

Feasibility Report

Version 1.00



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| Project Name: | MetroWest Phase 1 |
| OP Reference: | 140569 |
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Appendices

- A** Drawings
- B** Cost Estimate
- C** Qualitative Cost Risk Analysis
- D** Capacity Modelling
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- F** Signalling Appraisal
- G** Photograph Gallery
- H** Track Bed Investigation (Factual, Interpretative and Hazardous Classification)
- I** Visualisations (Galingaleway and Sheepway Gate Farm)
- J** Interdisciplinary Design Certificate
- K** Portishead Station Options Appraisal Report (produced by North Somerset Council)

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Abbreviations

| | | |
|-------|---|--------------------------------------------|
| ADSL | - | Asymmetric Digital Subscriber Line |
| BASRE | - | Bristol Area Signalling Renewals Project |
| BRB | - | British Railways Board |
| BRT | - | Bus Rapid Transport |
| CCTV | - | Closed Circuit Television |
| CIS | - | Customer Information Systems |
| CWR | - | Continuous Welded Rail |
| DCO | - | Development Consent Order |
| DDA | - | Disability Discrimination Act |
| DfT | - | Department for Transport |
| DNO | - | Distribution Network Operator |
| DOO | - | Driver Only Operated |
| EIA | - | Environmental Impact Assessment |
| GPDO | - | General Permitted Development Order |
| GRIP | - | Guide to Rail Investment Projects |
| GSM | - | Global Systems Mobile |
| GSM-R | - | Global Systems Mobile (Rail) |
| LED | - | Light Emitting Diode |
| NWR | - | Network Rail |
| OLE | - | Overhead Line Equipment |
| ORR | - | Office of Rail Regulator |
| PA | - | Public Address |
| PADS | - | Parts and Drawing Systems |
| PHP | - | Passenger Help Points |
| PID | - | Project Initiation Document |
| REB | - | Relocatable Equipment Building |
| QCRA | - | Qualitative Cost Risk Analysis |
| ROGS | - | Railway and Other Guided Transport Systems |
| RUS | - | Route Utilisation Strategy |
| SISS | - | Station Information & Surveillance Systems |
| SSSI | - | Site for Special Scientific Interest |
| SUDS | - | Sustainable Urban Drainage System |
| TBI | - | Trackbed Investigation |
| TOC | - | Train Operating Company |
| TVSC | - | Thames Valley Signalling Control |
| WoE | - | West of England |

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1. Executive Summary

This Report has been produced at the request of the Network Rail Senior Sponsor, on behalf of North Somerset Council and the West of England Councils. This Report is an update to the 'Option Selection Report GRIP Stage 3 111797 Portishead reopening' Report produced in 2010. The remit for this Report was to refresh the 2010 GRIP 3 Report and to undertake additional feasibility study arising from a wider project scope and additional options over and above those addressed in the previous report. The scope of the project has widened to a broader local rail network enhancement including train service improvements for both the Seven Beach line and Bath to Bristol line, combined with re-opening the Portishead to Bristol line. Rather than operating a shuttle only operation, the Portishead line will connect with either the Seven Beach line, or the Bath line, or both lines. The project was launched in 2013 and is known as MetroWest Phase 1. The West of England (WoE) Joint Transport Board has identified its strategic programme and determined that MetroWest Phase 1 is its highest priority for allocation of devolved DfT capital funding. The new inputs for MetroWest Phase 1 GRIP stage 2 include a potential track alignment, Trackbed Investigation results, concept designs for Portishead and Pill Stations, Galingale Way footbridge Options, consideration of cycleway widths / track cess, review of accommodation crossings, review and consideration of the existing freight route between Parson Street and Portbury Dock Junction, Pill tunnel evacuation route and turn back facilities at Bathampton and Avonmouth.

The 2010 report established that a demand for a public transport system to serve Portishead was warranted due to the expansion of the town and the need for an alternative commuter route into Bristol. Portishead's population is now over 27,000 and is expected to reach 30,000 before the project opens in 2019. While the city region's population is expected to 1.1 million 2026. Planning for this growth means the city region needs to make sure its transport infrastructure is not only fit for purpose, but has the ability to respond to increasing demand, and therefore maximise potential for continued economic growth. MetroWest Phase 1 will play a key role in supporting economic growth and major employment areas including Temple Quarter Enterprise Zone and the five Enterprise Areas across WoE. The project is the first major part of the WoE MetroWest programme to uplift the local rail network and achieve better transport network resilience.

Portishead was part of the national rail network until 1964 when it was closed under the Beeching Axe. The route is still present, with 6 miles now reinstated for freight traffic to serve the Royal Portbury Dock and circa 3.5 miles of abandoned track leading up to as far as Quays Avenue in Portishead. Early investigations suggest the 3.5 miles of abandoned track will require planning consent, while the remaining works can be undertaken through Network Rail's General Permitted Development rights. Further scoping of the consents strategy will be needed, however early indications are that the abandoned section of track may require a Development Consent Order for powers to re-build and operate it.

A revisited demand modelling exercise is being undertaken through a hybrid Rail Demand Model which uses both Moria and the Discounted Cashflow models used by Network Rail together with the G-BATS multi-modal transport model developed by the WoE councils. Initial rail network capacity analysis has been undertaken and has identified two viable options connecting the three rail lines together to form through rail routes. The Options under development provide for a half hourly service between 06:00hrs – 19:00hrs then hourly until close to midnight. The service will run between

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Portishead, Bath and Severn Beach with a number of intermediate stops in between utilising a new turnback facility at Bathampton Junction. This will entail upgrading the freight only route between Parson Street Junction and Portbury Dock Junction to passenger status and reinstatement of the disused line between Portbury Dock Junction and Portishead. Two new Stations, one at Portishead and the other at Pill (utilising the former station platform) are to be developed in order to facilitate the passenger service. The journey time between Portishead and Bristol Temple Meads is less than 17 minutes in each direction and will operate between the freight traffic serving the Royal Portbury Dock.

Once the Project moves into the design and build stages, it is planned to complete the works and commission the Project within two years. The commissioning date for the Project is planned for spring 2019.

Timescales:

2014-2016

- Detailed technical work, and business case to support a major planning application

2017

- Planning consent awarded
- Procurement completed
- Full business case completed
- Funding approval and contractual arrangements finalised
- Construction started

2019

- Construction completed

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2. Introduction

The WoE Local Enterprise Partnership together with the Executive Members for Transport of the four councils, who collectively comprise the WoE Joint Transport Board, has determined that MetroWest Phase 1 and Phase 2 are its highest priorities for devolved DfT funding.

The town of Portishead has grown rapidly with a population today of over 27,000 compared with 17,000 in the 2001 Census and 6,400 in the 1961 Census. It is anticipated that future developments planned for the town will see the population rise to over 30,000 during the next few years.

Main road access to Portishead is via the A369 which is dissected by the M5 at Junction 19. During peak times the A369, M5 Junction 19, and the Bristol end of the A369 all become very congested.

Rail passenger services from Bristol Temple Meads to Portishead ceased to operate in 1964. Part of the line was re-opened in 2002 for freight traffic only to serve Royal Portbury Dock. Sustained economic and population growth over the last decade has increased demand on the sub-regional transport network. As a result the WoE councils have identified a need to ensure the local rail network is sufficiently accessible and has sufficient capacity and resilience, to continue to meet the sub region's needs.

The history of the former Portishead Station is interesting and worth summarising.

After the completion of both Isambard Kingdon Brunel's Great Western Railway (GWR) main lines from London to Bristol and the Bristol & Exeter lines, Brunel proposed a railway link to the pier at Portishead. Although proposed as long ago as 1839, Brunel died before the line was eventually built and opened in 1867; about three years after Brunel's Clifton Suspension Bridge opened. It took less than three years to build the Portishead line, including the four tunnels. The line was operated by the Bristol & Portishead Pier & Railway Company as a single line constructed to broad gauge Standards



The original Main Station at Portishead

Initially there were four Stations on the route serving Clifton Bridge, Pill, Portbury and Portishead. The Portishead pier came into use in 1868, with steamers running to Cardiff, Newport and Ilfracombe. Portishead docks opened in 1879, two years after its rival at Avonmouth.

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The 1954 Main Station at Portishead



The former Portishead Pier Station



Historical photograph of Pill Station

In 1880, the route was converted from broad gauge to the Standard 4ft 8½" gauge. This conversion took place between the 24th and 27th January 1880. The route became part of the GWR in 1884.

Ashton Gate Station opened in 1906, and Portbury Shipyard Station opened in 1918 to serve a shipyard being built during World War 1. The shipyard was never completed and the shipyard Station closed in 1923. The former main redbrick building can still be seen at the foot of the steps leading down from the Royal Hotel.

Ham Green Halt opened in 1926 to serve the hospital, and Nightingale Valley Halt just north of the bridge opened in 1928, though it closed in 1932.

The main Portishead Station was demolished in 1954 to facilitate access to the new Portishead B Power Station, a modern terminus Station was built where the Waitrose petrol Station now stands. The new Station was only to last a decade as the line closed to passenger traffic in 1964 and for freight in 1981. However, the line was never dismantled.

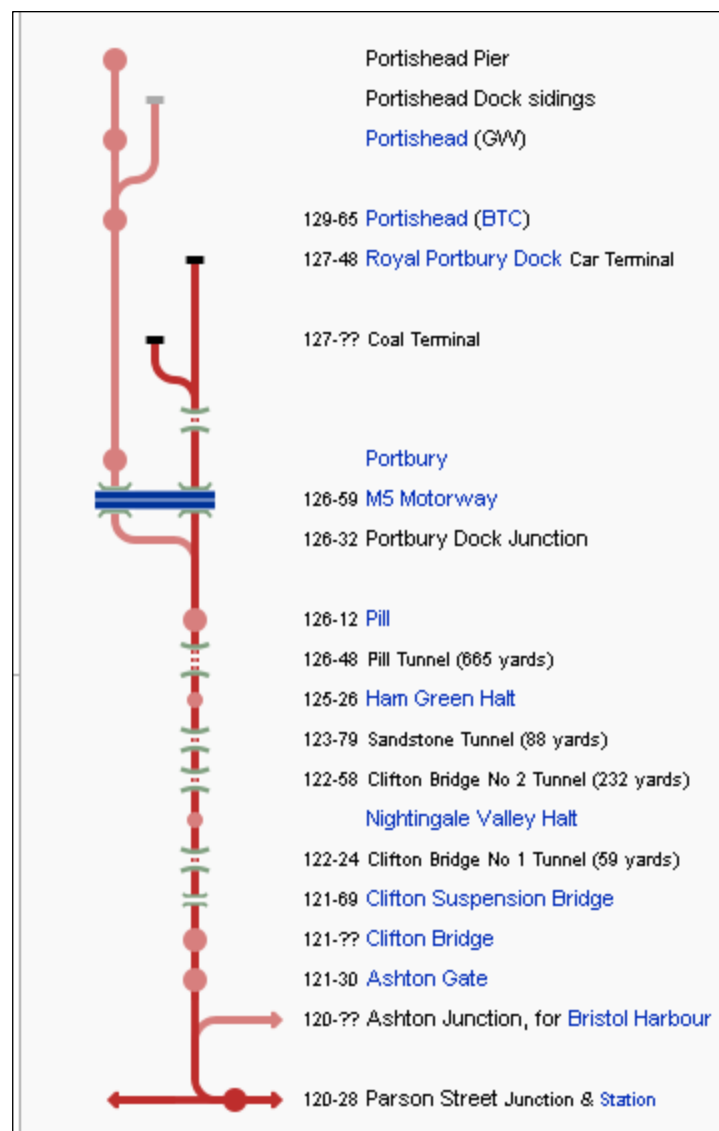
Pill Station opened in 1867 and closed in 1964. A goods yard just north of the Station opened in 1912 and closed in 1963.

Once the Royal Portbury Dock (opened in 1978) became fully established, it was viable to open part of the branch line again to enable cars and coal to be transported from the docks. The line reopened in 2002 but only as far as the Portbury docks and for freight

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only. The route is currently served by both DB Schenker and Freightliner services. The major freight flows along the line are bulk coal and newly delivered vehicles.

The remaining old track (a continuous length of circa 3.5 miles) still exists into Portishead and this has been safeguarded from development through North Somerset Council's planning policy. In 2009 North Somerset Council purchased the land containing 3.5 miles of the disused track from BRB Residuary. The land will be transferred to Network Rail, upon re-opening the line and adoption back into the national rail network.



Map showing existing and former route to Portishead

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3. Business Objective

3.1 Problem Identified

The West of England (WoE) sub-region is a net contributor to UK PLC, with the highest economic growth of any core city region (3.1% GVA). However, the sub region's economic prosperity is beginning to be constrained by its transport network. As demand on the transport network increases as a result of economic and population growth, further investment is needed to ensure the transport network is sufficiently accessible and has sufficient capacity and resilience, to continue to meet the sub region's needs. Longer term problems of sustained traffic growth and car dependency also need to be tackled, in addition to wider long term issues of carbon emissions and social wellbeing.

Rail travel across the WoE has doubled in the last ten years and this marks a very clear public appetite to increasingly opt for rail. However, rail travel in the WoE has historically been low compared with similar city regions across England. While the WoE benefits from good long distance rail routes, the local rail network is relatively under-developed. Many of the local rail routes have don't have a basic half hourly peak frequency and some terminate at Bristol Temple Meads, rather than operating across the City region. There are also a number of strategically important disused rail lines and re-opening these lines is a key part of the four WoE councils (Bath & North East Somerset, Bristol City, North Somerset and South Gloucestershire Council) strategy to uplift the local rail network, through the MetroWest programme.

The proposal for MetroWest Phase 1 is being taken forward at a time of considerable investment in the Western Route through Control Period 5 (CP5) 2014-2019. The Western Route is to undergo considerable transformation through the delivery of; electrification of the Great Western Main line, strategic enhancement projects to deal with bottlenecks and to increase capacity and renewal projects to modernise infrastructure. The CP5 programme of committed schemes focuses on the high volume main lines and various strategic investments spread across the rest of the Western Route. MetroWest Phase 1 is not a CP5 committed scheme, is it however the largest third party promoted rail scheme in England. MetroWest Phase 1 is the foundation upon which the MetroWest programme will be taken forward over the next decade.

3.2 MetroWest Concept

The MetroWest programme will address the core issue of transport network resilience, through targeted investment to increase both the capacity and accessibility of the local rail network. The MetroWest concept is to deliver an enhanced local rail offer for the sub-region comprising:

- Existing and disused rail corridors feeding into Bristol
- Broadly ½ hourly service frequency (but some variations possible pending business case)
- Cross Bristol service patterns i.e. Bath to Seven Beach etc
- Providing a Metro type service appropriate for a City Region of 1 million population

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The programme includes:

- MetroWest Phase 1 - Half hourly local service for the Severn Beach line, Bath to Bristol line and a re-opened Portishead line with stations at Portishead and Pill;
- MetroWest Phase 2 - Half hourly service for the Yate to Bristol line and an hourly service for a re-opened Henbury line, with stations at Henbury, North Filton, and possibly Ashley Down and Horfield.
- Further additional station openings subject to separate business cases; and
- Other potential enhancements including feasibility of extending electrification across the WoE network.

The MetroWest programme is to be delivered over the next ten years during CP5 and CP6. The MetroWest programme will also extend the benefits of strategic transport interventions that are either in the process of being delivered or have been delivered by the WoE councils. These include the Ashton Vale to Temple Meads (MetroBus) project, South Bristol Link (MetroBus), North Fringe to Hengrove Package (MetroBus), Bath Package, Weston Package and the Local Sustainable Travel Fund programme. The delivery of these projects together with the MetroWest programme will result in better modal integration between rail, bus and active modes, providing an important step towards seamless modal transfer at key hubs across WoE.

The MetroWest programme has the full backing of the WoE Local Enterprise Partnership. The WoE LEP together with the Executive Members for Transport of the four councils, who collectively comprise the WoE Joint Transport Board, has determined that MetroWest Phase 1 and Phase 2 are its highest priorities for devolved DfT funding.

