals included in the application for the TWAO they will be subject to the automatic "call in" for determination by Secretary of State required by section 12(3A) of the Planning (Listed Buildings and Conservation Areas) Act 1990.

Public Rights of Way (PRoW) works

2.4.37 A network of PRoW is located within, or close to, the Scheme area. This PRoW network comprises a mix of public footpaths, bridleways and byways. Several of these rights of way cross the existing railway, some below the railway others cross over the railway.

2.4.38 In the temporary case there is a need to temporarily close or divert a number of rights of way. Details of the proposed works and how they may impact on the PRoW network in both the temporary and permanent case are set out in Table 2-3.

2.4.39 The location of these rights of way together with the proposed diversion routes are shown in Figure 2-2 (Volume 4 of this ES).

2.4.40 As part of the Scheme there are no proposals to permanently extinguish any PRoW however the works will necessitate the permanent diversion of a number of PRoW. Locations are set out below and details are shown in Figure 2-2:

- HUD42/10 – Permanent diversion of footpath due to replacement of Field House Overbridge (MVL3/98);
- Birkby Bradley Greenway (NCN Route 69) – Permanent diversion/realignment of the greenway between Ridings Underbridge (MVL3/99) and Whitacre Street (MVL3/101) (due to embankment works at Deighton Station);

- HUD51/10 – Permanent diversion of footpath due to the A62 Leeds Road Overbridge (MVL3/102) works;
- NCN Route 66 – Permanent diversion over new alignment of Wheatley's Overbridge (MVL3/103);
- KIR/240/10 – Permanent diversion/realignment of PRoW over a new footbridge (MVN2/188a) and through new underpass at Helm Lane Underbridge (MVN2/188); and
- DEW/3/10 – Bridleway – permanent diversion/realignment between Hunger Hill Overbridge (MVN2/201) and Ravensthorpe Road.

Table 2-3 Proposed works to PRoW network

Route Section	PRoW reference	Type	Temporary impacts during construction	Impacts during operation
1 – Huddersfield	HUD/327/10	Footpath	Temporary closure during construction works at Springwood Junction. Diversion route proposed.	None
1 – Huddersfield	HUD/327/20	Footpath	Temporary closure during construction works at Springwood Junction. Diversion route proposed.	None
1 – Huddersfield	HUD/327/30	Footpath	No works - no impacts	None
1 – Huddersfield	HUD/328/10	Footpath	Temporary closure during construction works at Springwood Junction. Diversion route proposed.	None
1 – Huddersfield	HUD328/20	Footpath	Temporary closure during construction works at Springwood Junction. Diversion route proposed.	None
1 – Huddersfield	HUD328/30	Footpath	No works required to footpath – but temporarily closed during works at Springwood Junction. Diversion route proposed.	None
1 – Huddersfield	HUD/329/10	Footpath	Temporary closure during construction works at Springwood Junction. Diversion route proposed.	None
1 – Huddersfield	HUD/336/10	Footpath	No works - no impacts	None
1 – Huddersfield	HUD/338/10	Footpath	Temporary closure during construction on viaduct. No diversion route proposed.	None
2 – Hillhouse and Fartown	HUD/58/10	Byway	Temporary closure during construction works through Deighton Corridor including Red Doles Road. Diversion route proposed.	None
2 – Hillhouse and Fartown	HUD/57/10	Footpath	Temporary closure of footpath from Red Doles bridge to north of canal (canal lock bridge will be kept open) during construction works through Deighton Corridor including Red Doles Road. Diversion route proposed.	None
2 – Hillhouse and Fartown	HUD/56/20	Footpath	Potential for construction traffic to utilise PRoW/access road but no requirement to temporarily close the PRoW.	None
2 – Hillhouse and Fartown	Canal Towpath to south of Red Doles Road	Towpath	No works proposed	None
2 – Hillhouse and Fartown	Birkby Bradley Greenway	NCN 69	Temporary closure from Field House Overbridge (MVL3/98) to Peel's Pit Underbridge (MVL3/100) to accommodate construction works. Diversion route proposed.	None

Route Section	PRoW reference	Type	Temporary impacts during construction	Impacts during operation
2 – Hillhouse and Fartown	HUD/41/10	Byway	Temporary closure during construction works through Deighton Corridor including Field House Overbridge (MVL3/98). Diversion route proposed.	None
2 – Hillhouse and Fartown	HUD/41/20	Byway	Temporary closure during construction works through Deighton Corridor including Field House Overbridge (MVL3/98). Diversion route proposed.	None
2 – Hillhouse and Fartown	HUD/41/30	Byway	Potential for construction traffic to utilise PRoW/access road but no requirement to temporarily close the PRoW.	None
2 – Hillhouse and Fartown	HUD/43/30	Byway	No works – no impacts	None
2 – Hillhouse and Fartown	Canal Towpath to south of Fieldhouse Lane	Towpath	Potential for construction traffic to cross towpath in vicinity of canal bridge (Field House Overbridge (MVL3/98)). Crossing point to be installed during construction and other necessary mitigation measures will be employed as appropriate to manage the interface with construction traffic	None
2 – Hillhouse and Fartown	HUD/44/20	Footpath	Temporary closure during construction works through Deighton Corridor including Ridings Underbridge (MVL3/99). Diversion route proposed.	None
2 – Hillhouse and Fartown	HUD/44/30	Footpath	Temporary closure during construction works through Deighton Corridor including Ridings Underbridge (MVL399). Diversion route proposed.	None
2 – Hillhouse and Fartown	HUD/44/40	Footpath	Temporary closure during construction works through Deighton Corridor including Ridings Underbridge. Diversion route proposed.	None
2 – Hillhouse and Fartown	HUD/43/40	Byway	Construction traffic will be routed down byway. Temporary closures may be required.	None
2 – Hillhouse and Fartown	HUD/43/50	Byway	Construction traffic will be routed down byway. Temporary closures may be required.	None
2 – Hillhouse and Fartown	Canal Towpath to south of Ridings	Towpath	Potential for construction traffic to cross towpath in vicinity of canal bridge (Ridings Underbridge (MVL3/99)). Pedestrian crossing point to be provided across vehicle access route during construction works.	None

Route Section	PRoW reference	Type	Temporary impacts during construction	Impacts during operation
2 – Hillhouse and Fartown and 3 – Deighton and Bradley	Birkby Bradley Greenway	NCN 69	Temporary closure to accommodate construction works between Ridings Underbridge (MVL3/99) and Whitacre Street. Diversion route proposed	Permanent diversion/realignment of Greenway (due to embankment works and reconstruction of Deighton Station)
3 – Deighton and Bradley	HUD/51/10	Footpath	Temporary closure during construction works at A62 Leeds Road Overbridge (MVL3/102).	Permanent diversion/realignment of footpath to accommodate embankment works at A62
3 – Deighton and Bradley	HUD/51/20	Footpath	No works – no impacts	None
3 – Deighton and Bradley	Calder Valley Greenway	NCN 66	Temporary closure during construction plus diversion for construction of Wheatley's Overbridge (MVL3/103). Diversion Route proposed.	Permanent diversion over new alignment of Wheatley's Overbridge (MVL3/103).
4 – Colne Bridge and Battyeford	Calder Valley Greenway	NCN 66	Potential for construction traffic to cross Greenway in vicinity of Paul Lane compound. Crossing point to be installed during construction compound setup which may require temporary closure. Diversion/realignment will be provided if temporary closure required	None
4 – Colne Bridge and Battyeford	Canal towpath to south of Colne Bridge Road	Towpath	Temporary closure during construction works. Diversion proposed.	None
4 – Colne Bridge and Battyeford	KIR/240/10	Footpath	Temporary closure of footpath during construction in Heaton Lodge area. No diversion proposed due to lack of suitable alternatives	Permanent diversion/ realignment of PRoW over new footbridge and through new underpass
6 – Ravensthorpe and Westtown	DEW/8/30 (Bridleway)	Bridleway	Temporary closure during works to divert overhead power lines, no reasonable diversion available	None
6 – Ravensthorpe and Westtown	DEW/8/50	Footpath	Temporary closure during works to divert overhead power lines, no reasonable diversion available	None

Route Section	PRoW reference	Type	Temporary impacts during construction	Impacts during operation
6 – Ravensthorpe and Westtown	DEW/12/10	Footpath	No works required	None
6 – Ravensthorpe and Westtown	DEW/5/20 (Footpath)	Footpath	Temporary closure during works to divert overhead power lines, no reasonable diversion available	None
6 – Ravensthorpe and Westtown	DEW/6/10	Bridleway	Temporary closure during works to divert overhead power lines. Following which diversion would be available via DEW/94/10 then DEW/12/40, DEW/12/30, DEW/12/10, DEW/12/20, DEW/8/30, DEW/7/10	None
6 – Ravensthorpe and Westtown	DEW/6/20	Bridleway	Temporary closure during works to divert overhead power lines. Following which diversion would be available via DEW/94/10 then DEW/12/40, DEW/12/30, DEW/12/10, DEW/12/20, DEW/8/30, DEW/7/10	None
6 – Ravensthorpe and Westtown	DEW/6/30	Bridleway	Temporary closure during works to divert overhead power lines. Following which diversion would be available via DEW/94/10 then DEW/12/40, DEW/12/30, DEW/12/10, DEW/12/20, DEW/8/30, DEW/7/10	None
6 – Ravensthorpe and Westtown	DEW/6/50	Bridleway	Temporary closure during works to divert overhead power lines. Following which diversion would be available via DEW/94/10 then DEW/12/40, DEW/12/30, DEW/12/10, DEW/12/20, DEW/8/30, DEW/7/10	None
6 – Ravensthorpe and Westtown	DEW/15/10	Bridleway	Temporary closure during works to divert overhead power lines. No reasonable diversion available.	None
6 – Ravensthorpe and Westtown	DEW/16/10	Bridleway	Temporary closure during works to divert overhead power lines. No reasonable diversion available.	None
6 – Ravensthorpe and Westtown	DEW/12/20	Footpath	Temporary closure during works to divert overhead power lines. No reasonable diversion available.	None
6 – Ravensthorpe and Westtown	DEW/12/30	Footpath	Temporary closure during works to divert overhead power lines. No reasonable diversion available.	None
6 – Ravensthorpe and Westtown	DEW/12/40	Bridleway	Temporary closure during works to divert overhead power lines. No reasonable diversion available.	None

Route Section	PRoW reference	Type	Temporary impacts during construction	Impacts during operation
6 – Ravensthorpe and Westtown	DEW/94/10	Bridleway	Temporary closure during works to divert overhead power lines. No reasonable diversion available.	None
6 – Ravensthorpe and Westtown	DEW/6/60	Bridleway	Temporary closure during works to divert overhead power lines. No reasonable diversion available.	None

Station works

2.4.41 The following stations serve the line within the Scheme area.

- Huddersfield Station;
- Deighton Station;
- Mirfield Station; and
- Ravensthorpe Station.