3.3 MetroWest Phase 1 Strategic Intervention

MetroWest Phase 1 compliments planned CP5 investment through targeted investment in the WoE local rail network, to enhance the Severn Beach line, the Bath to Bristol line and re-open the Portishead to Bristol line. MetroWest Phase 1 will play a key role enhancing access to major growth areas including Temple Quarter Enterprise Zone and five Enterprise Areas across the sub-region. The project will bring these major employment centres closer to the skilled workforce catchment, by simultaneously enhancing access to the local train network and enhancing train service frequency. Major employers will have a larger skilled workforce pool to draw on within a 30 minute commute and this will play a part removing barriers to inward investment.

The long term trend of continued traffic growth threatens the WoE's economic prosperity; in response to this the four WoE councils have developed the MetroWest programme as a key part of its integrated 'TravelWest' transport strategy. Key highway corridors into and across the city region are at or near capacity and average vehicle speeds are among the lowest for comparable city regions. The case for intervention to re-balance the transport network, through investment in the local rail network is compelling.

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3.4 MetroWest Phase 1 Project Objectives

The principal objectives of Metro Phase 1 are:

- To support economic growth, through enhancing the transport links to the TQEZ and into and across Bristol City Centre, from the Portishead, Bath & Avonmouth /Severn Beach arterial corridors.
- To deliver a more resilient transport offer, providing more attractive and guaranteed (future proofed) journey times for commuters, business and residents into and across Bristol, through better utilisation of strategic heavy rail corridors from Portishead, Bath & Avonmouth /Severn Beach.
- To improve accessibility to the rail network with new and re-opened rail stations and reduce the cost (generalised cost) of travel for commuters, business and residents.
- To make a positive contribution to social well being, life opportunities and improving quality of life, across the three arterial corridors.

In addition, Metro Phase 1 has the following supporting objectives:

- To contribute to reducing traffic congestion on the Portishead, Bath & Avonmouth /Severn Beach arterial corridors.
- To contribute to enhancing the capacity of the local rail network, in terms of seats per hour in the AM and PM peak.
- To contribute to reducing the overall environmental impact of the transport network.

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4. Business Case

4.1 Business Strategy

Metro Phase 1 forms an important part of the West of England's economic growth agenda, led by WoE Local Enterprise Partnership (LEP). The WoE LEP's economic development strategy is being driven by its Strategic Economic Plan (SEP), submitted to Government in March 2014. The SEP together with the City Region Deal (CRD) provide the framework for unlocking growth across the WoE. The SEP and the CRD will deliver the following key outputs:

- Temple Quarter Enterprise Zone (17,000 new jobs);
- Five Enterprise Areas including Bath 'City of Ideas' (9,300), Weston-super-Mare Gateway J21 (11,000), Filton/A38 (4,000) and Avonmouth Severnside (650ha site);
- Ministry of Defence at Filton Abbey Wood;
- 5,700 homes and 50 ha of employment land at Filton Airfield (partly covered by the Enterprise Area);
- 8,000 and 3,000 new homes at Weston-super-Mare and North Yate respectively; and
- Redevelopment of Keynsham Town Centre and Somerdale (former Cadbury's site).

The city region is set for further population growth which is expected to exceed 1.1 million 2026. Portishead's population is now over 27,000 (2011 census plus new home completions) and is expected to reach 30,000 before the project opens in 2019. Furthermore the population within 1 km catchment of Portishead station is over 13,000, resulting in substantial latent passenger demand. Planning for this growth means the city region needs to make sure its transport infrastructure is not only fit for purpose, but has the ability to respond to increasing demand, and therefore maximise potential for continued economic growth.

4.2 MetroWest Governance

MetroWest Phase 1 is being promoted by the four WoE councils (Bath & North East Somerset, Bristol City, North Somerset and South Gloucestershire Council). The four Councils have entered into an Initial Promotion Agreement setting out how the councils are working together to deliver the project, including cost sharing arrangements. The councils have nominated North Somerset Council as the lead council for taking the detailed technical work forward, supported by the WoE Office. A formal governance structure is in place, including the Rail Programme Board (representatives include Network Rail and First Great Western), along with the Programme Assurance Board having an oversight role. The Boards have responsibility for the delivery of the MetroWest programme and comprise of senior officers. The two officer Boards report to the WoE Joint Transport Board which comprise of the four Executive Members for Transport and representatives of the WoE Local Enterprise Partnership. The WoE Joint Transport Board is the strategic decision maker and directs the MetroWest project, determines options and allocates resources and funding, including devolved DfT transport funding. The WoE Joint Transport Board has identified its strategic programme and determined that MetroWest Phase 1 is its highest priority for allocation of devolved DfT capital funding.

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4.3 Business Case Approach

The MetroWest Phase 1 business case is being prepared using the Transport Five Case Model, in accordance with the DfT's WebTAG framework. The five cases comprise; Strategic case, Economic case, Delivery case, Finance case and Commercial case. The Business Case has to:

- address the project objectives and set out wider context about why the intervention is needed - **Strategic Case**
- provide a good investment and offer effective use of public sector funds - **Economic Case**
- show deliverability and robustness - not dependant on other factors - **Delivery Case**
- be affordable to the Councils both capital and revenue / train service subsidy - **Finance Case**
- have a sound commercial footing and robust procurement arrangements - **Commercial Case**

The business case is being prepared by the WoE councils with the exception of the economic case, which is being prepared jointly by Network Rail and the WoE councils. The economic case entails a hybrid Rail Demand Model which uses both Moria and the Discounted Cashflow models used by Network Rail's together with the G-BATS multi-modal transport model developed by the WoE councils. Simplistically, Moria is being used to quantify the user benefits from existing stations, with a direct demand model for new stations and G-BATS is being used to quantify the non-user benefits.

4.4 Business Case Stages

The business case is being developed in three stages; Preliminary Business Case, Outline Business Case and Full Business Case. The Preliminary Business Case is needed for allocation of resources for the development of the project and to inform decision making on the train service option to be taken through to delivery. The Outline Business Case is undertaken to support statutory processes including a Development Consent Order. The Full Business Case follows procurement of construction works and operational arrangements including the train service and confirms the total cost of delivering the project.

4.5 Business Case Timescales

The Preliminary Business Case is undergoing preparation and is scheduled to be completed by late August and submitted to the WoE Joint Transport Board on 12th September 2014. Each stage of the business case is being taken forward in parallel with the respective GRIP stage, as follows:

- Preliminary Business Case - Sept 2014 (GRIP2 June 2014)
- Outline Business Case and GRIP 3 - October 2015
- Full Business Case and GRIP 4 & 5 - September 2017

Construction is programmed to commence November 2017 with completed by April 2019. The MetroWest Phase 1 train services are programmed to start in May 2019. Handover and project close (GRIP 7 & 8) is programmed to be complete by June 2020.

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5. Project Scope

The project is a third party project promoted and funded by the WoE Councils. The Project proposal is to introduce rail passenger services across Bristol with a service pattern operating between Portishead, Bath Spa and Severn Beach, with intermediate stops. This will entail upgrading the existing freight only route between Parson Street Junction and Portbury Dock Junction, re-instatement of the current disused line between Portbury Dock Junction and Portishead, and work on the main line between Parson Street and Bristol Temple Meads. A new terminus will be required at Portishead with an intermediate Station at Pill. Initial rail network capacity analysis has been undertaken and has identified two viable train service patterns connecting the three rail lines together to form through rail routes. Further details are set out in section 16 of this report. The two train service patterns are undergoing economic appraisal as part of the WoE council's Preliminary Business Case, which is scheduled to be submitted to the WoE Joint Transport Board on 12th September 2014. The Board will determine which of the two options it wishes to take forward to GRIP stage 3 and through to delivery.

The MetroWest Phase 1 project is a priority for the West of England Councils.

The Project is to;

- deliver a reliable public transport service for the residents of the Portishead and Pill and provide a half hourly local service for the Severn Beach line and the Bath to Bristol line.
- ensure freight operations and pathing rights are not jeopardised
- take into consideration other committed West of England Partnership proposals i.e. interaction with Bus Rapid Transport (BRT)
- not to preclude future cross Bristol services such as MetroWest Phase 2 and potential future services such as Portishead to Bristol Parkway
- provide a timetable to enable a journey between Bristol Temple Meads and Portishead to be in the region of 17 minutes.
- be delivered in collaboration between Network Rail and the WoE Councils, subject to business case, powers to build and operate and allocation of funding.

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6. Deliverables

This Report reviews and updates the previous GRIP 3 Single Option Report and the feasibility of operating a rail link between Portishead, Bath Spa and Severn Beach, known as MetroWest Phase 1.

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The following engineering works have been proposed to deliver MetroWest Phase 1;

- Rebuild the Portishead to Pill Line.
- Closure of historic crossings.
- New station at Portishead.
- Reopen former station at Pill (using the Down platform).
- Double track works at Pill and Ashton Gate area.
- Improve highway access to Pill tunnel.
- Environmental mitigation measures.
- Enhancement to Parson Street Junction.
- Re-signalling the entire line between Temple Meads and Portishead.
- Bathampton Turnback.
- Additional signalling at Avonmouth station to facilitate turnback.
- Partial reinstatement of Down Relief Line to assist recessing / regulation of freight trains.

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7. Options Considered

7.1 Service Options Previously Considered for the Portishead Line

This Report covers the proposal for what was termed Option 6 in the previous GRIP stage 3 Report. The following Options were addressed during the previous GRIP Stage 2 study and as part of the previous GRIP 3 Option Selection Report, in 2010. The detail behind the Options from the previous GRIP stage 2 Report (2010), are summarised below with the Options taken forward for further development highlighted by a blue box with the sub Options noted below it.

| Option | Description | Component parts i.e. platform, track etc. | Impact on Operations | Impact on Maintainability | Constructability | Main advantages | Main disadvantages |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------------------------------------------------------------------|
| Service Options | | | | | | | |
| 1 | To provide an hourly service between Portishead and Bristol TM with minimal work and alterations to the infrastructure to achieve this. | <ul style="list-style-type: none"> Resignalled route along the Portbury Branch New track between Portbury junction and Portishead New Station at Portishead. New road layout at Quays Avenue | <ul style="list-style-type: none"> Freight services are maintained Main line services maintained | <ul style="list-style-type: none"> New track access points required More maintenance due to increase in infrastructure | <ul style="list-style-type: none"> No new or novel equipment being used. Signalling best delivered on or around the time of the Bristol resignalling Project Quays Avenue arrangement to be completed prior to the track works | Cheapest Option | Hourly is not suitable for the demand. A Station at Pill is also preferred. |
| 2 | To provide an hourly service between Portishead and Bristol TM, including a stop at Pill Station, with minimal work and alterations to the infrastructure to achieve this. | <ul style="list-style-type: none"> Resignalled route along the Portbury Branch New track between a new arrangement around Pill Station and Portishead New Stations at Portishead and Pill New road layout at Quays Avenue | <ul style="list-style-type: none"> Freight services are maintained Main line services maintained | <ul style="list-style-type: none"> New track access points required More maintenance due to increase in infrastructure | <ul style="list-style-type: none"> No new or novel equipment being used. Signalling best delivered on or around the time of the Bristol resignalling Project Pill Station to be brought back into use by using a disused platform Quays Avenue arrangement to be completed prior to the track works | | Hourly is not suitable for the demand. |

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| Option | Description | Component parts i.e. platform, track etc. | Impact on Operations | Impact on Maintainability | Constructability | Main advantages | Main disadvantages |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3 | To provide an hourly service between Portishead and Bristol TM, including stops at Pill and Ashton Gate Stations, with minimal work and alterations to the infrastructure to achieve this. | <ul style="list-style-type: none"> Resignalled route along the Portbury Branch New track between a new arrangement around Pill Station and Portishead Ashton loop extended New Stations at Portishead, Ashton Gate and Pill New road layout at Quays Avenue | <ul style="list-style-type: none"> Freight services are maintained Main line services maintained | <ul style="list-style-type: none"> New track access points required More maintenance due to increase in infrastructure | <ul style="list-style-type: none"> No new or novel equipment being used. Signalling best delivered on or around the time of the Bristol resignalling Project Pill Station to be brought back into use by using a discussed platform Quays Avenue arrangement to be completed prior to the track works | Stops at a number of Stations on route between Portishead and Bristol. | <p>Hourly is not suitable for the demand.</p> <p>Requires 3 new Stations to be built. Expensive beyond likely funding availability.</p> <p>Ashton Gate in particular is an expensive Station to construct due to the requirement for 2 platforms and site location involving construction on an embankment.</p> |
| 4 | To provide an hourly service between Portishead and Bristol TM, including stops at Pill, Ashton Gate, Parson Street and Bedminster Stations, with minimal work and alterations to the infrastructure to achieve this. | <ul style="list-style-type: none"> Resignalled route along the Portbury Branch New track between a new arrangement around Pill Station and Portishead Ashton loop extended New Stations at Portishead, Ashton Gate and Pill Minor Station works at Parson Street and Bedminster New road layout at Quays Avenue | <ul style="list-style-type: none"> Freight services are maintained Main line services maintained | <ul style="list-style-type: none"> New track access points required More maintenance due to increase in infrastructure | <ul style="list-style-type: none"> No new or novel equipment being used. Signalling best delivered on or around the time of the Bristol resignalling Project Quays Avenue arrangement to be completed prior to the track works Pill Station to be brought back into use by using a discussed platform | <p>Stops at the greatest number of Stations on route between Portishead and Bristol.</p> <p>Ideal solution – half hourly services stopping at all possible Stations between Portishead and Bristol.</p> | <p>Hourly is not suitable for the demand.</p> <p>Most expensive and beyond likely funding availability.</p> |

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| Option | Description | Component parts i.e. platform, track etc. | Impact on Operations | Impact on Maintainability | Constructability | Main advantages | Main disadvantages |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| 5 | To provide a half hourly service in the peak and an hourly off peak between Portishead and Bristol TM with minimal work and alterations to the infrastructure to achieve this. | <ul style="list-style-type: none"> Resignalled route along the Portbury Branch New track between a new arrangement around Pill Station and Portishead Double junction at Parson Street Ashton loop extended New Station at Portishead New road layout at Quays Avenue | <ul style="list-style-type: none"> Freight services are maintained Main line services maintained | <ul style="list-style-type: none"> New track access points required More maintenance due to increase in infrastructure | <ul style="list-style-type: none"> No new or novel equipment being used. Signalling best delivered on or around the time of the Bristol resignalling Project Quays Avenue arrangement to be completed prior to the track works | <p>This Option fits in with the requirements set by client in terms of half hourly services between Portishead and Bristol.</p> <p>Has minimal infrastructure to meet the requirements.</p> | Excludes Pill Station. |
| 6 | To provide a half hourly service in the peak and an hourly off peak between Portishead and Bristol TM with a stop at Pill. | <ul style="list-style-type: none"> Resignalled route along the Portbury Branch New track between a new arrangement around Pill Station and Portishead Double junction at Parson Street Ashton loop extended New Stations at Portishead and Pill New road layout at Quays Avenue | <ul style="list-style-type: none"> Freight services are maintained Main line services maintained | <ul style="list-style-type: none"> New track access points required More maintenance due to increase in infrastructure | <ul style="list-style-type: none"> No new or novel equipment being used. Signalling best delivered on or around the time of the Bristol resignalling Project Quays Avenue arrangement to be completed prior to the track works Pill Station to be brought back into use by using a discussed platform | Maintains the business case. | None |

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7.2 Portishead Station Location Options

Since the completion of the previous GRIP2, North Somerset Council has undertaken more detailed assessment of the options for the location of Portishead station. A total of six sites have been assessed through a Portishead Station Options Appraisal Assessment (see appendix K). The previous preferred site at the rear of Waitrose on Harbour Road is not viable, along with two other options. A total of three of the six sites are potentially viable and these are to be subject to public consultation from June to July 2014. Two of these potential sites are included in this report, shown as option A and B (note these are identified as option 2A and 2B respectively by North Somerset Council). North Somerset Council's Option 2C which is a variation of Option 2B was not included in this report for practical purposes of managing scope, however its omission does not in any way imply that it is not being considered by North Somerset Council. Following the close of the public consultation, North Somerset Council will consider the consultation responses and intends to make a decision later this year on which station site it wishes to take forward to GRIP 3 and through to delivery.

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8. Portishead to Portbury Dock Junction Overview

8.1 General

The key deliverable for this section is to make provision for a single track between Portishead and Portbury Dock Junction within the existing railway boundary. The railway corridor is still evident except where it has been severed by Quays Avenue. The track, signalling and Station layout drawings contained in Appendix A are to be used as references throughout this Section.

8.2 Land Ownership

Network Rail own the section of railway land from Portbury Dock Junction to the former Portbury Station (exclusive) which is managed by Network Rail's Property Division. This section of railway is currently out of use.

North Somerset Council owns the section of land from Portbury Station (inclusive) to Portishead. The land was purchased from British Rail Board (BRB) (Residuary) Ltd during 2009. North Somerset Council will transfer the land to Network Rail for use as an operational railway.

North Somerset Council is undertaking public consultation on the location for Portishead rail station, in June and July 2014. A total of three sites have been identified as potentially viable sites, all of which are within the vicinity of Quays Avenue. There are existing rights for adjacent landowners and other statutory undertakings and consents to be progressed as the project develops.

8.3 Statutory Powers

The entire route is covered by the Bristol and Portishead Pier and Railway Act, 1863 and subsequent amending Acts.

The 1863 Act proposed a main line, curving away from the existing alignment at the former Portbury Station, terminating to the North-East of Portishead. This line was never built. This Act also proposed a branch line from Portbury to Portishead on a straight alignment crossing the tidal inlet known as Portishead Pill. This Branch was built, although Limits of Deviation of this Act are generally restrictive. It was subsequently amended by the Bristol and Portishead Pier and Railway Act, 1866. This Act allowed a greater Limit of Deviation in the Portishead area. Both Acts, although amended, have not been repealed.

The Limits of Deviation of the 1863 and 1866 Acts have been plotted onto the scheme Drawings. These limits have been based on the original deposited plans. No formal abandonment of the railway has taken place as goods and mineral trains continued to use the railway after its closure to passenger services.

Early investigations suggest the 3.5 miles of abandoned track will require planning consent, while the remaining works can be undertaken through Network Rail's General Permitted Development rights. Further scoping of the consents strategy will be needed, however early indications are that because the abandoned section of track is more than 2km a Development Consent Order may be required for powers to re-build and operate it.

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The Planning Act 2008 deems all rail projects involving more than 2 km of track outside the operational railway, to be a Nationally Significant Infrastructure Project (NSIP) and consequently are subject to the Development Consent Order planning process.

The Limits of Deviation of the 1863 Act provide adequate physical limits of work for bringing the railway back into use. Care will need to be taken that any works are undertaken within these limits so as to be within the “Permitted Development” rights that the Private Act confers under The Town and Country Planning (General Permitted Development) Order 1995 Part 11 (Development under Local or Private Acts or Orders, Class A).

Part 11 Rights are subject to Prior Approval of the detailed plans and specifications by the Planning Authority, North Somerset Council. The Planning Authority only has powers to consider the visual impact of the scheme on the amenities of the area.

Network Rail is also permitted under The Town and Country Planning (General Permitted Development) Order 1995 Part 17 (Development by Statutory Undertakers, Class A, Railway or light railway undertakings) to undertake other limited works in connection with the movement of traffic by rail. Part 17 powers are not confined to the Limits of Deviation. They are however restricted to Railway operational land and do not give rights to construct a railway.

Care should be taken on any works that affect the private sidings at Royal Portbury Dock (section of track west of Portbury Dock Junction) and their connection to the Network Rail railway as no statutory powers from an Order under the Transport and Works Act, 1992 nor any Network Exemption from the Office of Rail Regulators were sought for the operation of a railway. Any Connection Contract (Private Sidings Agreement) with The Bristol Port Company will need to be amended (or a new Connection Contract instituted) and approval sought from the Office of Rail Regulator (ORR). No alterations are expected to be required to the Royal Portbury Dock private sidings as per track, signalling and layout drawings in Appendix A. However the above constraint should be noted for consideration in GRIP stage 3 and beyond in order to avoid unnecessarily triggering the need to obtain powers to operate a railway, by means of a Transport and Works Order under the 1992 Act.

8.4 Rights of Way

No registered Public Footpaths, Bridleways or Bye-ways cross the railway according to North Somerset Council’s Definitive Map. Moor Lane at Portishead is regarded as a bye-way on railway records land which previously served the corporation tip. Rights to the crossing are held by the Corporation of Bristol.

The Drove at Portbury is being claimed as a Bye-way by a rights of way group. The claim is contested by North Somerset Council. Several private rights of way exist over this railway; some appear to be severed due to adjacent housing or port developments. From examination of the records, three Occupation Crossings are considered to be active: -

Elm Tree Farm access negotiations are ongoing between North Somerset Council and the Land Owner with a view to closing the crossing and providing alternative access via the A369.

Sheepway Farm access negotiations are ongoing between North Somerset Council and the Land Owners with alternative access arrangements being proposed.

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Lodway Farm access negotiations are to be progressed by both Network Rail and North Somerset Council to pursue deeds of release so that the occupational crossing can be closed.

9. Engineering Options

9.1 Requirements for reopening the Portishead to Portbury Dock Junction Line

9.1.1 Portishead Station

The proposed new Station at Portishead will form the terminus for services from Bristol Temple Meads, Bath Spa and Severn Beach. The Station is to be located within the vicinity of Quays Avenue. There are two reported Options regarding the location of the Station and these differ from those proposed in the Corus Report of 2010. North Somerset Council have identified a third option which is a variation of Option B and are undertaking public consultation on all three Options in June and July 2014. The third Option was not included in this report for practical purposes of managing scope; however its omission does not in any way imply that it is not being considered by North Somerset Council. For further details about the Options considered by North Somerset Council, see Portishead Stations Options Appraisal Report in Appendix K.

For both reported Options the layout of the Station at Portishead will provide a single platform for 4-cars of 97 metres in length, with passive provision for 5-car units of 122 metres length. A Ticket Office with retail kiosk will be provided adjacent to the platform with access through to the platform.

The platform will have the following features:

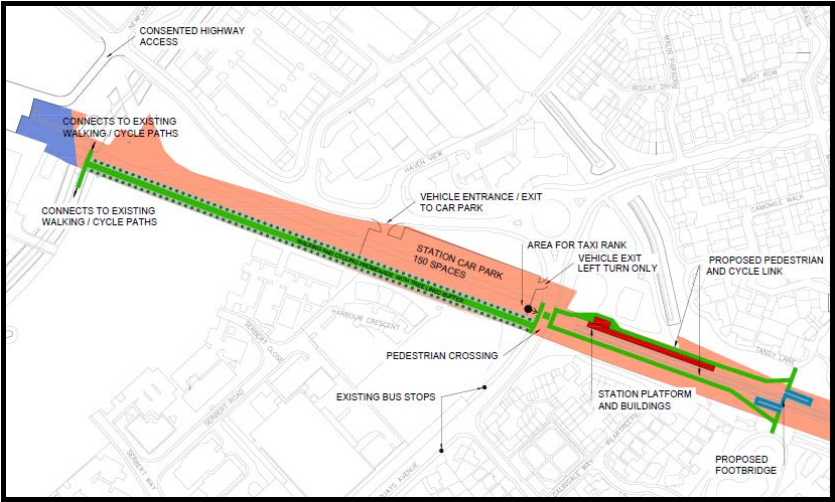
- Separate DDA compliant access for when the Station is unmanned
- Waiting shelter
- Public toilet block
- 25m long canopy
- Lighting
- Public Address system
- CCTV
- Passenger Information Display
- Customer Help Point
- Cycle rack

The Options provide a “Transport Terminus” close to the centre of Portishead. The town centre is evolving with the redevelopment of Portishead Quays at Harbour Road. The Station would be in the midst of the redevelopment and could be surrounded by an attractive environment. It would make a positive statement of the importance of the new transport link.

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The Options considered are:

9.1.1.1. Option A



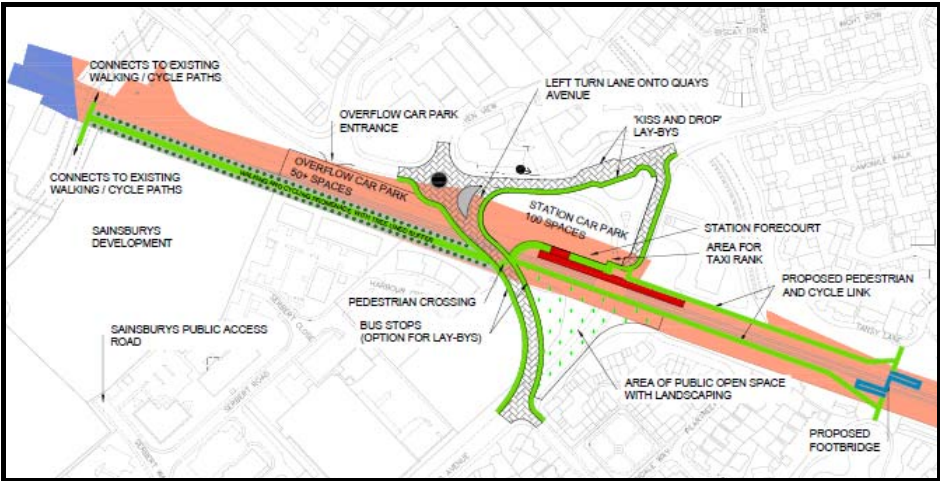
Portishead Station Option A

The new Station building and platform is located to the East of Quays Avenue with the Station car park to the West of Quays Avenue, the two being linked by a pedestrian/ cycle way crossing.

Vehicle access to the car park is proposed to be from a roundabout located on Harbour Road and a junction onto Quays avenue.

This Option provides 150 car spaces with 9 DDA compliant spaces.

9.1.1.2. Option B



Portishead Station Option B

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The new Station building and car park are both located across the existing alignment of Quays Avenue, requiring the rerouting of Quays Avenue to the West of the proposed Station and Car park. This option will require the removal of the roundabout on Quays Avenue, a pedestrian crossing for the cycle path and overflow car park will be required. However passengers will not need to cross Quays Avenue to access to the Station from the main car. A drop off and pickup zone will be provided together with a taxi rank adjacent to the Station building within the footprint of the car park.

This Option provides 155 car spaces with 9 DDA compliant spaces. Vehicle access to the car park is proposed to be from a junction on Harbour road.

9.1.2 Civils

For both Options the construction of the platform for Portishead Station can be carried out at any time during overall the construction phase and is therefore not possession dependant. The form of construction adopted may therefore be developed as that offering minimum costs for construction.

A front / rear wall form of construction can be adopted with suitable imported fill as this offers reduced costs for construction and is effectively a greenfield site. The surfacing of the platform can be either block pavements or tarmac depending on available budgets and appearance of the Station required, Standard Network Rail details exist for Platform construction.

A minimum of 2500mm available platform width is required to comply with Network Rail Standards.

Drainage off the rear of the platform will be necessary and it is proposed that this takes the form of a soakway, subject to suitable ground conditions, although alternative options for using this 'grey' water should be considered in the next GRIP stage. Connections to a local authority sewer will be necessary for the waste from the toilet block.

For design development a geotechnical investigation is required to prove foundation details of the platform for proposed drainage, soakaways and design of car park surfacing.

Design interface will be required with the lighting design team and the telecoms design team to ensure that cable duct routes and bases for lighting, CCTV, PA and CIS information screens is provided.

Detailed design of the track and platform, following topographical survey, should ensure that the platform is constructed on a 1:500 or shallower gradient as required by Railway Standards, which is a particular requirement at a terminating Station.

Design to be compliant under the Disabled Discrimination Act 1995 (DDA) will need to ensure that access to the Station platform, by ramps, hand railing is given full consideration.

9.1.3 Telecoms

For both Options the following shall apply:

Station Information & Surveillance Systems (SISS)

Closed Circuit Television (CCTV)

A CCTV surveillance system shall be provided to monitor the public areas within the Station and shall comply with Network Rail Standard NR/L2/TEL/30135.

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The system shall be designed for the purpose of providing general monitoring of the Station, particularly entrances / exits to the Station platform and will offer a means of protecting the safety and security of the public and staff in the general management of the Station and train operations.

The CCTV system shall make provision to include 24 hour surveillance of the Station car parking facilities. The cameras shall be suitable for both day and night operation, to maintain a good quality level of coverage, for when the light levels diminish.

CCTV images shall be recorded locally on a Digital Video Recorder. The system however, shall be designed to enable monitoring from a remote location if required by the Train Operating Company (TOC).

Public Address (PA)

A standalone PA system shall to be provided at Portishead Station to broadcast secure, fail-safe, and high intelligibility speech to all public areas on the Station platform, including access routing to the platform. The requirements for the new PA system shall comply with Network Rail Standard NR/L2/TEL/30134.

In order to update the announcements a dedicated link from the PA control equipment at the Station, to the associated TOC Control Centre will be required.

Customer Information Systems (CIS)

A Customer Information System shall be provided, delivering live train information to the travelling public in transit from the Station car park and passengers waiting on the Station platform.

The requirements for the new CIS system shall comply with Network Rail Standard NR/L2/TEL/30130.

In order to update the train information displayed a dedicated link from the CIS control equipment at the Station, to the associated TOC Control Centre will be required.

Passenger Help Points (PHP)

Passenger Help Points shall be provided as a focal point for information and in the event of an emergency.

It is proposed that the PHP's be a GSM enabled Help Point.

PHPs shall be a two button type unit with one button marked 'Information', the second 'Emergency'. Information calls are routed via the GSM provider and Public Switched Telephone Network (PSTN) to the information call centre.

To aid passengers with hearing difficulties, the PHP will include an Induction Loop facility, integrated within the passenger help point enclosure.

Telecommunication Equipment Cabinet

A telecoms equipment cabinet shall be provided to house the CCTV, PA and CIS control equipment. This will need to be located in a position that provides unhindered access for maintenance purposes. A power supply will need to be provided for the telecommunication equipment cabinet.

Third Party Connections

It will be necessary for a third party ADSL connection to be provided at Portishead Station.

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The third party connection will allow the SISS to be connected to the TOC control centre in order to provide updated information for both the CIS displays and PA.

Operational Communications

The only operational circuit required at Portishead Station is to facilitate an operational telephone at the Bristol end of the platform.

Due to both the lack of existing cable infrastructure and there being no other Lineside telephone requirements, in the area, it is proposed to use a BT 'leased line' circuit to connect the operational telephone to the controlling Signal Box.

9.1.4 Electrical

Distribution Network Operator Supply

The proposal at Portishead for the Options would be to provide a DNO supply for the Station and locate this in the fence line of the area. The DNO cubicle will be double sided and would contain the DNO equipment and meter on the public side of the fence and on the Network Rail side of the fence the distribution and lighting control system would be located. In order to access the Network Rail side of the cubicle an adjacent pedestrian access gate will be required. Alternatively access could be gained through the Station and providing a set of steps to the west of the platform down to the cess level. Providing the access through the Station may prove problematic during the times when the Station is not in operation and access would need to be arranged with the Station Manager prior to the visit.

The DNO distribution would be used to provide a supply for the Station and access lighting, power requirements in the Station building, power and lighting in the toilet and stop blocking lighting. Since the stop lighting is classed as being part of the railway infrastructure and all other supplies would be associated with the Station, the stop block lighting would be sub-metered so that the cost of the stop block light could be factored out of the running costs of the Station.