2.4.42 Stations within the Scheme area will be upgraded or provided to modern standards and will provide better accessibility facilities for passengers.

2.4.43 The Scheme will provide four fully accessible, and compliant stations, with step-free access, drop-off arrangements, and blue badge parking now available at all.

2.4.44 Step-free access will make travel easier for passengers with reduced mobility, as well as people with children and pushchairs, heavy luggage or shopping. Connectivity for pedestrians and others will be improved at the railway stations through improved facilities and general improvements such as tie ins with the existing facilities and cycleways. Improved connectivity will lead to wider economic benefits.

2.4.45 Office for Rail Regulation (O&RR) records[5] show the total entries and exits for different stations for a given year. Annual estimates of the number of entries/exits and interchanges at each station in the Scheme for the year 2019/20 (see Table 2-4). These estimates are based primarily on ticket sales and are produced by Steer on behalf of ORR.

Table 2-4 Estimates of station usage

Station name	2019-20 Entries & Exits - TOTAL	% change from 2018/19
Huddersfield	4,769,384	+0.4%
Deighton	79,978	+0.4%
Mirfield	447,428	-0.9%
Ravensthorpe	35,518	+0.5%
Scheme area total	5,332,208	
Manchester Victoria	9,570,816	+7.4%
Leeds	31,020,744	+0.6%

2.4.46 Patronage forecasting using the Passenger Demand Forecasting Handbook for the year 2042/43 suggests that total trips in the Scheme area will increase to 8,224,811.

Huddersfield Station

2.4.47 Huddersfield Station is located within the Town Centre off John William Street and is a Grade I Listed Building. There are commercial properties located to the north and south of the Scheme area.

2.4.48 A number of options for Huddersfield Station have been discussed with key stakeholders such as Historic England and Kirklees Council. The following provides a summary of the works (see Insert 2-3):

[5] Office of Rail & Road (O&RR) - https://dataportal.orr.gov.uk/

- Main train shed – structural works to maintain and strengthen. Two bays at Manchester end of canopy to be demolished. Two new bays at Leeds end of platform 1;
- Reinstatement of main train shed lantern;
- Smaller train shed to be demolished. New roof to be constructed to cover platforms to north.
- Free standing canopies to be constructed over island platforms to eastern end of station;
- Extension of canopy to service Penistone Line;
- CCTV, Visual and audio announcements will be provided on platforms.
- Lighting and OLE – freestanding infrastructure proposed on platforms;
- Relay room – to be demolished;
- Tea rooms – to be retained but relocated within island platform. Timber structure to be dismantled and reconstructed;
- Additional access and egress through the station and platforms is required. A covered footbridge, with stairs and a lift, is to be constructed to the eastern end of the station (Huddersfield Station Footbridge (MVL3/91AA)); and
- Extension to existing Passenger Subway (MVL3/91) (of 12.5m) required to service the new island platform to the north of the station

Insert 2-3 Visualisation of Huddersfield Station following construction of Scheme

Deighton Station

2.4.49 Deighton Station is located adjacent to Whitacre Street, north west of the A62. There are residential properties located to the north and south and commercial properties to the south of the Scheme area.

2.4.50 The station is to be retained at its existing location albeit the platforms are to be relocated west. Currently there are two circa 90m long platforms with ramped access provided to each platform directly from Whitacre Street. There is no access provided between the platforms.

2.4.51 The works will comprise;

- Construction of two platforms to serve the stopping services on the slow lines. The platforms will provide a 150m of usable platform. The current platform length is 85m;

- The fast lines will not be platformed;
- Two waiting shelters plus seating areas to be provided at 50m intervals;
- Visual and audio announcements will be provided on platforms;
- CCTV and lighting will be provided on both platforms, forecourt and station entrance;
- Station access will be via a new forecourt located to the south east of the existing station. Access will be from Whitacre Street; provision will be made for three blue badge accessible parking spaces, a maintenance parking bay, and a turning head; and
- The platform will be accessed via a new footbridge (Deighton Station Footbridge (MVL3/100B)) with stairs and a lift.

Mirfield Station

2.4.52 Mirfield Station is located off Station Road, a short distance south of Mirfield town centre and the A644, between the River Calder and the Calder and Hebble Navigation. There are residential and commercial properties located to the north and south of the Scheme area.

2.4.53 The works comprise:

- Reconstruction of the island platform. The platforms will provide a 150m of usable platform. The current platform length is 100m;
- Fast lines are proposed to run to the south of the station footprint and will not be platformed as services do not stop at this location;
- The island platform will be provided with two waiting shelter seating areas at 50m intervals;
- Improved connectivity to existing bus routes and Mirfield town centre. Step-free access will be provided from platforms to Station Road by means of a lift. This will be located to the east of Station Road. The existing access to the west of Station Road will be infilled. A new footbridge (Mirfield Station Footbridge (MVN2/193A)) will be provided from the drop off area and car park to the platform accessed via steps and a lift;
- Visual and audio announcements will be provided on platforms;
- CCTV and lighting will be provided on the platform, in the station entrance and car park; and
- The station car park is to be retained in its current location (56 spaces including 4 blue badge spaces). During construction this area will be used as a construction compound and so temporary parking will be made available to the south of the station.

Ravensthorpe Station

2.4.54 Ravensthorpe Station is currently located to the south of Ravensthorpe to the east of Calder Road. The station is accessed from Calder Road via an informal road with no drop off area or turning head.

2.4.55 The existing station is currently served by two platforms.

2.4.56 The existing station will be closed and its existing platforms demolished. A new station will be provided to the west of the realigned Calder Road. The works for the new station will comprise;

- Provision of an island platform to serve the stopping services on the slow lines. The new island platform will be 150m long with future passive provision to extend this to 200m.
- Fast lines will not be platformed;
- The platform will be provided with two waiting shelters seating areas at 50m intervals per platform;

- Visual and audio announcements will be provided on platforms;
- CCTV and lighting will be provided on both platform, forecourt and station entrance;
- The station will be accessed from the south via a new forecourt from a roundabout on the realigned Calder Road consisting of three number blue badge accessible parking spaces, a maintenance parking bay and a vehicle turning head;
- The platform will be accessed via a footbridge (Ravensthorpe Station Footbridge (MVN2/201A)) with stairs and a lift. The footbridge will be level with the new forecourt.
- The existing station (platforms and Ravensthorpe Station Footbridge (MVL1/4)) will be demolished.

2.5 Earthworks and retaining walls

2.5.1 There are existing earthworks throughout the Scheme area associated with the existing operational railway.

2.5.2 Earthworks allow the track to stay relatively level through a varied topography and allows trains to operate more efficiently by reducing the need for additional acceleration and deceleration to climb and descend climbs. Earthworks comprise:

- Embankments – where the track is running above ground level; and
- Cutting – where the track is running below ground level.

2.5.3 Works are required for a variety of reasons including;

- Widening of existing embankments or cuttings to facilitate 4 tracking or track realignment; and
- Support new infrastructure e.g. highways works.

2.5.4 In general, the design assumption is that the majority of earthworks will provide a 1 in 2 slope as standard as this provides a worst-case assumption for the land take required. The embankment slopes will be owned and maintained by Network Rail except where earthworks are already under the ownership of a third party.

2.5.5 Earthworks (new and where they have been reworked) will generally be covered in topsoil and landscaped as appropriate. Any exceptions to this will be detailed within the Landscape and Ecological Management Plan (LEMP) to be submitted as a condition attached to the deemed planning permission[6].

2.5.6 The EIA will assess the current design options as set out in Table 2-5. Where changes to earthworks are required but limited space is available, then retaining structures will be employed. The exact provision will be location specific and will be informed by the ongoing investigation works. This will be considered during the detailed design stage and may include the following options:

- Bored piled wall – A contiguous wall is formed by installing a series of individual vertical Reinforced Concrete piles. The diameter of each pile in is usually not less than 300mm;
- Gravity retaining wall this uses the mass to the wall to act as the resistance to the retained earth and is usually constructed from concrete;
- Ballast retention /gabion wall – similar to gravity wall but construction uses steel structures/cages filled with stone rather than concrete;

[6] On making an order under the Transport and Works Act 1992, the Secretary of State may direct that planning permission shall be deemed to be granted, subject to such conditions (if any) as may be specified in the direction. Network Rail are making a request to the Secretary of State for such deemed planning permission with the Transport and Works Act Order

- Embedded retaining wall/King post wall – A reinforced base created by drilling holes into the ground and filling with concrete which creates a solid structure and relies on the passive resistance of the ground for its strength;
- Earth walls – Reinforced soil slopes are typically used where levels are being raised within the Scheme area, and steep slopes or vertical structures are required. Material is compacted around layers of reinforcement to form a reinforced soil mass. The facing is then chosen based on slope angle, maintenance, and aesthetic considerations for vertical faces – generally modular blocks are used; and
- Soil nailing - Grouted steel nails installed horizontally to reinforce soils and create a gravity retaining wall.