Lighting

The platform lighting would need to comply with Railway Group Standard GI/RT/7016 and RIS-7702-INS and in general should achieve a maintained horizontal minimum of 20 Lux with a minimum uniformity of 0.4 and this is consistent with driver only operated (DOO) Stations. During the time the Station is manned and lit for the dispatching of trains the lighting parameters will be 10 Lux maintained illuminance with a uniformity of 0.25. The vertical illuminance at a height of 1m above the platform surface at the edge of the platform will need to be 6 Lux for DOO Stations and 2 Lux for manned Stations with 0.125 diversity. However, the RIS Standard advises that lighting should be developed to any task that might be undertaken on the platform and if there are any tasks that require a certain level of detail to be completed the Lux levels will need to be revised relevant to that task.

DDA compliance would see the lighting level on the platform rise to a minimum of 100 Lux and the DfT Code of Practice does not give minimum Lux levels or uniformity so this would be in line with the 0.4 requirement of RIS-7702-INS. Usually DDA requirements are not applied to platform areas so the Group Standard requirements are being adopted.

Under the canopy area, flat glass luminaries have been shown attached to the roof of the canopy and are spaced at 4m intervals. The canopy will need to have cable routes for this equipment along with routes to and from the roof to the platform level to

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achieve the looping in and looping out cabling associated with lighting installations. The platform luminaries are shown as being 5m above the platform and at 6m spacing. The heights and spacing's for all luminaries are to be confirmed at the Grip 3 Stage of the Project. The use of raise and lowering columns mean that the maintenance staff can carry out maintenance and repair at platform level.

The waiting shelter is assumed to be a transparent or translucent type structure that will not require separate lighting requirements and the platform lighting will provide enough lighting for its use.

The supplies for the telecoms equipment such as Customer Information System (CIS), Close Circuit Television and Public Announcement will be feed from the Station distribution board located in the confines of the Station building.

The toilet block power, lighting and heating requirements will be fed from a sub distribution board located in the toilet block and fed from the DNO Station fuse switch disconnector via the Station distribution board. The lighting level in the block will need to be in accordance with BS EN 12464-1 and be a minimum maintained illuminance of 200Lux with an uniformity of 0.4.

The Station area will need to be lit to the requirements of BS EN 12464-1 and for Ticket Hall and concourse areas along with entrance halls be a minimum of 200Lux with a 0.5 uniformity. For a ticket counter or ticket machine a minimum of 300Lux with a uniformity of 0.5 will be required. Emergency lighting will also need to be considered during the GRIP 3 stage of the Project.

The stop block lighting will be confirmed as being required at the GRIP 3 Stage by the Signal Sighting Committee along with the colour of the light to be used. A reflective strip across the buffer stop may be more than adequate when taking Station lighting into account in the area. A sub metered fuse switch disconnector will be used in the distribution cubicle and will feed a local 230V/110V transformer and key switch that will used to provide the supply. The lights shall be the PADS approved Marl LED type and draw current in the range of 40mA per light.

The steps to the Station and access ramps will need to be lit to BS 5489 and be 30 Lux with an uniformity of 0.5 but to comply with the Disabled Discrimination Act (DDA, which has since evolved into the Equalities Act 2010) requires a minimum of 100 Lux from the accessible building entrance to the platform access point, measured at floor level. This is detailed in the Department for Transport Accessible Train Station Design for Disabled People: A Code of Practice. There is no uniformity given in the DfT Accessible Train Station document but it is recommended that the uniformity to the BS 5489 Standard be applied.

Selected operating times for lighting/ PA will form an essential element of the design at future GRIP stages.

9.1.5 Utilities

It has been assumed that a gas supply is not required for the Station and water will be provided via a stop cock located outside the Station at a convenient location. The drainage of the Station and toilet block area is assumed to be able to tie into local drains with agreement of the local water authority and water consumption and drainage flow rates will need to be investigated and confirmed with the water authority to establish possible connection to their infrastructure. Hot water for the toilet facilities will be gained via the use of electric instantaneous water heaters or similar.

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9.2 Portishead Station Car Park

9.2.1 Electrical

Distribution Network Operator Supply

For both Options it is suggested that a separate DNO be installed so that an under road crossing (URX) will not need to be created to provide power to the lighting of the car park and any CIS, CCTV, pay and display machines, and PA equipment that might be proposed there. However, it may be more cost effective to provide the power from the proposed Station DNO and construct the URX with an appropriate amount of ducts to provide power to the car park. This would mean the supply at the Station would need to include the car park load requirements.

It is proposed that the power to the overflow car park for lighting and any CIS, CCTV and PA equipment as well as pay and display machines if required are to be derived from the Station DNO with routes provided through the main car park to reach the overflow car park.

LIGHTING

Car Park lighting is to comply with CP-PM-42. For both Options and indicative purposes only, 8m columns with luminaries have been shown with typical 12m spacing. Where necessary double headed lighting columns have been used with flat glass luminaries utilised to reduce glare and light pollution.

Where lighting columns are in vulnerable positions collision protection is to be considered and if deemed necessary applied.

For Option B the path way from the North of the Station to the car park has been shown to be lit and the lighting requirements would be the same as those required for the car park. This would not typically have DDA requirements applied to it for lighting levels.

An overflow car park is proposed as part of the works for Option B and this will be required to be lit to the same requirements as those for the main car park and will be dependent on whether DDA requirements are to be applied or not.

9.2.2 Utilities

A soakaway appears to be the most suitable and sustainable method of draining the car park, and should be installed with an oil separator buried in the car park at a suitable location. It has been assumed that this would not require power and would be a passive device, cleaning and removal of the oil would be necessary at least once a year. Ground investigation work will be required to assess permeability together with an assessment of flow rates should be undertaken prior to design.

The car park surface should be a highway compliant surfacing, suitable for any vehicle permitted to travel on the public highway.

9.3 Quays Avenue

During the GRIP 3 study a new bridge over Quays Avenue was proposed, however this option has now been discounted due to the high cost, disruption to local neighbourhood, businesses and land owners..

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Option A within this report requires a pedestrian crossing over Quays Avenue opposite the Station entrance linking the Station and the car park, such as a Zebra or Toucan crossing.

Option B involves the diversion of Quays Avenue with its current alignment being blocked-up. A pedestrian crossing (Zebra or Toucan crossing) will be required over the new Quays Avenue alignment in order to link the Station and the overflow car park with the main car park to the North of the Station.

9.4 Conclusion:

Option B has some advantages over Option A as it offers a more integrated solution, where the car park and the Station are situated on connected plots of land. As a result of the Quays Avenue realignment outlined in Option B, the requirement for passengers to cross the highway between the car park and Station is eliminated, making it a key advantage over Option A. The reduced distance between the car park and the Station in Option B is also beneficial over Option A.

9.5 Avon Road Underbridge

Avon Road underbridge will require repairs to the masonry abutments and widening to accommodate the proposed twin-tracking.

The proposed solution includes the installation of new precast concrete deck units sat on new pile supported precast abutment walls. These would be installed following the removal of the parapet precast edge unit, and breaking down of the existing wing walls to at least 1m below sleeper level. A new precast decking unit would be installed to replace the removed edge unit.

New concrete wingwalls would also be installed perpendicular to the parapet wall, and would also be supported on piles. These proposals are subject to ground conditions, site survey and detailed design.

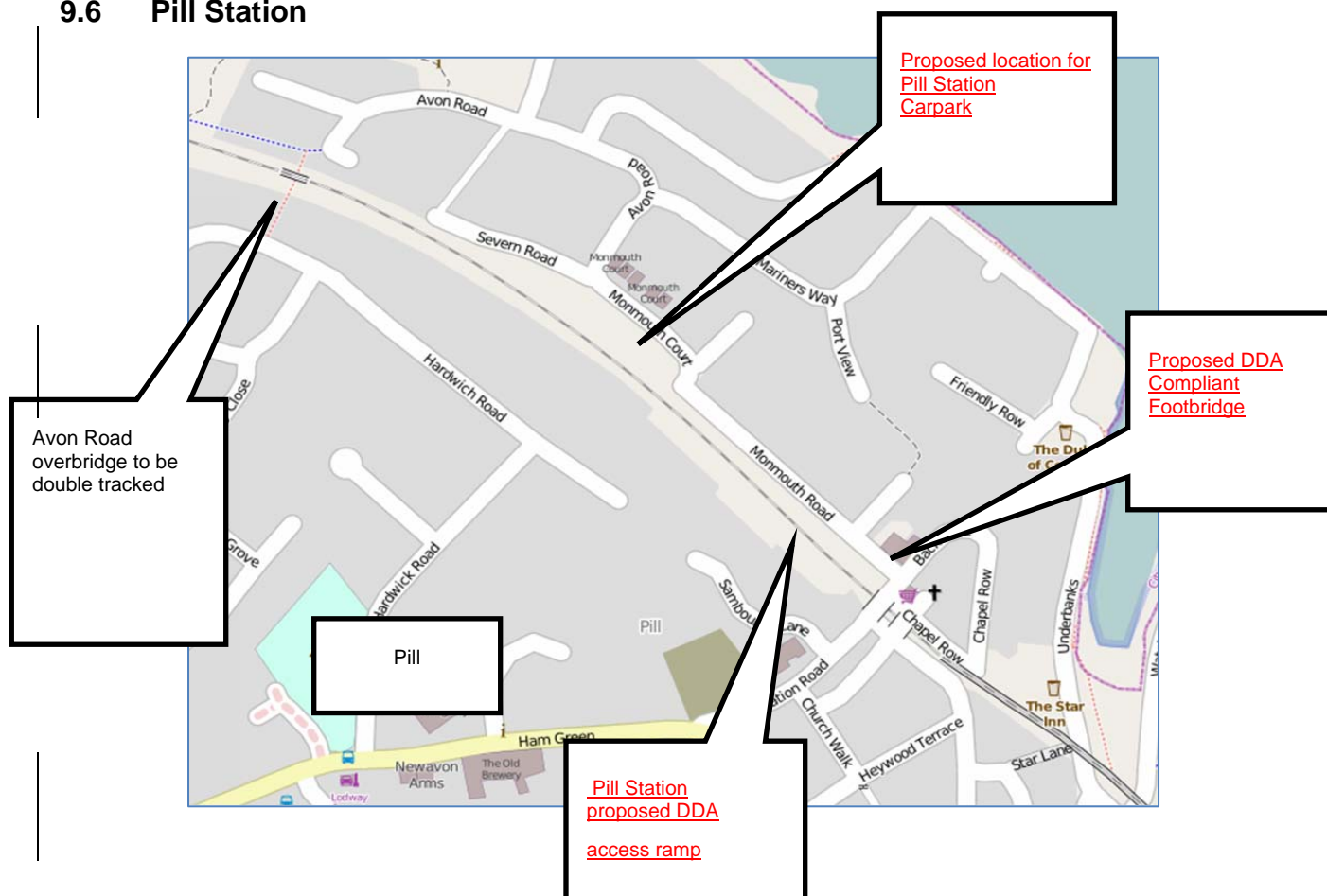
The embankment adjacent to the bridge will require a topographical survey at GRIP 3 Stage, and needs reinforcing or retaining to constrain the embankment within the Network Rail boundary. The proposed solution for the embankment includes a dual gradient slope, with the lower section graded at 20 degrees to the vertical, and reinforced accordingly with geotextile.



Avon Road Underbridge - location of proposed bridge widening

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9.6 Pill Station



The proposed single lead junction layout at Portbury Dock Junction along with a single line all the way to Ashton Junction is not adequate for trains stopping at Pill to meet the timetabling requirements.

The RailSys timetable modelling determined that passenger trains stopping at Pill will occupy the single line section for a length of time that will conflict and impact with freight services.

The proposal developed to resolve this conflict is to provide a twin tracking arrangement from Pill Junction to the Portbury Dock Junction, with the removal of the existing points at Portbury Dock Junction.

This in essence creates two parallel single lines, one a passenger line to Portishead and the other a freight line to Portbury Dock.

9.6.1 Civils

Pill Station would be constructed using the former Down platform, with the cutting slope behind the platform suitably graded. The existing obscured retaining walls (possibly those of the previous Station waiting shelter and signal box) should be inspected and assessed for structural capacity following removal of the heaped spoil in front.

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Access to the platform would ideally be from the Down side, but the former Station house is now owned and occupied by a private tenant. The alternative is to construct a DDA compliant footbridge accessed from the Up side and a DDA compliant ramp, with a gradient of 1:20 off the bridge, down to the platform. It is proposed that this is to be either a steel structure supported above the embankment, or a part fill based ramp in a retained terraced embankment. If the former is selected, the supporting columns and corresponding foundations require encasing with sheet piles on three sides to facilitate maintenance access. If the latter is selected, a proprietary interlocking block retaining wall with soil reinforcing, if required, would be a suitable solution to retaining the terraced earth. As the proposed footbridge across the line is a new structure, the track to bridge soffit vertical clearance should be 4880mm, for OLE Normal Clearance with full tolerance passive provision.

The cutting slope should have the vegetation removed, and be surveyed prior to further design work. The platform requires remedial work to the surfacing, coping stones, and the masonry wall. The cavity located approximately halfway along and under the platform should be assessed, repaired or infilled. Attention should be given to the drainage off the Platform; this should be investigated further along with the provision of a 1:40 backfill from Platform Edge.



Pill Station platform – view from bridge towards Portbury

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Pill Station platform – Lineside view

A Customer Information system and Customer Help Point will be provided on the new platform. Car parking facilities are proposed within the site of the former station goods yard. REB facilities to provide signalling supply would also be located within the former station goods yard, with power supplies taken from an adjacent sub-station. The land in question is believed to have been sold by Network Rail and may need to be re-purchased. Optical fibre links for the GSM-R radio Network mast will terminate in the Pill area and be linked directly to the signalling REB.

The line speed on the Passenger line is proposed to be 50 mph from Pill Junction through Pill Station to 126m 49ch and 75 mph from this point through to Portishead Station reducing to 25 mph into the Station itself. On the Freight line the line speed will be 40 mph from Pill Junction to the boundary with the Bristol Port Company near the former Portbury Dock Junction. Due to the improved track geometry and higher line speeds the ambient noise levels will be altered, probably beneficially. A noise survey will need to be undertaken at GRIP stage 3.

9.7 Pill Station Car Park

The former goods yard appears to provide adequate capacity for the proposed car park, however, a good pedestrian route between the car park and the footbridge is required to ensure ease of access for users. Network Rail specification NR/L3/CIV/160 ISSUE 1 states that at least three disabled spaces should be provided in a car park of this size, and the required number of disabled spaces are provided however this does not directly adhere to the recommendations set out by BS 8300:5.1. The BS Standard recommends that the maximum distance away from a car park is 50m, the proposed car park is in excess of this distance. Disabled access from the proposed car park to the Station will be via the highway as the entrance to the footbridge is from Monmouth Road, subject to highway consents.

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Sufficient CCTV and lighting for the car park must be provided. The car park surface should be a highway compliant surfacing, designed for axle tonnage envisaged.



Pill Station former goods yard: the proposed location for the car park

A pedestrian only area with paths to crossing points over Monmouth Road, in front of the bridge entrance, is required, to ensure a safer pedestrian highway interface. Bollards or other appropriate means of preventing obstruction of, or intrusion onto, the pedestrian area by vehicles should be installed.

9.7.1 Telecoms

Station Information & Surveillance Systems (SISS)

Closed Circuit Television (CCTV)

A CCTV surveillance system shall be provided to monitor the public areas within the Station and shall comply with Network Rail Standard NR/L2/TEL/30135.

The system shall be designed for the purpose of providing general monitoring of the Station, particularly entrances / exits to the Station platform and will offer a means of protecting the safety and security of the public and staff in the general management of the Station and train operations.

The CCTV system shall make provision to include 24 hour surveillance of the Station car parking facilities. The cameras shall be suitable for both day and night operation, to maintain a good quality level of coverage, for when the light levels diminish.

CCTV images shall be recorded locally on a Digital Video Recorder. The system however, shall be designed to enable monitoring from a remote location if required by the Train Operating Company (TOC).

Public Address (PA)

A standalone PA system shall be provided at Pill Station to broadcast secure, fail-safe, and high intelligibility speech to all public areas on the Station platform, including

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access routing to the platform. The requirements for the new PA system shall comply with Network Rail Standard NR/L2/TEL/30134.