Table 2-5 Proposed earthworks

Route Section	Works ID	Existing provision	Proposed works	Location	Dimensions (approximate)	Additional comments
1 – Huddersfield	W1	Soil embankment	Retaining structure – either king post wall or soil nailing	Eastern end of Huddersfield Viaduct, near to Hillhouse Lane (southern extent) – Up main[7]	55m length & 0.5m height	Works required to existing embankment to facilitate track widening/realignment.
2 – Hillhouse and Fartown	W2	Cutting	Retaining structure – either gabion wall or soil nailing	Emerald Lane – (southern extent) up main	300m length & 2m height	Works required due to realignment of tracks
3 – Deighton and Bradley	E1	Soil embankment	embankment widening	To east of Red Doles Road – up main	190m length & 9m high	Rework and extension of existing earthworks to facilitate track widening/realignment.
3 – Deighton and Bradley	E2	Soil embankment	Minor fill	Between Field House Overbridge (MVL3/98) and Ridings Underbridge (MVL3/99) – down main[8]	500m length & ~1m high	Earthworks to facilitate track widening/realignment.
3 – Deighton and Bradley	E3	Cutting	Widening of existing cutting – new 1 in 2 cut slope)	Deighton approach – down main	370m length & 14m high	Railway corridor is widened to the north to accommodate the additional tracks and new slow line platforms.
3 – Deighton and Bradley	W4	Cutting	Retaining structure – either gravity retaining wall or soil nailing	Deighton Station – down main	50m length & 5m height	Works to facilitate track realignment, relocation of the station platforms and works to the Whitacre Street Overbridge (MVL3/101) will necessitate provision of Retaining structures to the east and west of Whitacre Street Overbridge (MVL3/101). Retaining wall is likely to involve a
3 – Deighton and Bradley	W5	Cutting	Retaining structure – either gabion wall or soil nailing	To east of Deighton Station – down main	60m length & 5m height	

Route Section	Works ID	Existing provision	Proposed works	Location	Dimensions (approximate)	Additional comments
						soil nail solution due to the reduced construction working room when compared to a piled retaining wall option. To deliver the forecourt to the south of the proposed platforms, a faced reinforced earth wall is proposed.
3 – Deighton and Bradley	W6	Cutting	gravity wall	Between MVL3/101 and MVL3/102 - up main	300m length & 5m height	Works to facilitate track realignment
3 – Deighton and Bradley	E4	Cutting	cutting widening	Between MVL3/101 and MVL3/102 – up main	300m length & 4m height	Works to facilitate track realignment
3 – Deighton and Bradley	W7	Cutting	Embedded wall	Adjacent to MVL3/102 – down main	50m length & 0.5m height	Works to facilitate track realignment
3 – Deighton and Bradley	E6	embankment	embankment widening	Bradley Culvert (MVL3/102A) – up main	300m length & 5m height	Works to facilitate track realignment, reworking of existing embankment
3 – Deighton and Bradley	W8	soil embankment	Ballast retention wall	Area adjacent to Volkswagen (VW) site at Leeds Road – up main	125m length & 2m height	Works to facilitate track realignment
3 – Deighton and Bradley	E7	Cutting	Embedded	Area adjacent to Buy it Direct Warehouse (Neptune Way, Bradley)- down main	50m length & 0.5m height	Works to facilitate track realignment, reworking of existing embankment
4 – Colne Bridge and Battyeford	W9	Cutting	Gabion wall	Area between Bradley Junction industrial units (off Leeds Road) and the railway – down main	135m length & 3m height	Works to facilitate track realignment
4 – Colne Bridge and Battyeford	E8	Soil embankment	Gravity	Bradley Junction industrial units (off Leeds Road) – up main	125m length & 2m height	Widening of cutting to facilitate 4 tracking and track realignment

[7] For the purposes of this Scheme the up main or up line refers to the railway track that carries trains running from Leeds (Dewsbury) to Huddersfield
[8] For the purposes of this Scheme the down main or down line refers to the railway track that carries trains running Huddersfield to Leeds (Dewsbury)

Route Section	Works ID	Existing provision	Proposed works	Location	Dimensions (approximate)	Additional comments
4 – Colne Bridge and Battyeford	W10	Cutting	Retaining wall	Area at Bradley Junction – along the BBW line – up main	40m length & 3m height (assumed)	Required to facilitate 4 tracking and track realignment
4 – Colne Bridge and Battyeford	E9	Cutting	Gravity	Approach to Huddersfield Broad Canal Underbridge (MVL3/108S) – down main	135m length & 3m height	Widening of cutting to facilitate 4 tracking and track realignment
4 – Colne Bridge and Battyeford	W11	Cutting	Retaining wall	Heaton Lodge area adjacent to Colne Viaduct - up main	80m length & 3m height	Wall needed due to track realignment affecting existing embankment
4 – Colne Bridge and Battyeford	E10	Cutting	Reprofiling of earthwork	Bradley Junction - BBW line – up main	40m length & 3m height (assumed)	Widening of cutting to facilitate 4 tracking and track realignment
4 – Colne Bridge and Battyeford	E11	Cutting	Embedded	Heaton Lodge adjacent to Colne Viaduct Underbridge (MVL3/109) – up main	80m length & 3m height	New cutting (12m deep) for construction of fast lines
6 – Ravensthorpe and Westtown	W12	Cutting	Embedded	Proposed Ravensthorpe Station – up main	85m length & 12m height	Wall required due to works to construct new Ravensthorpe Station
6 – Ravensthorpe and Westtown	E12	Cutting	Embedded	New 1 in 2 cutting – Hunger Hill area	85m length & 12m height	Widening of existing cutting required for track works
6 – Ravensthorpe and Westtown	W13	At grade[9]	Gravity	Ravensthorpe Junction – Flyover Intersection (RBA/1) structure down main	100m length & 5m height	Required to support works to fast line
6 – Ravensthorpe and Westtown	W15	at grade	Gravity	Ravensthorpe Junction - Flyover Intersection (RBA/1) - up main	80m length & 5m height	Required to support works to fast line

[9] At the same level as the railway

Route Section	Works ID	Existing provision	Proposed works	Location	Dimensions (approximate)	Additional comments
6 – Ravensthorpe and Westtown	E13	at grade	Gravity	Ravensthorpe Junction – Flyover Intersection (RBA/1) – down main	100m length & 5m height	Required to support works to fast line
6 – Ravensthorpe and Westtown	W16	At grade	Gravity	Ravensthorpe Junction – down main	260m length & 2m height	Works required due to track realignment and reinforcement needed at toe of new embankment
6 – Ravensthorpe and Westtown	E14	Cutting	Gravity	Ravensthorpe Junction – adjacent to Calder Road	85m length & 5m height (assumed)	Widening of cutting for track works
6 – Ravensthorpe and Westtown	E15	Soil embankment	Gravity	Ravensthorpe Junction -flyover structure – up main	120m length & 5m height	Widening of cutting for track works
6 – Ravensthorpe and Westtown	E15a	At grade	Cutting	Existing Ravensthorpe Station -	150m length & assumed 2m height	Small cutting to accommodate new slow track
6 – Ravensthorpe and Westtown	E16	At grade	Gravity	Ravensthorpe Junction – down main	390m length & 2m height	Embankment as part of new flyover and viaduct structures. Embankment lies within the Thornhill Quarry site
6 – Ravensthorpe and Westtown	W17	Soil embankment	Reinforced earth wall	Adjacent to Kirklees Household Waste Recycling Centre (HWRC) – up main	265m length & 9m height	Earth wall required due to construction of Baker Viaduct Underbridge (RBA/2)
6 – Ravensthorpe and Westtown	E17	Soil embankment	Soil embankment	Behind Shackleton's and Armley's	120m length & 10m height	Widening of existing embankment
6 – Ravensthorpe and Westtown	E18	Soil embankment	Soil embankment	West of Thornhill Road	95m length & 9m height	Widening of existing embankment

Route Section	Works ID	Existing provision	Proposed works	Location	Dimensions (approximate)	Additional comments
6 – Ravensthorpe and Westtown	W18	Soil embankment	Reinforced concrete	New wall near Weaving Lane – up main	120m length & 9m height	Widening of existing embankment to facilitate track works
6 – Ravensthorpe and Westtown	W19	Soil embankment	King post	King Post Wall at top of embankment – up main	230m length & 1m height	Works required due to vertical track realignment at Thornhill Road
6 – Ravensthorpe and Westtown	E19	Soil embankment	Soil embankment	East of Thornhill Road	260m length & 5m height	Widening of existing embankment
6 – Ravensthorpe and Westtown	W20	Non retaining wall & soil embankment	Retaining wall & soil embankment	Between the highway (B6117 Thornhill Road and residential properties on Brookes Yard	65m length & 2.5m height	Works required due to road realignment of Thornhill Road
6 – Ravensthorpe and Westtown	E20	Soil embankment	Soil embankment	Works to Wakefield Line	480m length & 5m height	Works to realign Wakefield lines

2.6 Demolition of properties

2.6.1 Seven properties require demolition to facilitate the construction and operation of the railway as upgraded by the Scheme. This includes three residential premises and four commercial/industrial premises.

Industrial units – Hillhouse compound (two industrial units)

2.6.2 These two industrial units are situated within the Hillhouse compound in Route Section 2 and therefore both require demolition.

Heaton Lodge Cottages, Helm Lane (three residential properties)

2.6.3 These 3 private residential properties are situated adjacent to the existing line in Route Section 4 and fall under the footprint of the new fast lines through Heaton Lodge Curve and therefore all four require demolition.

Portal Frame building at MVL3/108S

2.6.4 This industrial unit is situated adjacent to the existing line in Route Section 4 close to the Huddersfield Broad Canal Underbridge (MVL3/108S) and falls under the footprint of the earthworks (embankment) in this location and therefore requires demolition.

Thornhill House, Thornhill Road, Dewsbury

2.6.5 This commercial unit is situated adjacent to the existing line in Route Section 6 close to structure Occupation Underbridge (MDL1/10) and falls under the footprint of the earthworks (embankment) in this location and therefore requires demolition.

2.7 Other railway infrastructure

Signalling

2.7.1 Signalling is essentially a traffic light system for the railway. The system allows trains to move safely around the network and ensures adequate distances are kept between services. Whilst the existing railway infrastructure for the Scheme area includes signalling; Works to provide new signalling infrastructure are required due to the realignment of the tracks and also due to the provision of four-tracking i.e. additional signalling is required to allow the railway to operate trains at higher speeds and also allow control over both the fast and slow lines.

2.7.2 Signalling structures are spaced according to the average interval between trains, the speed of trains and the presence of junctions. Structures are up to 4m tall. Insert 2-4 illustrates the typical signals that will be employed throughout the Scheme. Signals will be connected via cables which will be installed in cable routes that run adjacent to the tracks.

Insert 2-4 Example signalling infrastructure

Telecommunications

2.7.3 A telecommunications network consisting of Fixed Telecommunications Network (FTN) and wireless Global System for Mobile Communications – Railway (GSM-R) technology provides a secure communication system between the train driver and signaller. The works will impact on two existing FTNs and these will be relocated as close to their existing location as possible as part of the Scheme:

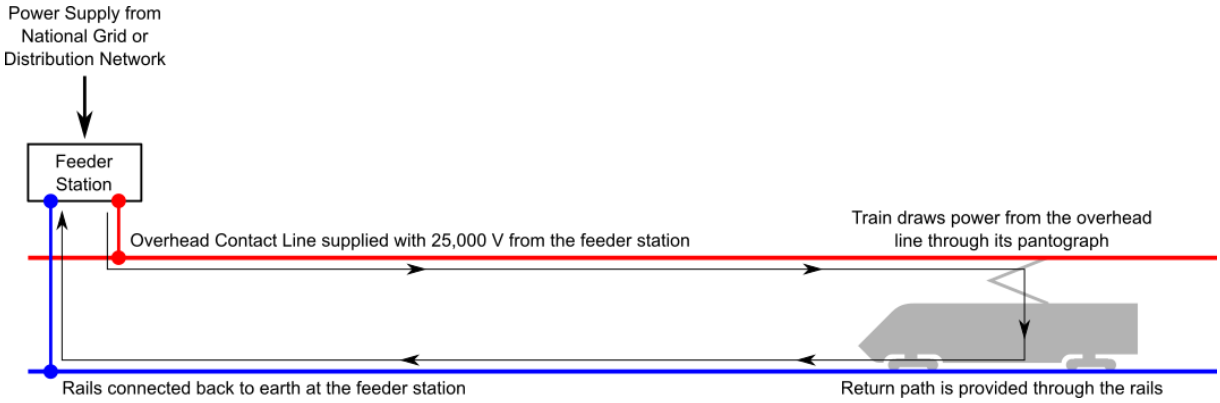
- Heaton Lodge; and
- Hillhouse Compound.