In order to update the announcements a dedicated link from the PA control equipment at the Station, to the associated TOC Control Centre will be required.

Customer Information Systems (CIS)

A Customer Information System shall be provided, delivering live train information to the travelling public in transit from the Station car park and passengers waiting on the Station platform.

The requirements for the new CIS system shall comply with Network Rail Standard NR/L2/TEL/30130.

In order to update the train information displayed a dedicated link from the CIS control equipment at the Station, to the associated TOC Control Centre will be required.

Passenger Help Points (PHP)

Passenger Help Points shall be provided as a focal point for information and in the event of an emergency.

It is proposed that the PHPs be a GSM enabled Help Point.

PHPs shall be a two button type unit with one button marked 'Information', the second 'Emergency'. Information calls are routed via the GSM provider and Public Switched Telephone Network (PSTN) to the information call centre.

To aid passengers with hearing difficulties, the PHP will include an Induction Loop facility, integrated within the passenger help point enclosure.

Telecommunication Equipment Cabinet

A telecoms equipment cabinet shall be provided to house the CCTV, PA and CIS control equipment. This will need to be located in a position that provides unhindered access for maintenance purposes. A power supply will need to be provided for the telecommunication equipment cabinet.

Third Party Connections

It will be necessary for a third party ADSL connection to be provided at Pill Station.

The third party connection will allow the SISS to be connected to the TOC control centre in order to provide updated information for both the CIS displays and PA.

9.7.2 Electrical

Distribution Network Operator Supply

The DNO would be located in a cubicle at a location to deter vandalism and theft and if necessary within a fenced area. Where lighting columns are in vulnerable positions collision protection is to be considered by the use of Armco barriers.

LIGHTING

Car Park lighting to comply with CP-PM-42.

Lighting will be subject to the same requirements as Portishead Car Park and will be at the least 10 lux with a uniformity of 0.25 or where DDA requirements are deemed to be applied this will rise to 100Lux with a 0.25 uniformity. Again for indicative purposes the lighting has been shown to be 8m columns with typical 12m spacing's. The GRIP 3 design stage will verify the lighting requirements to achieve the necessary Lux levels.

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Power supply requirements for CIS, PA, CCTV and pay and display machines will be derived from the DNO cubicle.

9.7.3 Utilities

The drainage of the car park is assumed to be agreeable with the local water authority and discharge into the water authority's drainage will need to be via an oil separator buried in the car park at a suitable location. It has been assumed that this would not require power and would be a passive device that would require cleaning and removal of the oil at least once a year. Flow rates into the local drainage system would need to be investigated and confirmed with the water authority to establish a connection into their system.

9.7.4 Signalling

The current proposal is to split the single line East of Pill viaduct providing lines to both Portishead and Portbury Dock.

The new Station (and parallel movements from the Docks) will be fully signalled, incorporating full axle counter detection, to provide control of the single line between the new Pill Junction and Clifton Junction replacing the existing token section.

The provision of complete signalling and train detection over this section will extend the control area of Thames Valley Signalling Control (TVSC) introduced by the Bristol Area Signalling Renewals Project (BASRE) from its existing end at Ashton Junction to the whole of the Portishead branch.

9.8 Pill Tunnel

It is noted that Pill Tunnel is a single bore tunnel, 665 yards long. The tunnel and railway was constructed as a broad gauge railway and while this provides an additional 350mm clearance on either side from rolling stock to tunnel wall, evacuation from the train will be difficult due to restricted widths.

Historically Pill tunnel suffered from inadequate drainage and track formation. As a result Network Rail undertook full track renewal during 2012/2013 with the associated provision of enhanced track drainage.

There may be an incremental cost which will need to be borne by this Project regarding the difference between meeting the current 20mph line speed through the tunnel compared to the proposed 55mph, however, the Network Rail Western Track Renewals Team are aware of the passenger train Project and will consider opportunities for future proofing to provide efficiencies.

The tunnel will need improved line side access to the portals, the provision of a safe walking route in the cess, lighting, leaky feeder communications and fire hydrants in order to meet the fire and evacuation requirements as agreed at a safety workshop.

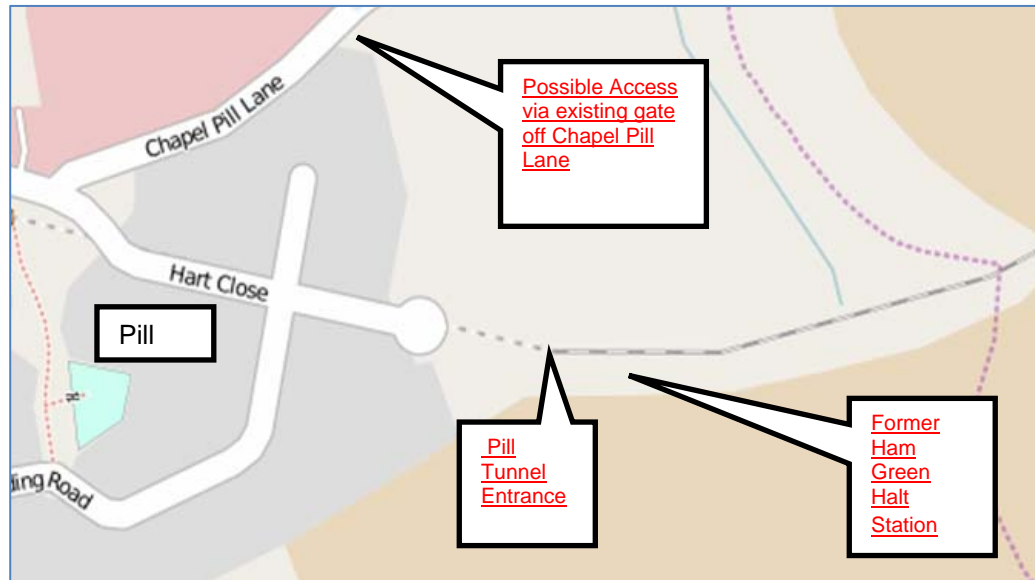
Access from Hays Mays Lane (off Chapel Pill Lane) to the Eastern portal of Pill tunnel would Maintenance access points are limited on the current freight line and require some highway work to enable emergency vehicular access should there be an incident involving a passenger train in the tunnel.

Near to the Western portal an access route should be considered at the proposed site for Pill Junction. Access rights are to be investigated and obtained if necessary over the cycle route leading to this site.

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An outline design for the evacuation requirements at Pill Tunnel will need to be completed at GRIP stage 3.

GRIP 3 should also include the logistics of materials handling within the single-bore tunnel.



9.8.1 Civils

Previous work has indicated that emergency access provision is to be considered at the East end of the tunnel portal. An evacuation area located in the vicinity of the former Ham Green Halt has been identified as a possible site, see Appendix A. A risk assessment is to be undertaken in GRIP3 to determine if provision is required. If necessary some highway works to enable both emergency and maintenance access may be needed.

It is proposed that a walkway is provided to enable lineside safe access within the railway boundary from the Eastern tunnel portal in the up cess way to an emergency evacuation point on the up cess (north side) of the railway formation. This walkway will be approximately 150m in length.

Its is noted that access to the railway off Chapel Pill Lane follows a relatively steep gradient, some re-profiling, minor retaining walls or re-grading of slopes may be required.

Consideration in GRIP3 is to be given to loadings from fire engines and ambulances; a "Grasscrete" solution could be an option as it offers:

- Minimal visual impact.
- Loading of up to 40t gross vehicle weight.
- Allows adequate drainage capacity.

Improvements to the existing gateway would be necessary to allow access by vehicles in an emergency and not to be hindered by a chain locked gate.

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The road and field access rights and ownership must be established with loss of use of an area of land compensated, if appropriate.

9.8.2 Telecoms

In order to maintain radio communications throughout the tunnel, for the GSM-R, Airwave and VHF Channel 5 for the emergency services, a “leaky feeder” communications cable system must be installed.

9.8.3 Electrical

Distribution Network Operator Supply

The DNO, Distribution and light control cubicle would be located in the fence line at the access to the site. A switch on button on the face of the Network Rail side of the cubicle would allow anyone entering the site to switch on the lights and it is proposed that the switch then be by light level sensor or a time delay circuit of duration 2 hours. Thus the lights are not turned off at the end of the area, they will be switched off automatically when sun rise occurs or when the 2 hours has elapsed, saving energy and costs associated with lights being on throughout the night time when not required.

The lights have been shown as being 5m high, raise and lower columns on the road to the compound area at track level with 6m spacing's. For the compound area it is proposed to install 8m high columns with 8m high, raise and lower columns with 6m separations to achieve higher lux levels than the approach road. The actual lighting level of the area will depend on the tasks that are to be undertaken and it has been assumed that at least a 50Lux light level will be required with a 0.4 uniformity. If the area is just required to park vehicles then the Lux levels can be reduced in line with those for the car park. It may be necessary to add lighting in the centre of the compound area to achieve the necessary lighting levels and this will need to be confirmed at the GRIP 3 stage of the Project.

Where lighting columns are in vulnerable positions collision protection is to be considered and if deemed necessary applied.

This route would typically not have DDA lighting level requirements applied to it.

It has been assumed that there is no drainage or gas requirement associated with the Pill Tunnel Evacuation Route.

9.9 Underline Structures

The higher line speed of 55mph to 60 mph will affect loadings on under-bridges. Pill Viaduct is also proposed for re-instatement of double-track. Records of these structures will need to be examined and possible site investigations under-taken to determine the capability of the structures. However, in the past the structure used to carry two tracks and loading from two DMU trains should not be an issue. Nevertheless, a load carrying assessment and inspection of the structures should be carried out. These surveys will take place at GRIP Stage 3.

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9.10 Parson Street Junction to Bedminster and Bristol Temple Meads

To facilitate a robust timetable, the junction at Parson Street will be enhanced and converted to a double junction. The existing is a single lead junction. Several switches and crossings on the Up Portishead line could then be removed, thereby reducing ongoing maintenance costs.

Within Network Rail's long-term RUS (Route Utilisation Strategy) proposed for Control Period 5, but currently unfunded, there is a proposal to add an additional track between Parson Street Junction and Bedminster. This is to rationalise the track configuration to accommodate two Relief lines on the Western side of the alignment and two Main lines on the Eastern side of the alignment. The proposal for a double-lead junction could be made consistent with that rationalisation.

The existing Parson Street Junction forms a constraint on line capacity and performance hence the requirement of the double junction. The current Up Freight Line from Portishead forms the Up Relief line on the Bristol side of Parson Street Station. It is connected directly to the West Freightliner Sidings which were brought back into use during early 2010.

The line speed on the Up Relief line from Parson Street Station to Bedminster should be increased from its current mixture of 25 mph and 40 mph to a uniform speed of 60 mph. Recanting could be accomplished as part of the ongoing maintenance tamping programme.

9.10.1 Train Regulation Bristol Temple Meads – Parson Street

9.10.1.1 Track

Network Rail's track and signalling infrastructure west of Bristol Temple Meads Station is intensively utilised by both passenger and freight trains. The addition of a regular passenger service to and from Portishead will result in additional pressure on the robustness of the service through this area. A daily car train service between Warrington and Portbury Dock, comprising 100 SLU's in length (approx. 650m), is towards one of the longest trains run on the national network. Signaller's instructions normally result in this service being signalled to run, non-stop, through Temple Meads Station and out onto the Down Main line to Parson Street junction where it diverts onto the Portbury Dock line. On the rare occasions that this long train is brought to a stand at Bristol Temple Meads Station the bulk of the East end of the Station is "locked up" by the long length of the train.

The likelihood of the long car train being brought to a stand in the Temple Meads area would be increased by the introduction of the Portishead services. There being no suitable refuge for this train in the Temple Meads area it is sensible to consider the provision of a looping facility to assist during perturbed operating conditions. Historically a long loop line (The Down Relief Line) extended from Temple Meads to the west of Parson Street Station and the reinstatement of part of this former line would represent the most cost effective means of providing a refuge for the long car train. In its simplest form the Down Relief Line would be accessed from existing turnouts at Bristol West junction and be re-laid to a point just to the west of Bedminster Station where a new 40 m.p.h. turnout would be installed in the Down Main line to provide an exit from the loop. Fixed signalling equipment, axle counters, switch heating and a cess pathway would be installed attendant with the reinstated loop. Some 950m on good serviceable CWR on concrete/steel sleepers, together with a new NR57 Cv13 modular

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concrete trailing turnout in the Down Main line at approx. 119m 45c would be needed to complete the Down Relief Line.

The Down Relief would be able to hold the long car train and other freight services whilst other services passed in either direction on the adjacent Main Lines.

The arrangements for the potential reinstatement of part of the Down Relief Lines are shown on the Drawings in Appendix A.

Incremental enhancements to the “base case” loop could see it extended, possibly at a higher speed, as far as Parson Street west or converted to passenger status which would further assist with train regulation in the busy Bristol Temple Meads West area.

9.10.1.2 Signalling

There is only 1 Option being considered for Signalling which is to reinstate the old Down Relief line (existing Carriage Line) towards Parson Street, joining on to the Down Main as close to Bedminster Station as possible, but allowing for a full overlap for the new signal. This Option will require a signal at Bedminster Station (parallel to existing BS6) and a single end junction to join the mainline just after the Station . This will provide adequate signal spacing for the proposed line speed. The upgrading of the Carriage Line to a relief line does not drive the need for any additional trapping protection over the existing provision.

9.10.2 Parson Street junction - Signalling

The proposal is to create a new double junction to replace the existing single one, which will have little effect on the existing signalling layout with the exception of the need to review the risk assessment of B21.

Any freight moves from the siding will have a direct effect on the Up Main traffic flow due to occupation of B21 overlap and having to hold trains further out.

9.10.3 Parson Street and Bedminster Stations - Signalling

The proposed BASRE design for Parson Street replicates the existing platform starter on the Up Relief (B421) and therefore services can easily stop here.

The proposed BASRE design for Bedminster Station also replicates the existing arrangements, but has no platform starters for either the Up Main or Up Relief. Instead the signalling control is via existing B25 and B27 which are approximately ¼ mile in advance of the Station but as sighting is good, no signalling work will be required for services to stop (subject to timetable modelling).

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9.11 Disused Line Portbury Junction to Portishead

9.11.1 Existing Track

The age of the existing track between Portbury Dock Junction and Portishead is circa 1920's and primarily composed of a mix of BS 95 and GWR 00 section (97.5 lb/yd) jointed bullhead rail on softwood timber sleepers. The turnout at Portbury Dock Jn. leading to the disused section to Portishead has had its switches removed and plain lined such that the disused section is no longer connected to the national network.

Although the Line was originally planned out as a twin tracked route only a single track, with a passing loop on the approach to the former Station at Portishead, currently exists. The switch and crossing layouts at either end of this loop are also formed from bullhead jointed rail on softwood timber bearers. Between approx. mileages 127m 07c and 127m 37c a length of some 600m of FB113A continuous welded rail (CWR) on F27 concrete sleepers was installed in the early 1980's. Adjustment switches are located at either end of this length of CWR.

The bullhead track materials have no residual value as replacement components for life expired Network Rail track assets and should be regarded as having value only as scrap. It may be that individual elements of the switch and crossing layouts and a limited number of plain line rails may be of interest to railway heritage organisations. Subject to visual and ultrasonic testing the lengths of long welded rail may be suitable for incorporation in the replacement trackform although the attendant F27 sleepers would probably be regarded as too historic to be reinstalled in the proposed works.

Many of the existing timber sleepers are completely rotten and would not hold track gauge or support rail construction traffic. It is sensible to assume that the existing track should not be offered to potential installation contractors as being suitable for use in their construction activities.

The ballast profile of the existing track is choked with fines and is completely overgrown with brambles, Butterfly Bush and small deciduous trees. A comprehensive series of automatic ballast sampling and trial pitting has been carried out throughout the route and the resultant factual and interpretive Track Bed Investigation (TBI) Reports will be used to reach agreement as to the nature of the proposed sub-grade and track bed.

There are no piped track drains throughout the route but a comprehensive network of lineside drainage ditches would, if recommended in the TBI Reports, provide adequate outfalls for such drainage systems.

Both underline and overline structures reflect the fact that the route was originally laid out to a double track formation. The resulting generous clearances mean that the proposed single track alignment can easily be accommodated together with a compliant continuous cess path without the need for wholesale reconstruction of bridges and culverts.

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9.11.2 Proposed Track Alignment

An alignment proposal has been drafted that demonstrates that the aspiration for a 75 mph Line speed for the bulk of the route is perfectly feasible. The only sharp curvature on the route (approx. 600m radius) applies for around 300m immediately to the west of the current Portbury Dock Junction and through this section a Line speed of 50 mph. is proposed.

The remainder of the proposed alignment is either straight or has radii of approximately 1500m where an installed cant of approx. 65mm would apply. The services on the route will be almost exclusively Diesel Multiple Units running to a uniform speed profile and Network Rail's track team will be engaged to determine if traditional curve/cant relationships should be modified to match the uniformity of speed and weight of the proposed services.

Whilst existing headroom clearances beneath overline structures could accommodate DMU traffic with little deviation from current track levels the Project requirement specification mandates that the route be designed with passive provision for potential installation of Overhead Line Equipment (O.L.E.) The proposed vertical profile of the route will therefore show the need for track lowering of up to 300mm beneath 3 of the existing overline structures.

Driven by the need for the reinstated line to co-exist alongside a cycleway beneath three of the over bridges and for the line to be slued away from a residential property at the former Portbury Station the proposed alignment will not be coincident with the current arrangement. This movement away from the existing alignment is facilitated by the double track width of the existing formation.

9.11.3 Proposed Trackform

The proposed trackwork will conform to the requirements of a Standard gauge passenger railway with a track category of 4. The TBI interpretive Report will determine the nature of any sub-grade treatments needed to support the proposed traffic together with the requirement for any geomembranes, sand blankets and requisite ballast depths etc. A suitable crossfall will be specified to assist natural drainage and recommendations for bespoke piped drainage systems will be identified. New bottom and top ballast will be installed to profiles compliant with CWR. Although steel sleepers could be installed on a Category 4 line such as this recent history suggests that new or very good serviceable G44 concrete sleepers with fastclip fastenings are more likely to be specified. In order to provide a high performance low maintenance asset the track will comprise fully welded and stressed CWR throughout. The Route Asset Manager (Track) and Network Rail's NDS organisation will be engaged to determine if the procurement and installation of serviceable material is appropriate.

There is no requirement for any switch and crossing layouts between Portbury Dock Jn. and Portishead.

At the termination of the line at Portishead Station a bespoke friction buffer stop block, with attendant red lights, will be installed to a design that controls passenger deceleration to within accepted limits in the event of an overrunning train striking the stop block.

A "safe cess" walking route will be provided throughout the entire length of the route and Lineside ditches completely cleared of vegetation and re-profiled if necessary.

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Prior to the commencement of the GRIP 3 outline design phase a full 3D topographical survey of the railway corridor is to be undertaken. It would be prudent to adopt the same survey grid for this Project as is being used for other enhancement works in the area such as the Great Western Electrification Project and the Bristol Area Signalling Renewals Project.

A primary survey Station will be installed every ten kilometres with off-track survey studs inserted into permanent structures. The allocation of survey co-ordinates will be via GPS equipment.

Secondary survey Stations will be created at 500m intervals using Permanent Ground Monuments.

Tertiary survey Stations will be created within the existing rail corridor at 200m intervals and at locations that will not only support the survey activities but will remain in-situ to be used for setting out purposes.

The survey works and all subsequent construction activities will be carried out to timescales and methodologies guided by the requirements of an environmental assessment plan.

9.11.4 Track Gauging Issues

As a minimum the railway will be constructed to conform to the Standard structure gauge. A desired rail to soffit height of 4640mm will be achieved and this will retain the potential for the installation of O.L.E. at a future date.

At the M5 motorway overbridge, Marsh Lane and Portbury Dock Road over bridges the railway will co-exist with existing cycle ways through the spans of these structures. If the wholesale realignment of the cycle ways away from these structures is to be avoided then some compromise on the desirable width of the cycleway (3m) and the desirable width of cess (3m both sides of the railway) will be needed at the M5 and Marsh Lane bridges, discussed further in section 9.11.

9.11.5 Signalling

The proposal is to split the single line before Pill viaduct providing lines to both Portishead and Portbury Dock.

The new Station (and parallel move from the Docks) will be fully signalled, incorporating full axle counter detection, to provide control of the single line between the new Pill Junction and Clifton Junction replacing the existing token section.

The provision of complete signalling and train detection over this section will extend the control area of TVSC (introduced by the BASRE Project) from its existing end at Ashton Junction to the whole of the Portishead branch.

9.11.6 Telecoms

Operational Communications

Lineside Infrastructure

There is no requirement for any new operational Lineside telephones, as it is proposed to replace the existing farm crossings at Sheepway Farm with a new over bridge and provide an alternative access route for Elm Tree Farm.

GSM-R

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There is currently a GSM-R site (Site 6571) located at Lodway. This consists of a GSM-R Relocateable Equipment Building (REB) and mast, as shown in the accompanying photograph below. It should be noted, however, that this site is not currently operational as associated Lineside cables were found to have been severed.



The GSM-R site is located in a position which will not impeded the construction or gauging of the new track alignment and is therefore able to remain in situ. The associated cable route containing a 24 core Di-Sac fibre cable will require to be relocated to facilitate the proposed track realignment.

To ensure that GSM-R coverage can be provided to meet the requirements for this Project, it is recommended that a full GSM-R coverage survey of the Project area is undertaken as the Project develops, this may necessitate the provision of additional GSM-R infrastructure, as appropriate.

9.11.7 Drainage

From Portishead to Portbury Dock Junction the railway is on a level embankment, generally one metre higher than the surrounding low-lying land; with the exception of Portbury Halt, where the track is in a cutting as it passes under Sheepway Road.

There are “Turn of the Century” (1900) records of drainage schemes on this route. These have not been checked or verified.

There is formation drainage (ditches) at the following locations: -

- Down side, adjacent to Harbour Crescent 129m 30ch -129m 34ch;
- Down and Up sides, partially between Moor Lane and Sheepway Road 128m 68ch – 128m 78ch;
- Down side past Sheepway Gate Farm 128m 40ch – 128m 50ch;
- Down side from Royal Portbury Dock Road to Portbury Station 127m 24ch to 127m 71ch

These ditches will need to be cleaned out as part of the line reopening works.

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The track itself is heavily overgrown and impassable as are the adjacent embankments. A full analysis will need to be undertaken at GRIP stage 3 once the line has been cleared of vegetation. It is important that early clearance of vegetation is undertaken in order to identify further opportunities to reduce the construction costs associated with this Project.

Suitable formation drainage will depend on a cross-fall and will be incorporated in the track design.

Where drainage ditches exist, the crossfall will need to discharge into them. A Sustainable Drainage System (SUDS) will be adopted where there is no other drainage or pumped drainage.

Where the railway runs alongside existing watercourses, such as the Drove Rhyne, investigations should be undertaken into the acceptability of surface. There are pumping Stations adjacent to the railway at The Drove (Portbury) and at Quays Avenue (Portishead) operated by Wessex Water Authority.

The Drove Rhyne and the Portbury Ditch are maintained by the Environment Agency.

The Cut drain is maintained by North Somerset Internal Drainage Board.

Land drainage in the whole area is controlled by the North Somerset Internal Drainage Board, with the exception of the Drove Rhyne and The Portbury Ditch.

Consents would be required from the North Somerset Internal Drainage Board for the disposal of surface water and will need to be consulted at GRIP Stage 4.

At all these sites a full drainage investigation will need to be undertaken at GRIP Stage 3.

9.11.8 Fencing/ Security

From Portishead Station to Sheepway Road over-bridge, the railway passes through an area bounded by new housing estates. This poses a high risk of trespass.

The line will be fenced on both sides at the land boundary with welded, close-meshed galvanised steel fencing to a height of 1.8 metres.

Within the land boundary, the railway embankment should be cleared and replanted with a suitable thorn tree, with soil retention properties, such as Blackthorn (*Prunus Spinosa*). Care should be taken not to impede drainage ditches or plant closer than 3.5 metres from the nearest running rail.

From Sheepway Road over-bridge to The Drove, the line passes through a rural area, with low trespass risk. The main concern here will be livestock straying onto the line. The normal Standard of 5-strand wire fencing strung from concrete posts would be considered adequate in these locations.

From The Drove to Portbury Dock Junction, the line is bounded on the North side by the Drove Rhyne, then a permissive cycle-way and the Bristol Port Company's dock estate.

In this area, temporary wayleaves have been granted by Network Rail to Sustrans – a cycling recreational charity for a cycle-way on railway land adjacent to the track through bridges for the Royal Portbury Dock Road, Marsh Lane and the M5 motorway. The width under these bridges may require alterations to the current alignment and width of the cycle ways to accommodate the railway. GRIP Stage 3 will confirm the extent of these changes and confirm that there is sufficient space to provide a safe

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segregated area for the cycle way adjacent to the railway, taking account of the cess requirement and associated train operating speeds. Further details about the cycle paths are set out in section 9.12.

At all other locations between The Drove and Portbury Dock Junction the line passes through a rural area, with low trespass risk. The main concern here will be livestock straying onto the line. The normal Standard of 5-strand wire fencing strung from concrete posts would be adequate for these locations.

The former Portbury Station is now privately owned. The occupier has constructed a conservatory on the former platform with a fence approximately 670mm from the platform edge without coping stones. The track will need to be routed through the centre of the formation in order to provide adequate gauge clearance under the over bridge. This will give a measurement of approx. 2630mm from the nearest running rail to the platform edge without coping stones. This is less than the 4500mm required for collision protection. The distance from the fence to the running rail will be approx. 3300mm. This should be adequate to safely run trains. The main concern here is noise. Close boarded timber fencing up to 4m in height should be considered with consultation to the private home owner.

All fences should be installed and maintained to Network Rail Standards.

The fencing requirements therefore differ widely throughout the route and three types of fencing are needed to secure the railway from trespass and prevent livestock straying onto the track and local area, these can be summarised as follows:

- Galvanised steel palisade fencing approx. 1.8m high to be installed in residential areas and those locations where cycle paths run adjacent to the railway.
- 5 strand post and wire fencing to be installed throughout rural areas where there is the possibility on livestock straying onto the line.
- Close boarded timber fencing up to 4m in height to be installed adjacent to residential properties that are within 10m of the line for noise and visual impact protection.

9.12 Cycle Paths

The initial GRIP 3 study noted that the existing cycle ways may require re-routing due to insufficient clearance under existing structures on the route. This is no longer the case as it is proposed that the track will be slewed to provide greater clearance for cycle ways under the existing structures, subject to confirmation of cess requirements at GRIP stage 3.

The surface finishes of the cycle ways will be reproduced to match the existing.

The following cycleway widths can be provided (subject to detailed topographical survey in GRIP 3):

- M5 Motorway, Ch 1505m – 2m wide cycleway with 4.8m headroom.
- Marsh Lane, Ch 1975m – 2m wide cycleway with minimum 2.5m headroom.
- Portbury Dock Road, Ch 2400m – 2.5m wide cycleway with 5.2m headroom.

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It should be noted that on two of the structures, the cycleway will be narrower than the minimum recommended by TD36/93 (Highways Standard) which recommends a minimum width of 2.3m. This should not cause significant issues as the length of the width restriction is relatively short. Potential mitigation could be provided by provision of warning and advanced warning signs noting the width restriction (with appropriate surfacing/markings), this will be subject to future agreement.

9.13 Access Points

The reopening of the line between Portbury Dock Junction and Portishead will require a number of Lineside access points to be constructed to facilitate infrastructure maintenance activity and provide access for emergency vehicles.

Many opportunities exist for the provision of additional pedestrian access for maintenance staff once various forms of fencing have been erected adjacent to the railway. At Portishead the existing footpath crossings at Galingale Way and Moor Lane could have gated access provided in the security fencing for maintenance staff. The existing pedestrian access points at Sheepway Road and Marsh Lane over bridges, Lodway Farm crossing, the gated access opposite the GSM-R mast at 126m 1034yds and the Avon Road underpass access should all be retained for Maintenance use. It would be advantageous to the Maintenance regime if a vehicular access could be provided mid-way between Pill and Portishead. The Network Rail Hazard Directory records an authorised access point, identified as Priory Farm, leading from the Portbury Hundred Road at 127m 1276yds. In actuality this access point is primarily used by Wessex Water as access to their small sewerage pumping Station located immediately adjacent to the south side of the railway. The status of this potential access to the railway is uncertain particularly as Network Rail's Maintenance team at Bristol have not used it for many years and do not hold keys for the access gates. The situation is further complicated by a contested assertion by a local "Rights of Way" group that a track (known as the Drove) crossing the railway at this point is in fact a Bye-way.

The ORR would not sanction the conversion of two Occupational Crossings at Elm Tree Farm and SheepWay Gate Farm to User Worked Crossings status. It is therefore assumed these two access points will not be available to Network Rail as access for maintenance vehicles and that alternatives should be provided elsewhere.

At the southern end of the reopened route it would be possible to provide a short ramp down to rail level from the western end of the proposed Pill Station car park. This would provide for maintenance vehicle parking/turning and also areas for the temporary storage of track materials. Similar facilities could be provided at the proposed Portishead Station, via a gated access from the diverted Quays Avenue.

Notwithstanding the above issues this site would be an excellent location for vehicular parking and has the potential for the installation of a Road/Rail Access Pad.

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9.14 User Worked & Footpath Crossings

A site walkout was carried out for this phase of the Project to identify all the crossings either in use or out of use:

| Mileage | Name | Proposed action |
|-----------|------------------|----------------------------------------------|
| 129m 06ch | Galingale Way | Footbridge |
| 128m 46ch | Sheepway 1 | Accommodation Bridge |
| 128m 39ch | Sheepway 2 | Closure |
| 128m 17ch | Elm Tree Farm | Closure with alternative access via the A369 |
| 127m 71ch | Portbury Station | Closure |
| 127m 55ch | Drove crossing | Closure |
| Mileage | Name | Proposed action |
| 127m 14ch | Portbury No.3 | Closure |
| 126m 75ch | Manor Farm No2 | Closure |
| 126m 74ch | Manor Farm No1 | Closure |
| 126m 56ch | Lodway Farm | Closure |

9.15 Structures

During the walkout survey a number of under/ over bridges the following structures crossings and culverts were identified these can be seen in Appendix G.