2.7.4 No works are planned to any other FTNs or GSM-Rs in the Scheme area.

Overhead line infrastructure

2.7.5 The Scheme will be subject to full electrification of the railway. OLE will be therefore be implemented throughout the length of the Scheme.

2.7.6 Power is provided to trains through OLE. In this system an overhead contact line is used to deliver electrical power to a train and is supported by structures, collectively known as OLE. An electric train draws power (known as “traction power”) from this overhead contact line through its pantograph to power its motors and other on-board systems (e.g. interior lighting). The return path for the circuit is provided through the rails which are connected back to earth at the feeder station or Power Supply Points (PSPs). This circuit is illustrated in Insert 2-5.



Insert 2-5 Simplified overview of the OLE system

2.7.7 The design proposal for OLE is four-track portals and Twin Track Cantilevers (TTC). In general foundations will be piled however an alternative includes concrete pad foundations. This is in part influenced by the ground conditions. In areas of potential contamination, a foundation (piling) risk assessment will be carried out prior to construction works in order to determine the most appropriate construction approach. This will be secured via a planning condition attached to the deemed planning permission.

2.7.8 Insert 2-6 illustrates the typical form of OLE infrastructure to be used with the Scheme area.

Insert 2-6 Example OLE infrastructure

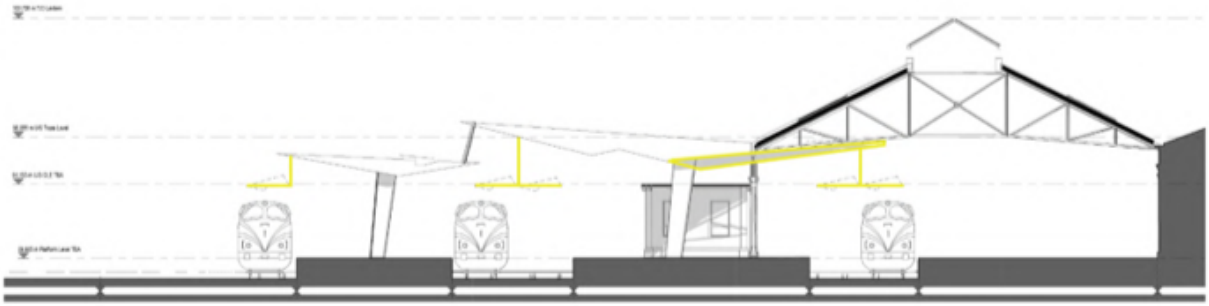
2.7.9 The OLE will be visible to lineside neighbours adjacent to the route as set out in Chapter 10 (Landscape, townscape and visual impact) of this ES.

2.7.10 The detailed design process will seek to ensure that the visual impacts are minimised, through consideration of the design of gantries and overhead wire connectors and minimisation of the size and scale of equipment where possible. This refined design will also mean that fewer portals are needed to hold the overhead wires with spacing of 55-65m likely to be achieved. The detailed design will also consider sensitive receptors including residents and where practicably possible the gantries will be located on property boundaries rather than directly opposite gardens or windows.

2.7.11 The design of the OLE has also been influenced by its proximity to heritage assets. Due to the presence of Grade I and Grade II listed assets along the route bespoke OLE designs are proposed at the following locations across the Scheme due to their increased sensitivity.

Huddersfield Station

2.7.12 To accommodate OLE, it is proposed that two cantilever frames per truss would be used to support the OLE wires at each OLE support location through Platforms 2 and 3. Under Roof A, it is proposed that there are four locations supporting OLE frames. The cantilever frames would be supported on vertical drop tubes suspended from the existing roof. A minimum of 3.5m electrical clearance measured from the platform standing surface to the OLE would be achieved (see Insert 2-7).



Insert 2-7 Example OLE infrastructure at Huddersfield Station

Huddersfield Viaduct (MVL3/92)

- 12 standard portals and 7 anchor portals are required on viaduct;
- On the north side, the OLE portal foundations will be located within the footprint of the structure, in-board of the masonry parapets;
- Where 5 tracks are proposed (i.e. to the east of the station), portals will be connected to the viaduct exterior; and
- On the south side, all portals are to be connected to the exterior of the viaduct (see Insert 2-8).

Mirfield Viaduct (MVN2/192 and MVN2/192A)

- The spacing of the portals over the viaduct has been maximised to reduce the number of portals required on the viaduct to three;
- Portal span has been designed to minimise the size of foundations;

- On the listed masonry side of the viaduct the OLE portal foundations will be located within the footprint of the structure, in-board of the masonry parapets; and
- On the metallic structure the OLE portals will be fixed to the exterior of the metal bridge structure.

Wheatley's Underbridge (MVN2/196)

- Portal span has been designed to minimise the size of foundations; and
- On the south side, the portal baseplates will be slightly skewed.

Insert 2-8 Example OLE infrastructure – exterior to parapets

Electrical power and plant

Power Supply Points (PSPs) and Distribution Network Operator (DNO) equipment

2.7.13 The overhead contact line is supplied with 25,000 volts AC from PSPs which are located at regular intervals along the railway. These PSPs draw power from the National Grid or local distribution network and transform it to the required voltage. Connections to the DNO network will also need to be made at various points along the railway.

2.7.14 As a back-up, PSPs also use supplementary sources to the DNO equipment to ensure the railway has a continuous supply due to faults etc.

2.7.15 PSPs are proposed at the following locations:

- Cross Church Street;
- Huddersfield Station car park;
- Fitzwilliam Street;
- Hillhouse compound; and
- Colne Bridge Road.

2.7.16 Units will measure roughly 5m by 9m and are 3.5m in height. In general, they will be constructed of glass reinforced plastic (GRP) (see Insert 2-9).

Insert 2-9 Example PSP equipment

2.7.17 Due to the track works there is a need to relocate the existing Bradley PSP facility. Due to the sensitive nature of the Colne Bridge Road area (proximity to listed assets) the proposal is to rebuild the PSP in a form similar to the existing structure. The building will be reconstructed in a similar form to the existing with brickwork walls and pitched roof, the dimensions are 8m by 15m and 2.5-3m in height.

2.7.18 DNO kiosks will also be installed across the Scheme. These kiosk units will be sited close to the public highway where possible so that DNO staff can access for any maintenance works

required and parking provision will also be made where feasible. An example DNO kiosk is provided in Insert 2-10 and these will be located as follows:

- Cross Church Street;
- Longroyd Lane;
- Huddersfield Viaduct (adjacent to Castlegate);
- Hillhouse Lane;
- Hillhouse Compound;
- Red Doles Road;
- Deighton Station;
- Bradley Junction;
- Heaton Lodge;
- Mirfield Station;
- Ravensthorpe Station;
- Weaving Lane; and
- Fall Lane.

Insert 2-10 Example DNO kiosk equipment

Track Sectioning Cabinet (TSC)

2.7.19 Track sectioning sites also form part of the system and are found between PSPs. These allow sections of the overhead line to be isolated during maintenance and also allow electrical power to be fed from alternative feeder stations when required. These take a similar form to the PSP shown in Insert 2-8.

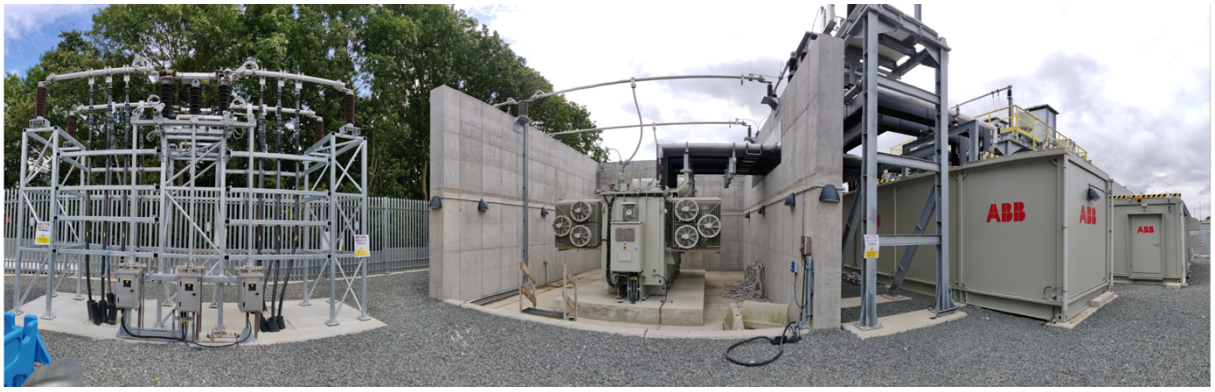
Power Supply Unit

2.7.20 The facility at Ravensthorpe (within the current Thornhill Quarry site) is a large-scale Power Supply Unit (PSU) and will utilise the power from the overhead 132 kilovolt (kV) power lines and transform it down to the power requirements of the railway.

2.7.21 The 132kV cables for the DNO supply to the PSU are proposed to be routed under Farnhills Underbridge (MDL1/5) opening.

2.7.22 Insert 2-9 provides an example of the type of infrastructure that will be constructed but detailed design is still ongoing based on exact Scheme requirements and taking account of location and construction constraints as well as ground condition information. The Environmental Impact Assessment reported in this ES has considered a worst-case scenario and it is considered that the mitigation proposed would be appropriate to reduce any effects should the design be altered.

2.7.23 This compound area will measure 80m x 35m.



Insert 2-11 Example PSU equipment

Insert 2-12 Visualisation of PSU equipment

Junction lighting

2.7.24 Lighting units are required at various points within the network. The purpose of the lighting is to provide an appropriate level of illumination to permit a safe working environment for maintenance activities during night-time working (when access to the railway can be obtained within minimal disruption to services). Setting up and dismantling temporary lighting would take time which could be used more productively. Therefore, fixed lighting is a more efficient option.

2.7.25 Lighting is proposed at the following locations:

- Springwood Junction (off Longroyd Lane);
- Huddersfield West;
- Huddersfield East;
- Huddersfield Viaduct;
- Adjacent to Hillhouse compound;
- Bradley Junction (at the junction between MVN and BBW lines);
- Heaton Lodge (close to Heaton Lodge Footbridge (MVN4/4));
- Ravensthorpe at locations to cover the junction and the Flyover Structure (RBA/1);
- Ravensthorpe East close to the Road Rail Access Point (RRAP) at Fall Lane.

2.7.26 The lighting units are 1.5m and examples are shown in insert 2-13. The units will be operated as and when required during maintenance works.

Insert 2-13 Example junction lighting

2.8 Drainage

2.8.1 Existing standard railway drainage is in place throughout most of the Scheme. These are infiltration systems i.e. they collect the storm water from the track area and allow it to drain into the ground. The system also ensures that during extreme events, there is sufficient storage within the pipe system to ensure that the storm water is moved to an outfall which would drain to surface water bodies or to culverted watercourses which lead to surface water bodies. Where possible these outfalls will be reused.

2.8.2 Where the Scheme does impact on the existing drainage there may be a requirement for;

- New drainage outfalls e.g. connections into sewer network or new headwalls to watercourses; and
- Works to culverts – e.g. lengthening, modification or repairs. Any works will be designed to minimise the risk of any additional flooding both upstream and downstream of the culvert.

2.8.3 Details of the proposed works on the drainage network and in particular culverts/discharge points are given in Table 2-6.

Table 2-6 Proposed works to culverts/drainage system

Route Section	Culvert ref.	Name	OS Grid Ref.	Comments
1 – Huddersfield	n/a	John Williams Street sewer (storm water) (Existing)	SE 1442 1697	Existing storm water drainage outfall which will remain operational following construction of the Scheme. It is a piped outfall from Huddersfield Station area which connects directly into the sewer within the highway. It is not proposed to modify the outfall.
1 – Huddersfield	n/a	John Williams Street sewer (foul drainage) (Existing)	SE 1442 1697	Existing foul water drainage outfall which will remain operational following construction of the Scheme. It is a piped outfall from Huddersfield Station area which connects directly into the sewer within the highway. It is not proposed to modify the outfall.
1 – Huddersfield	MVL3/91B	John Williams Street culvert	SE 1438 1708	Existing storm water drainage which has been blocked off. Its current purpose is unconfirmed, although it probably acts as a land drainage outfall for the northern part of Huddersfield Station. It will remain unaltered following the Scheme.
1 – Huddersfield	n/a	Fitzwilliam Street sewer outfall (New)	SE 1430 1707	Proposed new storm water drainage outfall for the re-modelled areas of Huddersfield Station. It will be a piped outfall from the drainage system, either directly into the sewer in the highway, or into an existing culvert within Network Rail land which connects into this sewer. A new manhole will be provided at the outfall.
1 – Huddersfield	MVL3/93	Hebble Beck Culvert (Existing)	SE 1461 1757	Existing culvert which extends beyond the Network Rail operational boundary. It carries an existing watercourse. It is not understood to be a railway drainage outfall and will remain unaltered following the Scheme
2 – Hillhouse and Fartown		Hillhouse Depot (Existing)	SE 1473 1818	The existing drainage outfall to the sewer in Alder Street will be reused for the proposed storm and foul drainage. Storm water flow rates will be controlled to the existing rates and an attenuation tank provided on the Hillhouse site. Drainage provision will cover the construction and operational phase of the Scheme.
2 – Hillhouse and Fartown	MVL3/94B	Red Doles Culvert	SE 1519 1843	Former storm water outfall which is now understood to be redundant. Previous surveys have indicated it is partially collapsed and not operational. It will remain unaltered following the Scheme works.

Route Section	Culvert ref.	Name	OS Grid Ref.	Comments
2 – Hillhouse and Fartown	MVL3/96A	Red Doles Culvert	SE 1519 1843	Culvert carries an existing watercourse under the railway and discharges into the Huddersfield Broad Canal. The culvert will be extended by approximately 10m under the new embankment, a new headwall will be constructed into the canal. The cross-sectional area of the new part will be similar to the existing. It is currently an outfall for railway track drainage, this will remain after the project
2 – Hillhouse and Fartown	MVL3/96AA	Topaz Close Culvert	SE 1527 1849	This culvert does not carry a watercourse, it is thought to drain the adjacent housing area. A short distance downstream the discharge enters the Huddersfield Broad Canal. The culvert will be extended by approximately 11m, with a new headwall constructed. The cross-sectional area of the new part will be similar to the existing. It is not currently an outfall for railway track drainage, and this will not change as part of the Scheme.
2 – Hillhouse and Fartown	MVL3/98A	Field House Culvert	SE 1578 1883	This culvert is not thought to carry a watercourse but may have been provided for flood relief purposes. The culvert will not be altered. It is not currently an outfall for railway track drainage, and this will not change as part of the Scheme.
3 – Deighton and Bradley	n/a	Deighton Station Sewer Outfall	SE 1645 1911	There is no known drainage outfall from the existing Deighton Station. A new storm water drainage system will be provided to drain the re-modelled platforms area. This will discharge to the south to be combined with the storm water runoff from the Station drop-off area. Attenuation will be provided within the platform area prior to discharge to a new connection into the re-aligned Yorkshire Water sewer which will pass under the station.
3 – Deighton and Bradley	MVL3/101A	Leeds Road	SE 1677 1939	The purpose of this drainage infrastructure is currently unknown and will be subject to further survey work prior to construction of the Scheme. The infrastructure is partially collapsed and there is little evidence of water flow. The original outfall was likely to the Leeds Road sewer. The infrastructure will be removed as part of the A62 Leeds Road Overbridge (MVL3/102) works and there are currently no proposals to replicate it within the Scheme. It is not anticipated that the survey work will lead to any effects that have not been assessed or could not be mitigated using the measures detailed in the ES.

Route Section	Culvert ref.	Name	OS Grid Ref.	Comments
3 – Deighton and Bradley	MVL3/102A	Bradley culvert	SE 1700 1974	This culvert carries an existing watercourse under the railway and discharges into the Huddersfield Broad Canal. The culvert will be extended by approximately 5m, with a new headwall constructed. This may require removal of approximately 2m of existing culvert to make the structural tie-in. The cross-sectional area of the new part will be similar to the existing. Existing culvert is a 1250mm diameter masonry arch, the new length will be constructed of 1200mm diameter concrete pipe. The culvert currently acts as an outfall for railway track drainage, this use will remain after the Scheme.
4 – Colne Bridge and Battyeford	MVL3/106A	Bradley No2 Culvert	SE 1747 2020	This culvert carries an existing culverted watercourse under the railway. The downstream pipeline destination is unknown; however, it is likely to be the Huddersfield Broad Canal. The culvert will remain, although the chamber will be replaced. The cross-sectional area of the new part will be similar to the existing. Currently acts as an outfall for railway track drainage, this will remain after the Scheme.
4 – Colne Bridge and Battyeford	n/a	Outfall to Third Party Drainage off Colne Bridge Road	SE 1765 2031	This is a railway drainage outfall which discharges to a drainage system within an adjacent property, the Mamas and Papas site on Colne Bridge Road. No works are proposed to this outfall, it will remain an outfall following the Scheme. The destination of the discharge is unknown.
4 – Colne Bridge and Battyeford	MVL3/110A	Colnebridge Culvert	SE 1810 2048	This culvert carries an existing watercourse under the railway, crossing under both the MVL3 and MVL4 lines. Downstream it discharges to a piped drainage system within the sewage works. It is proposed that existing culvert will largely remain intact but will be extended by approximately 15m to the south to take the existing watercourse under the new fast lines. Existing headwall to be removed and new headwall to be provided. The cross-sectional area of the new part will be similar to the existing. Existing culvert is a 900mm x 900mm brick arch, new length likely to be 900mm diameter concrete pipe. Currently acts as an outfall for railway track drainage, this will remain after the Scheme.

Route Section	Culvert ref.	Name	OS Grid Ref.	Comments
4 – Colne Bridge and Battyeford	MVL4/3A	Coopers Bridge culvert	SE 1844 2057	Existing culvert is located under the MVN4 line, as well as under the underpass structure carrying the MVN2 line over this. It does not appear to carry a watercourse, upstream the drainage is piped but is of unknown origin. Downstream it discharges into a watercourse which flows into the Calder and Hebble Navigation. The culvert is currently submerged and blocked with silt, so assumed to be non-operational. It is not proposed to reuse the culvert, but a new track drainage outfall may be located at a higher level close-by. It is not anticipated that the survey work will lead to any effects that have not been assessed or could not be mitigated using the measures detailed in the ES.
4 – Colne Bridge and Battyeford	MVL4/4A	Heaton Lodge Culvert	SE 1880 2038	This culvert carries an existing watercourse under the railway. Downstream the watercourse is piped but is assumed to outfall to the Calder and Hebble Navigation. The culvert will remain unaltered. It is assumed to be an outfall for railway land drainage, this will remain, but additional flows will be added.
4 – Colne Bridge and Battyeford	MVN2/190A	Heaton Lodge Junction Culvert	SE 1919 2009	This culvert and cascade carry an existing watercourse under the railway. Downstream the watercourse flows into the River Calder. The culvert will remain, but with repairs and modifications for the Scheme. The cross-sectional area of the existing culvert will be maintained. Currently acts as an outfall for railway track drainage, this will remain after the Scheme.
4 – Colne Bridge and Battyeford	MVN2/190B & MVN2/190C	Mirfield culvert	SE 1944 1993	This culvert and cascade carry an existing watercourse under the railway. Downstream the watercourse flows into the River Calder. The culvert will remain, but with repairs and modifications for the Scheme. The cross-sectional area of the existing culvert will be maintained. Currently acts as an outfall for railway track drainage, this will remain after the Scheme.
4 – Colne Bridge and Battyeford	MV2/191A	Chadwick Close culvert	SE 1971 1976	This culvert and cascade carry an existing watercourse under the railway. Downstream the watercourse flows into the River Calder. The culvert will remain, but with repairs and modifications for the purposes of the Scheme (may include culvert extensions upstream and downstream with replacement of chambers). It is not anticipated that the survey work will lead to any effects that have not been assessed or could not be mitigated using the measures detailed in the ES. The cross-sectional area of the existing culvert will be maintained. It is currently an outfall for railway track