9.16 Galingale Way Footbridge

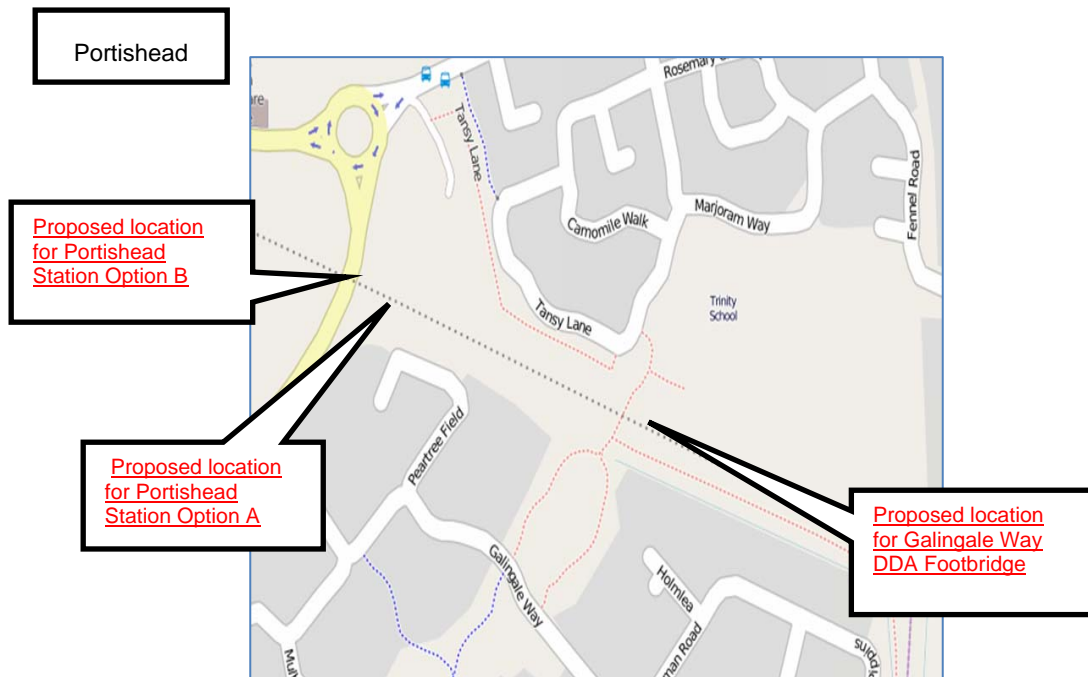
During the previous 2010 GRIP 3 study three Options were examined for retaining pedestrian access between Trinity School in the Village Quarter and the Vale housing estate, these Options were known as:

- Western Option (Quays Avenue) – provide footpaths parallel to the railway linking to Quays Avenue to provide an indirect pedestrian route
- Middle Option (Galingale Way) – footbridge option
- Eastern Option (Moor Lane) – footbridge option

Since 2010 a new housing estate to the north (Tarragon Place) has been constructed close to the railway boundary, this has meant that there is insufficient space available to install a fully accessible DDA compliant footbridge at the previously proposed Moor Lane Crossing (Eastern Option).

The only feasible Option for bridge placement is therefore the “Middle Option” between Tansy Lane and Galingale Way as this would provide the optimum route for pedestrian traffic utilising the current footpath, and would be adjacent to the entrance of the school.

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If the bridge is sited between Tansy Lane and Galingale Way (Middle Option) residents of the Tarragon Place housing estate wishing to cross the bridge will be able to walk between the railway boundary and the southern perimeter fence of Trinity school. This would be a walk of approximately 250m from the corner of the estate to the footbridge. Steps would need to be installed at the corner of the Tydeman Road estate, down to the footpath. For the south side of the railway line, residents could use the proposed bridge by walking through the estate and footpath leading off Galingale Way. Appendix A shows various photographic viewpoints at the main proposed location of the footbridge.

The Middle Option appears to have a strong pedestrian desire line and there is sufficient space to locate, a footbridge in the approximate position of the current crossing near Galingale Way. The access ramps and stairs should be positioned so as to consider the neighbouring houses and school boundary. The footbridge should be clad with timber or a similar aesthetically sympathetic material. To improve appearance, if a standard Network Rail footbridge is adopted then some modification of the design will be required to allow for additional wind loading if infill panels are proposed. The North-East end of the footbridge, overlooking the school should be suitably screened off. There are two Options for the Bridge crossing the plan and elevation can be seen in Appendix A with a visualisation of the bridge Options in Appendix I.

9.16.1 Civils

Both Options provide a DDA compliant ramped and stair access to both sides of the railway. The bridge form is based on Standard Network Rail steel footbridge designs although it is envisaged that these will be developed during GRIP stage 3-5 to provide more aesthetically sympathetic cladding to bridge parapets. Ground investigations will be needed to confirm foundation type although it is envisaged that a piled solution would be most appropriate.

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9.16.1.1 Footbridge Option 1

This Option provides a ramp with a single 180 degree turning landing with the ramp footprint extending parallel to the railway corridor. Both stairs and ramp terminate close to the footpath. The design of Option 1 was proposed to minimise the incursion of the bridge into the open public space, and to maximise the proportion of the structure within the railway boundary.

9.16.1.2 Footbridge Option 2

This Option provides a ramp with three 180 degree turning landings which extends the ramp footprint further from the corridor. Both stairs and ramp terminate close to the footpath.

9.16.2 Electrical

Both Options are considered to be similar from an electrical perspective and as such the DNO has been shown to be located in the fence line of the area and be double sided where the DNO equipment and meter would be located in the public side of the fence and the distribution and lighting control would sit in the Network Rail side of the fence. If this is deemed a high risk vandal area then it may be required to site the DNO in a separate compound to deter vandals.

The lighting has been shown with 8m high raise and lower columns along the public side of the footbridge. However additional lighting may be required depending on the side wall construction of the ramps and steps to overcome shadow effects. A light central to the walkway has been shown to aid the lighting levels in the area and the bridge will need to include cable route requirements to cross from one cess to the other and to reach any additional lights that may be needed and installed on frames above the bridge deck as shown on the central walkway.

The minimum lighting requirements for the bridge would be 30 Lux with a 0.5 uniformity in accordance with BS 5489-1 however should DDA compliance be deemed necessary then the lux level would rise to 100Lux and since the DfT Code of practice does not give a uniformity or minimum level of illuminance that stated in BS 5489 (0.5) shall be used.

Where lighting columns are in vulnerable positions protection from vehicles collision protection from road vehicles is to be considered and Armco barriers provided.

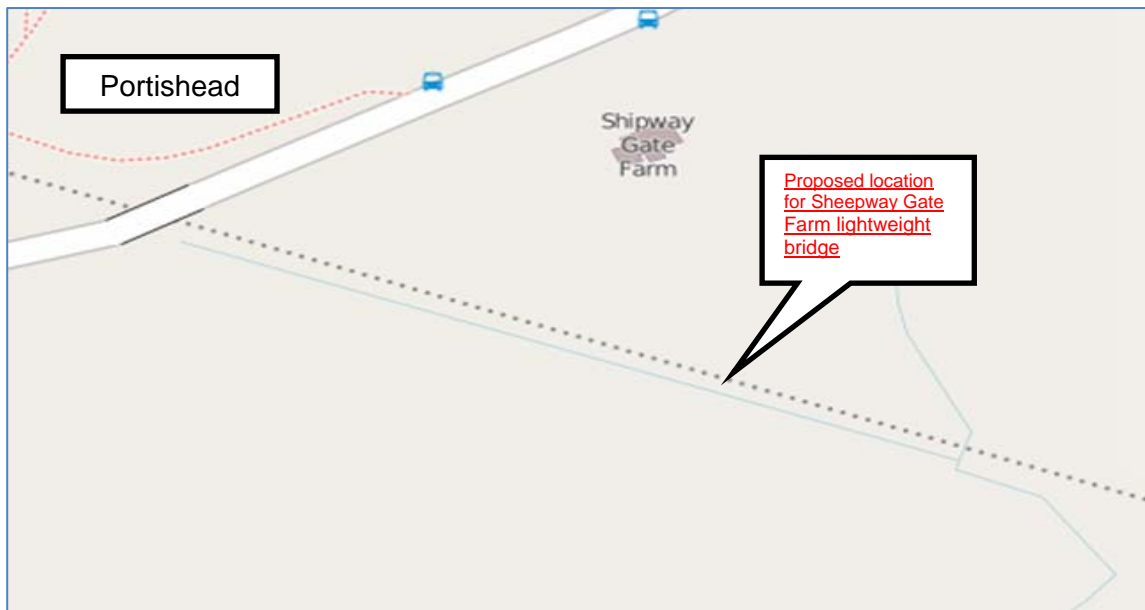
9.16.3 Conclusion

To be concluded through consultation by North Somerset Council.

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9.17 Proposed Sheepway Farm Bridge

It is proposed that the new farm accommodation bridge be located between the two existing farm crossings as this offers the best compromise between available space and convenience to the farmer. Figures 13 and 14, Appendix A, show photographs of the proposed crossing point.



A minimum cost option for this bridge has been proposed comprising a pre-fabricated steel deck similar to a Mabey Bridge “Quickbridge” and a maximum width of 2200mm to allow access for farm vehicles but restricted essentially to a Land Rover. To address vehicular restraint issues additional barriers running parallel with the bridge parapets are proposed and “sleeping policeman” ramps immediately off the bridge to reduce speed.

The next stage of the Project should address the vehicular restraint issue with Network Rail, then consider a cost comparison between a bespoke designed steel deck and a proprietary deck obtained from a modular bridge fabricator.

The bridge abutments and wingwalls, subject to ground investigation data, could be constructed from steel sheet pile sections with a concrete capping beam for the bearing shelf.

This form of construction offers a medium term life span of the structure compared to a structure designed for 120 year life as detailed below.

The bridge form for a 120 year life structure comprises reinforced concrete abutments and wingwalls with precast / prestressed concrete beams. It is proposed that the abutment wall and wingwall sit on piled foundations. The bridge width is limited to a single carriage way capable of carrying a Land Rover, which would require it to be in the order of 2200mm wide. The bridge width and loading capacity will require further consideration at GRIP stage 3, following further discussions with Sheepway Gate Farm.

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The bridge span has been designed with a single track railway, allowing a clearance of 4.5m to the abutment wall for collision impact. The bridge span is therefore in the order of 11.0m. A vertical clearance between rail and bridge soffit of 4880mm has been allowed for, giving passive provision for OLE Normal Clearance with full tolerance. 4.88m was chosen over the minimum required clearance of 4640mm, as the bridge is a new structure, and adding the extra clearance does not noticeably increase design complexity or cost.

The bridge deck, for the purposes as this is preliminary design, is detailed as precast prestressed MY beams within the design range for the span. Edge units are provided which are known as MYE beams. The MYE beams will be able to address vehicle incursion requirements through adequate bridge parapet provision. A concrete capping of the beams is proposed as a road surfacing, with a brushed finish, as this provides a favourable surface for cattle.

The approach ramp to the bridge will be constructed at a 9% gradient which is the maximum gradient permitted although dialogue with the farmer may result in a steeper gradient being acceptable to him if restricted to Land Rover use only.

The approach embankment will be constructed of engineering fill material with typically 1:2½ side slopes, however if space is limited then reinforced soils approach can be adopted either by the use of vertical concrete panels with soil reinforcing strips or a "Textomur" approach with a vertical face at 65° reinforced with steel mesh.

9.18 Bridge Electrification Clearance

The track design will need to provide passive provision for future potential Overhead Line Electrification. The vertical alignment for the reopened railway will provide a minimum of 4640mm beneath all of the over line structures to permit future installation of the 25kv Overhead Line Equipment. The achievement of this 4640mm dimension will require track lowering up to 300mm beneath 3 of the arched over bridge structures. Clearances for electrification compliance to TSI (Interoperability) are to be investigated further in GRIP 3.

9.19 Trackbed Investigation

In line with the Client's requirements and NR Standards, trackbed investigation has been undertaken to establish the condition of the trackbed through the redundant Portbury Dock to Portishead section. A total of 24 intrusive trackbed samples have been taken on the site, comprising both Automatic Ballast Samples (windowless core samples, ABS) and hand excavated Trial Pits. Samples extended to a nominal depth of 1.2m below existing rail level to assess the ballast and subgrade materials.

The results of the sampling works are presented in the Interpretative Trackbed Investigation Report (ref. 47070043/WT/PL/140569/2). The Report contains:

- General site description and site walkover survey photographs;
- Information on the trackbed, subgrade, drainage and structural clearances (including photographic sample logs and longitudinal material section);
- Discussion of the trackbed condition;
- Trackbed design recommendations and discussion including impact of the proposed bridge lowering.

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Please refer to the Report in Appendix H for full details of the trackbed investigation and design, noting that further trackbed investigation will be required at later GRIP stages to reliably specify the required trackbed treatment.

Additionally, chemical testing of trackbed samples has been undertaken in line with Standard practice (NR/L3/ENV/044) and all 24 samples have been tested using the Network Rail Ballast Analytical Suite (2008). Chemical testing results have been submitted to Network Rail for analysis and the NDS team have confirmed 15 of the 24 samples have triggered the contamination limits. The following table summarises the limits of contaminated ballast required for special disposal:

| From | To | Classification Result | Hazardous Properties |
|------------|------------|-----------------------|----------------------|
| 126m 1043y | 127m 1206y | Hazardous | H7, H13, H14 |
| 127m 1206y | 127m 1320y | Non-Hazardous | - |
| 127m 1320y | 128m 1385y | Hazardous | H7, H13, H14 |
| 128m 1385y | 129m 616y | Non-Hazardous | - |

Hazard properties

The Hazardous properties listed have been triggered by high levels of lead and zinc within the tested material.

Note that material is assumed hazardous up to the location of a sample classified as non-hazardous. Sample ABS 6 (127m 548y) was classified as non-hazardous, however since both adjacent samples were classified as hazardous, the ballast throughout this location is also considered hazardous. In addition, please note that the samples which returned high levels of contaminant were re-tested by the laboratory to confirm these results.

It is recommended that further consideration be given to more regularly spaced trackbed samples to potentially reduce the quantity of ballast required to be removed as hazardous waste. Also consideration in GRIP 3 to be given to leaving such materials on site where deemed acceptable.

9.20 Portbury Line - Parson Street Junction to Portbury Dock Junction

9.20.1 Conversion of the Freight Line to Passenger Status

This Option considered the existing Freight Line from Parson Street to Portbury Dock Junction to be converted to Passenger status. Network Rail convened a Safety Risk Workshop to consider the requirements on the 10th July 2009.

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9.20.2 Track Quality and Track Drainage

The existing Freight Line was constructed by Railtrack in 2000 to meet a basic requirement of 20 freight trains in each direction per day. The Line speed was set at 30 mph and the track was installed to meet the minimal safety and operational Standards to accommodate freight only traffic. The existing formation was scarified and new steel sleepers laid with new top ballast only.

No drainage or formation works were undertaken as this was deemed unnecessary. The Line became operational in 2002.

Historically since the 2002 opening the track and its formation has required high levels of maintenance attention to maintain the 20/30 mph ruling Line speed. During 2012/13 the track through Pill Tunnel was relaid and an associated track drain installed (see Pill Tunnel details below). Also during 2012/13 reballasting and drainage works were carried out through Ashton Gate and the Pill Station site.

Further track works are scheduled for Parson Street Junction (formation, reballast and drainage), Clifton No 2 Tunnel (full track renewal) and Sandstone Tunnel (formation and reballast). These works are as yet unassigned.

In order to achieve a satisfactory passenger ride Standard, the alignment needs to be slued and lifted to provide adequate transition curves and cant for the higher line speed of up to 60mph. The existing alignment was laid “as is” and has a series of complex curves with poor transitions which produces lurches at speed and poor ride quality. A comprehensive survey and alignment design package will need to be produced for those sections of the single line that lie outside of the proposed double tracking at Ashton Gate Loop and through Pill Station.

This Project will need to cover the costs of upgrading the existing track to bring it up to passenger Standards and improve line speeds to 50/55mph.

9.21 Ashton Gate Level Crossing

The level crossing at Ashton Gate is to remain in situ. The level crossing is a Manned Crossing Barrier, supervised by CCTV from TVSC (Thames Valley Signalling Centre) “A Desk”. The interlocking with the signalling will need to be reviewed concurrently with any changes proposed to the signalling and control systems.

The level crossing is interlocked with road traffic lights controlling the adjacent road junction at Ashton Vale Road. The double tracking will be restored from Ashton Junction to Clifton Junction.

In this case the level crossing deck would be widened to accommodate the extra track and the barriers, road signals and controls as they are moved accordingly. Initial discussions conducted by Network Rail with the ORR have concluded that this was acceptable.

9.22 Proposed Bus Rapid Transit

There are currently proposals for a guided bus rapid transit (BRT) from Ashton Vale to Bristol Temple Meads and Bristol City Centre. The BRT has achieved a Transport and Works Act Order (TWAO) to deliver its alignment. As part of the TWAO process discussions took place with the promoters of this Project to define an acceptable alignment and a combined BRT and rail line alignment drawing was produced, as the BRT has some impact on operational railway land. The drawing identified the need for

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the existing single track to be slued from Ashton Gate level crossing towards Clifton Junction to enable sufficient space for double tracking and the BRT. The bus rapid transit will cross the railway in the vicinity of Ashton Gate Level Crossing by means of an over-bridge.