Route Section	Culvert ref.	Name	OS Grid Ref.	Comments
				drainage, this will remain after the Scheme. It is assumed this culvert is an outfall to railway track drainage (this is subject to further survey work). It is assumed this function will be retained.
4 – Colne Bridge and Battyeford	MVN2/191B	Wood Lane Culvert	SE 1984 1969	This culvert carries an existing watercourse under the railway. Downstream it discharges to drainage within the new residential development located at Calder View and presumably into the River Calder. The culvert will remain for the Scheme. Currently acts as an outfall for railway track drainage, this will remain after the Scheme.
5 – Mirfield and Lower Hopton	MVN2/none	Mirfield Station	SE 2044 1947	There is no known drainage outfall from the existing Mirfield Station. A new storm water drainage system is required for the re-modelled platforms and additional track drainage. These will both discharge out to the drainage systems for the station car park, to be attenuated and discharged to local sewers.
5 – Mirfield and Lower Hopton	MVN2/198A A	Steanard Lane Culvert	SE 2159 1943	This culvert does not carry a watercourse and is blocked by gabions at its upstream end. It is assumed it was provided for flood relief purposes. The culvert will remain for the Scheme. It is not an outfall for railway drainage and will not be after the Scheme .
6 – Ravensthorpe and Westtown	MVN2/198B	Sands Lane Culvert	SE 2175 1947	This culvert carries an existing culverted watercourse under the railway, it is located under the Sands Lane overbridge and follows the line of the highway. The culvert will remain for the Scheme, although requires repair and modification for the Scheme. Currently acts as an outfall for railway track drainage, this will remain after the Scheme.
6 – Ravensthorpe and Westtown	MVN2/200C	Ladywood Culvert	SE 2224 1965	This culvert does not carry a watercourse, it is assumed it was provided for flood relief purposes. The culvert will remain for the Scheme. It is not an outfall for railway drainage and this will not change as a result of the Scheme. Proposed extension of 5m is required, the existing cross-sectional area will remain.

Route Section	Culvert ref.	Name	OS Grid Ref.	Comments
6 – Ravensthorpe and Westtown	MVN2/200	Ladywood Road Culvert	SE 2228 1967	This culvert carries an existing watercourse under the railway. Downstream it continues for some distance to discharge directly into the River Calder. The culvert will remain for the Scheme, although will require extending with a new headwall, the existing cross-sectional area will remain. Currently acts as an outfall for railway track drainage, this will remain after the Scheme.
6 – Ravensthorpe and Westtown	n/a	Ravensthorpe Station	SE 2282 1995	The existing station drains into the drainage system of the commercial estate to the north. It is proposed to re-use this outfall for the storm water drainage to form the new station and track drainage. Due to the level of the proposed railway being significantly lower than the existing, re-grading of this existing drainage within the adjacent property will be required. The hydraulic capacity of the drainage system will be maintained and the proposed flows will be attenuated to match existing.
6 – Ravensthorpe and Westtown	n/a	Ravensthorpe Triangle	SE 2331 2026	A new storm water outfall is required for railway infrastructure within the triangle of land that comprises the landfill site to the east of the existing Ravensthorpe Station. The area is bounded on two sides by railway lines, with the Calder and Hebble Navigation on the third. The current site drains by infiltration, with excess storm flows flowing to the canal and on to the river. The proposed drainage outfall will replicate these with the use of storm water attenuation structures and infiltration basins. Permeable paving will be used as much as possible to minimise concentrated flows.

*Where no formal reference is available for the structure then the table cell is blank

2.9 Utilities

2.9.1 The Scheme impacts on various existing transmission and distribution utility networks. Conflicts with utility services will typically occur at the following locations:

- Where the intervention crosses major or local roadways and over/under bridge structures;
- Where highway works are required either new or realigned;
- Adjacent to and within private properties/land for any new alignment;
- Where existing utilities cross the track in isolation, either underground or overhead;

2.9.2 Powers to carry out utility works will be included within the Order application. Where necessary to maintain programme, some works will ideally need to be undertaken in advance of the TWAO; these will be negotiated by agreement where possible.

2.9.3 The following section highlights the significant works (i.e. to gas mains, works to overhead power lines) required to deliver the Scheme. The EIA has considered the utilities works within the assessment although less certainty is available around the exact methodology for works. It is not anticipated that the work will lead to any effects that have not been assessed or could not be mitigated using the measures detailed in the ES.

Overhead Power Lines

- Route Section 4 – the existing 275kV power lines between B6118 Bridge Road Overbridge (MVL3/107) and Huddersfield Broad Canal Underbridge (MVL3/108) will be subject to tensioning works to ensure required clearance from OLE is achieved;
- Route Section 6 – there are existing 33kV electricity assets which run through the Newlay concrete site, cross the railway and then run south towards Ouzelwell Hall Farm. The proposal is to terminate the lines on the south of the railway, close to the location of the new Ravensthorpe station. Terminal tower points will be provided at this location and the circuits will then be diverted across the Calder Road Overbridge (MVN2/202);
- Route Section 6 – The existing 33kV circuits between Hunger Hill Overbridge (MVN2/201) and Calder Road Overbridge (MVN2/202) currently follow the existing PRoW. The 33kV circuits are proposed to be diverted along the diverted PRoW at the top of the cutting slope, they will then be diverted via the Calder Road Overbridge (MVN2/202);
- Route Section 6 – within the Ravensthorpe triangle the overhead 132kV power lines cross the railway at four locations. The proposal is for undergrounding of these power lines with a terminal pylon at each end. Two sections are proposed to be diverted underground;
  - Firstly, an underground diversion section commences within the Thornhill Power Station site, crosses under the Scheme lines and then through the Thornhill Quarry site before passing under the Wakefield line. The north terminal pylon is proposed to be situated to the north of the existing railway, west of the Calder and Hebble Navigation. The southern terminal pylon is proposed to be situated to the north of the Wakefield line close to the location of the existing pylon; and
  - A second underground diversion section commences south of Ravensthorpe Road, to the west of Ouzelwell Lane, then routes along Back Lane, connecting into the existing overhead power lines to the west at Long Plantation.
- For construction purposes, construction compounds of 50m x 50m are proposed around the existing pylons to be removed. An 8m buffer strip is required for areas of underground cable.

Gas mains

- Route Section 4 – two high pressure gas mains require diversion: East Brierley to Hopton Top and Hartshead Moor to Dewsbury. Both routes enter the railway corridor from the south and cross beneath the railway and will be impacted by construction of the fast lines. The mains will be diverted from their current location near Helm Lane Cottages and then routed west and then under the line of the new cutting as part of the earthworks in that area;
- Route Section 6 – the existing Northern Gas Networks (NGN) High Pressure Gas Main is in close proximity to excavation works proposed for the Wakefield flyover (intersection structure). It is proposed to divert the high-pressure gas main along the boundary of the railway, however areas of land will be required within two of the industrial units to accommodate the works. The gas main will then be diverted underground under the MDL Scheme lines.

Water

- Route Section 4 – requirement for diversion of the Yorkshire Water sludge main. The existing 250mm diameter sludge main route is located largely within the existing adjacent access track (buried at unknown depth) from just west of B6118 Bridge Road Overbridge (MVL3/107) to Parks Overbridge (MVL3/110 and MVL4/1) (Yorkshire Water sewage plant). The main will be repositioned adjacent to the tracks as part of the realignment works. At B6118 Bridge Road Overbridge (MVL3/107) the main will pass through the redundant arch, a new pipe bridge is required at Huddersfield Broad Canal Underbridge (MVL3/108S) and Colne Viaduct Underbridge (MVL3/109). After Colne Viaduct Underbridge (MVL3/109) the main will be undergrounded into the Yorkshire Water site.
- Route Section 6 – The existing Yorkshire Water Trunk Main currently follows the existing PRoW. The main will be diverted along the diverted PRoW at the top of the cutting slope, they will then be diverted via the Calder Road Overbridge (MVN2/202).
- Route Section 6 – Three sewers and one water main currently run to the east of the River Calder (close to the Weaving Lane Household Waste Recycling Centre). These assets will require diversion due to the construction of the viaduct pier and east abutment. The diversion will retain the assets as close to their original line as possible. Detailed design discussions are ongoing with the statutory undertaker.

2.10 Permanent track access and maintenance compounds

2.10.1 As part of the operational phase, ongoing access to the railway is required by the maintenance team. Rail track maintenance means inspecting, repairing and maintaining railway tracks to keep the trains running smoothly and safely so as to prolong the service life. If service life of railway track is reliable, railway track must be kept in good working order and be subject to regular maintenance. The design of maintenance and access points in the Scheme area has considered safety, security, operational suitability and impact to railway neighbours.

2.10.2 The following access points to the railway are proposed. Access is either pedestrian in which case steps will be provided. Alternatively, vehicle access (RRAP) may be required to allow maintenance vehicles onto the railway and are generally at the same level as the railway and gated.

- Cross Church Street RRAP – existing RRAP to be retained, boundary access gate to be widened to allow for articulated HGV access from Cross Church Street;
- Springwood Junction – Existing RRAP is accessed along a narrow one-way access track from Longroyd Lane, access is to be retained and will be limited to small rigid vehicles (transit van and small low-loaders);

- Hillhouse Compound – vehicle access and a four-track RRAP to be provided at Hillhouse Compound
- Red Doles Road – Access Point – pedestrian access via access steps to be provided on the south-east side of the overbridge, there is also a RRAP proposed just to the west of Red Doles bridge with access from the northern side;
- B6118 – Colne Bridge Road – RRAP – A new railway access point for vehicles and pedestrians will be provided to the south east of the railway. This will require a new access from Colne Bridge Road (to be shared with users of the PSP) and the area will be securely fenced;
- Heaton Lodge – Van access is currently provided to the east of Wood Lane, between the two existing railway underbridges. The Scheme will retain this access to increase the safety and security of the site. Vehicles will then travel down between the two sets of tracks and there will be provision for vehicular access to the underpass (part of the PRoW) allowing them access to the track adjacent to the Heaton Lodge footbridge (MVN4/4). This therefore creates a shared route for pedestrians and maintenance vehicles over a short distance;
- Currently to the west there is no access provided. This Scheme will construct a van access to the west to provide access to railway assets. Gates and fencing will be erected to provide security to the railway;
- Mirfield RRAP Access will be provided to the east of the station with vehicles routing via Lowlands Lane and Hurst Lane;
- Sands Lane - Access to the north of the railway on Sands Lane is currently provided via a shared access and turning head located on the Bridleway. The Scheme will retain this provision;
- Ravensthorpe Triangle (Thornhill Quarry site) – A RRAP will be provided as part of the operational traction power compound at Ravensthorpe; and
- Fall Lane – A new RRAP for vehicles is proposed with access alongside the track and then an area of elevated hard standing level with the railway. The site will be gated and fenced to provide security.

2.11 Permanent rail sidings site

2.11.1 During the permanent (operational) phase, the Hillhouse site will provide replacement sidings (3No.) to replace lost provision at Huddersfield Station (this will be provided during the construction phased and retained during operations) and a mobile maintenance train will also be stationed at the site. The sidings will be used to house train carriages overnight when not in services. The site will also make provision for welfare cabins for train operating company staff and associated parking. The accommodation units will be constructed under Network Rail's Permitted Development Rights.

2.12 Environmental design

Security and boundary treatment

2.12.1 To prevent unauthorised access to the railway, given the proposal for electrification, a 1.8m palisade fencing will be installed along the boundary to Network Rail owned land. Where fencing is already in place and meets the above requirements, this will be retained where possible. Where fencing is below the standard required or in a state of disrepair this will be removed and replaced.

Existing conditions

2.12.2 The environmental topic chapters of the ES set out the baseline conditions for their individual disciplines, this is based on information gathered from desk-based studies and also site visits.

Chapter 22 (Cumulative effects) sets out details of any Reasonably Foreseeable Future Projects (RFFP) and there is an assumption that some of these will be delivered prior to the Scheme works commencing. In this instance, the assessments assume these developments are part of the baseline conditions. Details are set out in Chapter 22 (Cumulative effects) of this ES.

2.12.3 Based on discussions with the landowners and site operators at Thornhill Quarry and Forge Lane Quarry it is understood that the sites will be fully restored prior to the Scheme coming forward and therefore details of this have been included in the assessment, albeit existing baseline conditions are also presented. Identified mitigation measures particularly in relation to landscape and biodiversity have therefore assumed that the baseline conditions are as per the agreed restoration proposals for these sites (Planning application references 2018/93805 and 2019/90391 respectively) as a conservative approach to the assessment.

Design

2.12.4 The design of the Scheme has sought to avoid environmental impacts where possible. This includes ensuring the layout/design of the project does not directly impact on sensitive receptors, relocation of construction compounds to avoid identified constraints, refinement of vehicle routing – construction traffic - to avoid sensitive receptors and environmental constraints and programming of works to ensure highways effects are minimised.

2.12.5 Where this has not been possible environmental design has been proposed which covers landscape, biodiversity, noise and vibration and the water environment, in particular flood risk.

Landscape and biodiversity

2.12.6 The landscape proposals are detailed in the outline environmental mitigation plan (Figure 2-3, presented in Volume 4). Further details will be submitted as part of the Landscape and Ecological Management Plan (LEMP) (pursuant to a condition to be attached to the deemed planning permission associated with the Order).

2.12.7 There will be landscape and ecological works implemented where the work requires clearance of existing vegetation and habitats. This includes areas used for construction compounds and access. Loss of habitat has been avoided where practicable to do so. Compensatory planting works include:

- Hedgerow planting;
- Shrub mix (particularly along the rail corridor where tree planting would conflict with the OLE infrastructure);
- Semi-improved grassland;
- Semi-natural broadleaved woodland;
- Riparian Planting – specifically along the River Calder (mitigation for viaduct works);
- Protected species habitat creation including replacement badger setts, bat roosts and bat boxes;
- Replacement ponds;
- Vegetation reinstatement – where possible vegetation removed to facilitate construction will be replaced; and
- Regeneration – where beneficial, areas where vegetation is removed will be allowed to regenerate naturally.

Noise and vibration

2.12.8 Noise attenuation has been considered where there are significant adverse effects at groups

of properties. This attenuation will take the form of acoustic barriers and are proposed at the following locations. The detailed design will be submitted to the Local Planning Authority for approval pursuant to a condition to be attached to the deemed planning permission.

- Hillhouse Construction Compound / Hillhouse Sidings compound (to rear of properties on Hammond Street);
- Red Doles Road/Abbey Place;
- Topaz Close and Jade Place;
- Station Road, (Bradley Junction);
- Helm Lane/Wood Lane Underbridge;
- Woodend Road;
- Chadwick Lane (Mirfield Viaduct);
- Huddleston Court, Mirfield;
- Mavis Street; and
- Thornhill Road Underbridge.

2.12.9 Location information is also detailed in the outline environmental mitigation plan (see Figure 2-3).

2.12.10 Where noise barriers are not considered appropriate and if deemed necessary, noise insulation will be provided.

Water environment

2.12.11 Compensatory Flood Storage Areas (CFSA) are proposed within Route Section 6 (Thornhill Quarry site) to compensate for the encroachment of the Scheme onto existing floodplains. The proposed CFSA will be a shallow scrape (around 0.5m deep). The land in this area will be open to access by the public and the presence of the CFSA will not impact on that end use. The location of the CFSA is given on the outline environmental mitigation plan in Figure 2-3.

2.13 Construction

2.13.1 This section provides details on the construction strategy for the Scheme. It provides details on the key construction activities, compound information and programme.

2.13.2 The construction data used within the ES has been provided by the Alliance's construction team based on experience of working on similar projects. The proposed construction programme and methodology will continue to be refined as the detailed design progresses and will be detailed and managed through the Code of Construction Practice (CoCP). Anticipated construction compound requirements may change subject to revised programme and detailed design.

2.13.3 However, the data provided to date is deemed sufficient to inform this EIA and is a conservative worst-case such that any new data would not significantly alter the conclusions of the ES.

2.14 Programme

2.14.1 The construction programme, assessed and reported in this ES, will occur over a four-year period. The exact start date is dependent on the determination period of the Order application but for the purposes of the EIA is set out as starting in late 2022 and completing in summer 2026.

2.14.2 For the purposes of assessment, it has been assumed that the main construction compounds

will remain in place throughout the duration of the Scheme i.e. for a maximum of four years. However, the exact length of time will vary according to the staging of works in each Scheme Route Section.

2.14.3 It is likely that the satellite compounds will be used intermittently over the 4 year period rather than continuously and details of likely durations is given in Table 2-7.

2.14.4 All construction compounds will be temporary and will be removed as part of the last phase of works. It is proposed that the land will then be returned/reinstated to its previous use.

2.14.5 During the construction phase of the Scheme, the Hillhouse Compound will be used principally as a construction compound. However, the compound site will also serve as a temporary platform while Huddersfield Station is being refurbished. Such activity is expected to occur for approximately 14 months between Christmas 2023 and April 2025.

Working hours

2.14.6 Working hours will differ depending upon the nature of the activity and location. However, in general working hours will be as follows;

- 08:00 to 18:00 Monday to Friday, with 30 minutes for setting up and organising/cleaning the site;
- 08:00 to 13:00 Saturday, with 30 minutes for setting up and organising/cleaning the site; and
- No working on Sundays.

2.14.7 Standard working hours refer to all activities where construction does not interfere with or require a closure of the operating railway. In general, this can be taken to define the majority of the works in constructing the Scheme.

2.14.8 Where works are required on the railway, these will be undertaken under possession (i.e. when trains are stopped from running); these periods could be overnight or over a long weekend which can include Bank Holidays. For more significant works, blockades will be required (long term shut down of the railway between two particular points). During these times rail replacement bus services will be provided to ensure that passengers are still able to travel.

Construction compounds

2.14.9 Construction compounds will be required across the Scheme. The locations are shown in Figure 2-4. The siting of the compounds has taken into account the works required and access requirements as well as any specific site constraints (e.g. land use and environmental).

2.14.10 Construction access and traffic will be managed through a Construction Traffic Management Plan (CTMP) which will set out details of traffic management including road closure programme and duration, traffic route information and signage, site access and egress. Proposed construction routes are shown on Figure 2-4.

2.14.11 The following sets out the general works that will be required to set up the compound sites

- Marking out of the site plus installation of temporary fencing (close boarded or heras);
- Install fencing;
- Vegetation clearance;
- Topsoil stripping (if necessary);

- Install compound surface;
- Erect welfare facilities/office blocks etc.;
- Establish car parking;
- Establish plant, materials and fuel storage etc.; and
- Tower lights will be employed as necessary to provide safe working areas particularly during winter months and also when night-time working is necessary.

2.14.12 The following compounds will be provided in order to deliver the Scheme.

Strategic main compounds

2.14.13 These are the sites from where the main construction and project management is undertaken. In general, they will provide office space, welfare facilities and processing and storage of materials will also take place at these sites. Where possible staff will be encouraged to travel to the compounds via public transport. However, the main compounds will act as a parking hub for staff from which they will be transported to other satellite compounds as necessary. Green travel plans (to ensure that staff travel are encouraged to travel as sustainably as possible will be produced as part of the CTMP.

2.14.14 Details of the four strategic construction hub sites are provided below in Table 2-7, as well as the functions they will house.

Table 2-7 Main construction compound information

Route Section	Compound location	Summary of use
1 – Huddersfield	Fitzwilliam Street	• Civils compound, OLE laydown area and P-way laydown area • 20 office units and 32 stores units • Parking – 50 spaces to be provided • Storage of materials and waste • Approximately 240 staff • Utilities – aim is to utilise existing utilities connections, sewer networks in close proximity (effluent tanks to be provided as contingency)
2 – Hillhouse and Fartown	Hillhouse	• Civils compound, OLE laydown area and P-way laydown area, rail systems fabrications area, • Staff parking – 20 spaces to be provided • 2-storey welfare cabins for 30 people (portakabins or similar) • Utilities – aim is to utilise existing utilities connections and sewer networks in close proximity (effluent tanks to be provided as contingency), substation required • Temporary 150m platform proposed to enable services to run during blockade at Huddersfield Station (to include PA system, and welfare facilities for customers and staff) • Storage of materials and waste • Security gate house to prevent unauthorised access by the public

Route Section	Compound location	Summary of use
		In addition, three temporary sidings will be constructed during the construction phase for the stabling of trains during night-time periods, because of the loss of provision at Huddersfield Station. The temporary station will be served by a bus replacement service (which will bring in passengers from Huddersfield Station while it is closed for works). Details of the number of bus services are not currently available but it is assumed that, on average, there will be up to five buses per hour serving the temporary station during core daytime periods. The number of bus services would be expected to be lower during the evening and early morning, with no services during the core night-time period when the station will not be operational (approximately midnight to 05:30). This is considered to be a conservative worst-case assessment which has been used to inform the EIA.
4 – Colne Bridge and Battyeford	Paul Lane (Heaton Lodge)	• civils compound, OLE laydown area and P-way laydown area • parking – around 50 spaces to be provided • 2-storey welfare cabins accommodating 150 staff to be located to the north-east corner of the site. Dimensions – 40m x 20m • 10 site cabins, approx. 50 people • Storage of materials and waste
6 – Ravensthorpe and Westtown	Ravensthorpe area	*Ravensthorpe Triangle (Hub) Main accommodation, **large semi-permanent office building*** • Compound: approx. 10 stores cabins and two security cabins • Utilities – aim is to utilise existing utilities connections, various HV circuits in vicinity (may require substation), no water/sewer networks in close proximity (effluent tanks to be provided) • Temporary bailey bridges to be constructed over canal to allow construction access to site from Forge Lane • 150 staff ***Newlay Concrete Compound*** • Compound: two site cabins and two stores cabins plus security cabin • Utilities – one generator and one effluent tank. ***Ravensthorpe Road West*** • Compound: two stores cabins and one security cabin

Route Section	Compound location	Summary of use
		• Utilities - one generator and one effluent tank • During construction works a temporary replacement parking area will also be provided within the compound area to mitigate for land lost at the Veola site during gas main works.

2.14.15 Civils work will be undertaken during standard working hours (daytime) however there will also be a requirement for night-time possession working (indications of locations where these works are likely to take place are set out in Table 2-8).

Table 2-8 Satellite construction compound information

Route Section	Compound location	Summary of use	Staff numbers	Working hours	Duration of use (estimated)
1 – Huddersfield	Cross Church Street	Works to railway and construction of TSC[10]	Approx. 10 staff	Daytime working	Periodically over 3 years 4 weeks for installation of TSC and site set up
1 – Huddersfield	Longroyd Lane	Works to railway including access for tunnel works and construction of RRAP		Both daytime and night time working will be required.	1 year
1 – Huddersfield	Springwood Road	Access to ventilation shafts during tunnel works	Approx. 10 staff	Both daytime and night time working will be required.	up to 6 months
1 – Huddersfield	Westgate	Parapet works to Westgate Overbridge (MVL3/90)	Civils: approx. 10 staff	Parapet works will be complete during night time possessions.	25 weeks
1 – Huddersfield	Huddersfield Station Car Park	Works at station and John William Street Bridge	Staff based out of main compound – Fitzwilliam Street	Both daytime and night time (possession) working will be required.	Up to 2 years
1 – Huddersfield	Huddersfield Viaduct (Span 1) Underbridge (MVL3/92(1))	Access for bridge works John William Street	Staff based out of main compound – Fitzwilliam Street	Both daytime and night time (possession) working will be required.	3 months
1 – Huddersfield	Huddersfield Viaduct (Span 4) Underbridge (MVL3/92(3)	Access for bridge abutment works MVL3/92(3)	Civils: approx. 20 staff	Both daytime and night time (possession) working will be required.	7 weeks
1 – Huddersfield	(Huddersfield Viaduct (Span 29) Underbridge (MVL3/92(9)) - Bradford Road	Required for bridge works - Bradford Road	Civils: approx. 50 staff	Both daytime and night time working will be required.	12 months
2 – Hillhouse and Fartown	Hillhouse Lane Underbridge (MVL3/94)	Access for Huddersfield embankment works	Civils: approx. 20 staff	Daytime working	6 months

[10] Is a contingency measure against power supply problems to the railway. If the power supply was to fail at a Power Supply Point (PSP) the electricity from the next PSP along the Scheme could be bypassed via the neutral section using the TSC and used to supply the next section of OLE, they also function as circuit breakers to the OLE supply (TSCs are located at a point on the line where there is a neutral section for OLE)..

Route Section	Compound location	Summary of use	Staff numbers	Working hours	Duration of use (estimated)
2 – Hillhouse and Fartown	Red Doles Road Underbridge (MVL3/96)	Construction of new bridge deck and embankment works	Civils approx. 30 staff	Both daytime and night time working will be required	6 months
2 – Hillhouse and Fartown	Field House Overbridge (MVL3/98)	Demolition and replacement of bridge deck	Civils approx. 30 staff	Both daytime and night time working will be required	3 months
2 – Hillhouse and Fartown	Ridings Underbridge (MVL3/99)	Works to remove and infill Ridings Underbridge (MVL3/99) and infill and embankment works to Peel's Pit Underbridge (MVL3/100)	Civils approx. 30 staff	Civils – daytime working Requirement for some night time working	20 weeks
3 – Deighton and Bradley	Deighton Station and greenway area	Works to Deighton Station and associated earthworks, works to Whitacre Street Overbridge (MVL3/101), utilities works, track works including installation of line side equipment and OLE	Civils approx. 50 staff	Both daytime and night time working will be required	2 years
3 – Deighton and Bradley	A62 Leeds Road Overbridge (MVL3/102)	Demolition and construction of A62 Leeds Road Overbridge (MVL3/102) and utilities works	Civils approx. 50 staff	Civils – daytime working Requirement for some night time working (limited)	20 months
3 – Deighton and Bradley	Wheatley's Overbridge (MVL3/103)	Bridge replacement works at Wheatley's Overbridge (MVL3/03)	Civils approx. 30 staff	Civils – daytime working Requirement for some night time working (limited)	35 weeks
3 – Deighton and Bradley	Bradley Junction	Earthworks and track works	Approx. 15-90 staff	Both daytime and night time working will be required	6 weeks
4 – Colne Bridge and Battyeford	B6118 Bridge Road Overbridge (MVL3/107)	Demolition and rebuild of the bridge MVL3/107, works to PSP and RRAP site	Civils approx. 30 staff	Both daytime and night time working will be required	40 weeks

Route Section	Compound location	Summary of use	Staff numbers	Working hours	Duration of use (estimated)
4 – Colne Bridge and Battyeford	Huddersfield Broad Canal Underbridge (MVL3/108 and MVL3/108S)	Bridge works to MVL3/108S including construction of Yorkshire Water pipe bridge	Civils approx. 50 staff	Both daytime and night time working will be required	8 weeks
4 – Colne Bridge and Battyeford	Heaton Lodge Water Treatment Works	Reconstruction of access bridge to water treatment works Parks Overbridge (MVL3/110 and MVL4/1)	Civils approx. 50 staff	Both daytime and night time working will be required	9 months
4 – Colne Bridge and Battyeford	Colne Viaduct Underbridge (MVL3/109)	Works to bridge including construction of Yorkshire Water pipe bridge and track works	Civils approx. 50 staff	Both daytime and night time working will be required	10 weeks
5 – Mirfield and Lower Hopton	Bradley's No. 2 (BBW/1) Overbridge (MVL3/105)	Works to parapet including night and weekend working.	Civils approx. 10 staff	Both daytime and night time working will be required	6-8 Weeks
5 – Mirfield and Lower Hopton	Woodend Road Overbridge (MVN2/191)	Civils: Works to demolish Woodend Road Overbridge (MVN2/191) and works to culverts. Rail systems: P-Way: Track renewal and track drainage	Civils – approx. 20 staff	Both daytime and night time working will be required	10 weeks
5 – Mirfield and Lower Hopton	Mirfield Viaduct Underbridge (MVN2/192) and Mirfield Viaduct (Steel Spans) Underbridge (MVN2/192A)	Strengthening works	Civils approx. 30 staff	Both daytime and night time working will be required	18 months
5 – Mirfield and Lower Hopton	Mirfield Station	Works to station and Station Road bridge, temporary car park, improved access to RRAP and extension to compound	Civils approx. 80-150 staff	Civils – daytime working Requirement for some night time working (limited)	13 months

Route Section	Compound location	Summary of use	Staff numbers	Working hours	Duration of use (estimated)
5 – Mirfield and Lower Hopton	Wheatley's Underbridge (MVN2/196)	Work to Wheatley's Underbridge (MVN2/196) – parapet works and OLE	Civils approx. 10 staff	Daytime working including during possessions	8 weeks (not necessarily continuous, possession dependant)
6 – Ravensthorpe and Westtown	Sands Lane Overbridge (MVN2/199)	Parapet works to Ladywood Road Culvert (MVN2/200) and RRAP access	Civils approx. 10 staff	Civils will be mainly daytime working but there will be a requirement for night time possession working	3 weeks
6 – Ravensthorpe and Westtown	Hunger Hill Overbridge (MVN2/201)	Parapet works to Hunger Hill Overbridge (MVN2/201)	Civils approx. 10 staff	Civils will be mainly daytime working but there will be a requirement for night time possession working	6 weeks
6 – Ravensthorpe and Westtown	Weaving Lane HWRC	Works to Ravensthorpe viaduct east retaining wall	Civils – approx. 40 staff	Civils will be mainly daytime working but there will be a requirement for night time possession working	35 weeks
6 – Ravensthorpe and Westtown	B6117 Fall Lane, Thornhill Road Underbridge (MDL1/9)	Works to highway at Thornhill Road and Fall Lane, works to B6117 Fall Lane, Thornhill Road Underbridge (MDL1/9) and works to Occupation Underbridge (MDL1/10), works to Fall Lane RRAP	Civils: approx. 50 staff	Civils – daytime working Requirement for some night time working (limited)	18 months
6 – Ravensthorpe and Westtown	Toad Holes, Dewsbury Underbridge (MDL1/12)	Infill works to Toad Holes, Dewsbury Underbridge (MDL1/12)	Civils – approx. 15 staff	Civils will be mainly daytime working but there will be a requirement for night time possession working	12 weeks (not necessarily continuous, possession dependant)

Route Section	Compound location	Summary of use	Staff numbers	Working hours	Duration of use (estimated)
6 – Ravensthorpe and Westtown	Ming Hill Underbridge (MDL1/14)	Infill works to Ming Hill Underbridge (MDL1/14)	Civils – approx. 15 staff	Civils will be mainly daytime working but there will be a requirement for night time possession working	12 weeks (not necessarily continuous, possession dependant)

Rail systems

2.14.16 Works to the railway are required throughout the Scheme. This includes:

- Track replacement;
- Track realignment;
- Installation of line side equipment – e.g. signalling, OLE; and
- Installation of track side drainage.

2.14.17 The majority of the work will therefore be carried out at weekends or during the night.

2.14.18 These works will be carried out by the rail systems team (approx. 15-90 staff) and will be staged as appropriate based on availability of access to the track (possessions and blockades). As these are linear works i.e. they will move along the track, any works will therefore be at a specific location for a relatively short duration.