The bus rapid transit will run southwards adjacent to the Down line of the railway as far as the footpath level crossing at Barons Close, known as Container Crossing. This footpath is due to be closed as part of this scheme with pedestrians using Ashton Gate Level Crossing.

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10. Bathampton Turnback

10.1 Track

The current proposal for the reopening of the Portishead line is that services from Portishead and Bristol Temple Meads will terminate at Bath Spa. There is however no possibility of providing, at reasonable cost, a turnback facility at Bath Spa Station itself. Services needing to return to Bristol Temple Meads and Portishead will run, as empty stock, some 1.75 miles further East to Bathampton Junction where the existing Up Passenger Loop (UPL) will be utilised as the turnback facility. To provide the turnback route from the UPL onto the Down Main line for the return to Bath Spa will require a new 25 m.p.h. Left Hand crossover to be located to the west of the existing connection from the Up Main Line into the UPL.

The positioning of this crossover is complicated by the existing Meadow Lane arched overbridge which crosses the railway at this location. Under the Great Western Main Line electrification proposals an outline horizontal and vertical track alignment has been prepared to provide for O.L.E. clearances beneath the Meadow Lane overbridge. In order that the proposed crossover arrangements are not at variance with the electrification proposals the design has been based on the designed electrification alignments. The crossover is located to the west of the overbridge on concentric horizontal radii and a uniform vertical gradient.

It is proposed that the crossover is formed from a Standard NR56 Cv13 with In Bearer Clamplock L.H. crossover on concrete bearers which will provide a 25 m.p.h. move from the UPL to the Down Main line.

Construction of the crossover is suitable for modular delivery. The ballast will be new due to the lowering work being undertaken in 2015-16 as part of track lowering works to facilitate delivery of the electrification project.

The proposal for the Bathampton turnback facility is detailed in Appendix A

10.2 Signalling

There are two Options to be considered for the turnback move at Bathampton:

1. A new signal (BLxxx) at the Bath end of the Loop (reading back to Bath) giving routes to both the Up and Down Mains through a new crossover (points ZZ)
2. Using existing signal BL1882 (B477) routes to:
 - Up Main and turn back behind BL1879 (B202)
 - Down Main and turn back behind BL1877 (B2)
 - Up Trowbridge and turn back behind BL6640 (B502)

The design incorporating the new signal (Option 1) at Bathampton would be the recommended choice. Whilst this Option incurs 3 extra SEU's, the impact on the present traffic flow using the other Option would be major.

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11. Constructability and Access Strategy

11.1 Constructability

11.1.1 Portishead to Portbury Dock Junction

The core works on this section of the line will be the removal of vegetation, surveying, track design and track relaying.

To minimise cost, the proposal is to take advantage of what is in effect a brownfield site. The first element will be to clear vegetation (including tree stump removal) of both the formation and the banks to the fence line; this will have to follow an environmental assessment of the route. Any vegetation clearance will have to take place outside the bird nesting season between February to September.

The next element will be to undertake a topographical survey of the route. This will enable the track and drainage design to be undertaken at GRIP 3/4 (Form A) and 5 (Form B) levels.

Actual construction can be undertaken once the Form B design has been agreed and 'Approved for Construction drawings issued'.

The use of the line as a tyred haulage route should be minimised to avoid damage to the formation. Suitable worksites with road access for Heavy Goods Vehicles should be set up at the proposed Pill Station car park, the site of the proposed Portishead Station and the site of the Wessex Water sewerage pumping Station.

The proposal is to recover the entire existing bullhead/FB CWR track throughout. The existing bullhead track will be sold for its scrap value with potentially some elements offered to heritage railways. Network Rail will assess the approximate 600m length of FB 113A on F27 Concrete Sleepers to determine if this has a worth over and above its scrap value.

The existing ballast/formation would be excavated to the proposed horizontal and vertical design parameters. The surface of the new formation will then be consolidated and graded to support the recommendations contained in the Interpretative Trackbed Report. The spoil will need to be removed by road vehicles to a rail loading point for processing by train to Network Rail's Local Distribution Centre. All the drainage ditches and dykes would be cleaned out and re-profiled as appropriate.

At areas where track lowering beneath overline structures is required and this encroaches significantly into the existing formation (3 no over bridges) a sand blanket would be installed in association with a needle punched separator, or a geotextile as an alternative as appropriate. The bottom stone would be laid and consolidated with a crossfall provided for drainage. Any drainage works recommended in the Trackbed Interpretative Report would be installed at the same time.

Caterpillar-tracked dozers would be used for this work. Any heavy vehicles used for the sand and stone delivery from a stockpile, should have adequate tyres to spread the load.

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The next stage is the track laying. The type of sleeper for the construction of this Project will need to be determined by the Route Asset Manager (Track). The current outline specification suggests that new concrete sleepers are required, but a further evaluation of the suitability and availability of serviceable rail and sleepers will be undertaken.

Long welded rail would be delivered from Portbury Dock Junction onwards towards Portishead. The rails would be drawn off the end wagon in 200 metre lengths, thimble into place and flash-butt welded. Mechanised methods of track installation will be utilised.

Top ballasting would take place with tamping, welding and stressing undertaken to provide a fully stressed CWR track-form throughout.

The first priority would be to lay the section of line from Portbury Dock Junction towards Marsh Lane to enable a siding to be created for the delivery of works materials and the removal of recovered materials including spoil.

Any signalling and telecoms works, including cable-laying in the cess would then take place.

Finally a safe cess would be created on one side of the formation using fine grade stone retained within treated softwood timber edges.

Fencing, variously comprising galvanised steel palisade, 5 strand timber post and wire and close boarded acoustic barriers would be erected.

Any agreed landscaping and planting would be undertaken.

The final stage would be acceptance to bring the line into use from the ORR, following review by the assessing and notifying bodies. A period of testing would also be required before sign-off by Network Rail to enable the acceptance and provision of records and drawings for the Health and Safety file.

11.1.2 Portbury Junction to Parson Street

There are a small number of renewal works scheduled to be completed by Network Rail on the existing freight route that do not form part of the Portishead reopening upgrade works. It is envisaged that the track slewing and lifting required would be accomplished during normal weekend possessions. Similarly the installation of twin or double tracks with associated switches and crossings and signalling, could be accomplished by normal renewals methods during normal weekend possessions.

The full extent of possession requirements will be established at GRIP stage 3/4 when the work is fully understood.

The proposed Station works at Pill would largely be completed in green zone working. The former Station yard should be obtained for use as a work-site for materials delivery.

The widening of the footpath under-bridge at Pill would require a short series of weekend possessions to undertake the embankment and abutment works. The proposed Pill Station car park would be used as a work-site for materials delivery.

The track works at Parson Street Junction will use the concept of modular S&C (Switch & Crossing) to reduce both timescales and costs. This method is now tried and tested proving to be an efficient process when undertaken.

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11.1.3 Quays Avenue Highway work

North Somerset Council will separately commission the highway works to be undertaken prior to the any track works in the area. The work will include all the work associated with the new highway layout including potential road diversions, new roundabout in Harbour road and the appropriate highways authority approvals and engagement with local business and residents.

11.2 Access Strategy

11.2.1 Track Access Portishead to Portbury Dock Junction

This section of railway is closed to traffic therefore no disruptive possessions will be required.

Connecting the new line to the existing Freight line will be done using Rules of the Route possessions. Access may be needed for engineering trains for the restoration of the disused line. The Old Portbury junction still exists and if the switches for the turnout were to be reinstated and a length of plain line refurbished it could form a railhead for the delivery of materials for the reopened route.

11.2.2 Track Access Portbury Junction to Parson Street

The line from Portbury Dock Junction to Parson Street Junction is an operational railway. The major constraint here is the need by the Port of Bristol for continuous access to the Royal Portbury Dock. The current possession opportunities are limited as shown in the Rules of the Route (GW548 Parson St Junction To Portbury Docks) for the year 2014 onwards but permit Weekend possessions from 22:10 Saturday to 19:00 Sunday and midweek possessions 23:45 Monday to Thursday to 05:35 Thursday to Friday. The work has been planned as though this will still be the case from 2017 to 2020. However, the possession regime on the current freight line for track slewing and relaying will be established in the next stage of the Project and may require booking some extended weekend possessions of up to 52 hours in order to achieve the works effectively – both in time and cost.

A 72 hour possession should be planned to install and commission the double junction at Parson Street, this includes signalling testing and commissioning time. It may be possible to take advantage of works being undertaken by other Projects such as BASRE the Parson Street S&C Renewal works which are provisionally to be undertaken in 2017-18; however this is dependent on the other Project timescales.

A full access strategy is to be considered as part of GRIP stage 3.

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12. Cost Estimates

The total railway related cost of the project is £47,114,305 in 2014 (2nd quarter) prices. In addition, allowance needs to be made for future inflation up to and during construction. Using BCIS Inflation Indices an uplift of 14.25%, totalling £6,713,788 is suggested. Furthermore, the West of England councils will incur some highway costs dependent upon which site for Portishead station is taken forward. The West of England councils will also have other costs in relation to planning powers, environmental assessment, business case and project management. Based on the GRIP2 deliverables in this report and other information available to date, the West of England councils have advised they are assuming a total project delivery cost of circa £55 million in out-turn (2019) prices.

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13. Project Risks and Assumptions

A Qualitative Cost Risk Analysis (QCRA) workshop was held 8th May 2014 with the objective of identifying the projects risks for the Metrowest Phase 1 project. Representatives of Network Rail, URS, North Somerset Council, CH2M Hill and West of England were present. All participated in the deliberations.

The objectives of the meeting were to:

- identify significant risks to the achievement of the project objectives
- establish a project risk register in Active Risk Manager (ARM)
- conduct an assumption analysis and identify any constraints

The risks to the project were identified in a brainstormed session and risk owners were allocated. Each risk was then analysed to understand the probability of occurrence and impact of the risks on the project outcome.

Each risk probability and impact was scored qualitatively based on categories ranging from very high likelihood of occurrence / impact to very low likelihood of occurrence / impact. The qualitative assessments were uploaded into ARM and a score for each risk was automatically generated based on a probability/impact matrix.

The full QCRA can be found in Appendix C.

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14. High level business case appraisal against whole life costings

As set out in Section 4 Business Case, the economic appraisal is being undertaken jointly by NR and the Councils and is to be submitted to the WoE funding body on 12th September 2014.

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15. Project Schedule

| Project Stage | Stage Description | Indicative Timescales |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Stage 1 | <ul style="list-style-type: none"> Option Development (GRIP 1-2) | 2013 - 2014 |
| Stage 2 | <ul style="list-style-type: none"> Scheme Case (GRIP 3) Detailed technical work and Business Case to support a major Planning application | 2014 – 2015 |
| Stage 3 | <ul style="list-style-type: none"> Planning Powers and Procurement (Including GRIP 4-5) Planning consent awarded, procurement Completed, full business case completed Funding approval and contractual arrangements finalised | 2015 - 2017 |
| Stage 4 | <ul style="list-style-type: none"> Construction completed (GRIP 6-8) Train services operating from Spring 2019 | 2017 - 2019 |

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16. Capacity/Route Runner Modelling

NR to complete

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17. Interface with other Projects

The 2010 GRIP 3 Report mentioned a number of sites between Parson Street and Portbury Dock Junction where Network Rail were scheduled to undertake track renewals and the provision of drainage works. Five of these sites have been completed and the remaining three sites are scheduled for completion during 2015.

Under the Bristol Area Signalling Renewals Project (BASRE) it is proposed to install Axle counters along the route between Parson Street Junction and Portbury Dock. Currently the BASR proposals do not include for the provision of a parallel junction at Parson Street or the reinstatement of the Down Relief line between Bristol Temple Meads and Parson Street. Should these two elements become an essential part of the efficient operation of the Portishead line then synergy between the two Projects would be advantageous.

In addition to the BASRE works the Electrification of the Great Western Main Line will see Overhead Line Equipment extended into the Bristol area, whilst there is no current proposal for the Portishead Line to be electrified passive provision is being made within the design proposals for potential future electrification.

At Pill tunnel any work undertaken will take into account the requirements to raise the Linespeed as well as emergency evacuation requirements under this Project. However, additional work over and above that required to maintain the 'steady state' will need to be borne by this Project.

The bus rapid transit will also need to interface correctly with the Portishead passenger railway scheme. This will require the Transport and Works Order secured by the bus rapid transit to be scrutinised further by Network Rail. It is noted that the some track sluing will be required to the existing single track through Ashton Gate, in order to reinstate double tracking, as the BRT has some impact on operational railway land. The Western Route Utilisation Strategy (RUS) has unfunded proposals for altering Parson Street Junction and extending the Down Relief. These should incorporate the requirements of the Portishead Passenger Railway Scheme for a double junction if possible.

European Train Control Systems (ETCS) is a signaling, control and train protection system designed to replace the many incompatible safety systems currently used by European railways. There is an EU directive for all new, upgraded or renewed track to adopt ETCS. Fitment of ETCS on the Western Route is provisionally proposed for 2019. However non-ETCS fitted rolling stock can continue to operate until the Lineside signals are removed.

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18. Impact on Existing Customers, Operators and Maintenance Practice

In order to make passenger and freight services run reliably and efficiently from Parson Street to Portishead, the whole line is to be re-signalled to remove the current token block working arrangement. The controlling signal box is currently located at Bristol. Although no novel signalling equipment is being proposed, adding additional signals, point machines and other signalling equipment will result in an increase in the maintenance regime – hence an increase in maintenance budget.

Additional access points have been proposed as part of this Project. These are required to aid Maintenance activities, but more fundamentally to aid the faulting teams should any of the signalling equipment fail.

Improvements to the track along the freight line would help to alleviate constant maintenance intervention, however, 3 miles of additional track between Portbury Junction and Portishead results in additional track maintenance inspections.

In terms of operating a reliable and punctual passenger service, the fully signalled route on the Portishead line assists in this. However, regulating the passenger trains between un-timetabled freight trains, or vice versa will require co-ordination between the Signaller's at Bristol Panel / Thames Valley Signalling Centre and Portbury Dock. Depending on the Option taken forward, there might be a requirement for timetable adjustments to be made on the main line to help operating margins.

Once the passenger service is in the block signalled section between Portbury Dock Junction and Portishead, there is reliance on the driver to inform the Signaller's on departure from Portishead.

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19. Consents Strategy

The consents required for this scheme will be complex and require detailed consideration by Network Rail (NWR) consents / legal team. Their view will be based on the definition of the scheme, final rail infrastructure ownership, as well as the operation and maintenance responsibilities. NWR will also consider the 'availability' and benefits associated the Development Consent Order (DCO) process verses the Transport and Works Act, in respect of planning legislation e.g. the Planning Act 2008 and availability of the General Permitted Development Order (GPDO). Other factors may also include the requirement for changes to utilities and utility supplies to the new railway.

The above consideration will indirectly influence the Environmental Impact Assessment (EIA), design development, land referencing and consultation requirements, as well as the overall programme to consent and beyond.

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20. Environmental Appraisal

URS have carried out an Environmental Appraisal in line with NWR/LS0/15, in light of the previous GRIP 3 study, and have taken into account the current URS GRIP 3 commission, see Appendix E. This specifically highlights environmental risks and information requirements. This appraisal also highlights a number of key issues that have programme and design implications including ecology, noise, traffic, drainage, contamination and so on. It recognises the need to identify the design, construction and consent related issues/information requirements that will be associated with the next phase (GRIP 3) to ensure the EIA can be completed and the consents requirements and programme met.

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21. Common Safety Method for Risk Evaluation Assessment (CSM)

CSM came into force on 1st July 2012 to facilitate mutual recognition between EU member states of risk evaluation and assessment processes to comply with Railway Interoperability Regulations (RIR) legislation.

A submission for assessment under the Railway and Other Guided Transport Systems (Safety) Regulations 2006 (ROGs) for MetroWest Phase 1 is to be made prior to commencement of GRIP 3.

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22. Contracting Strategy

The contracting strategy is to be considered in GRIP 3.

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23. Concept Design Deliverables

There are a number of drawings contained in Appendices A.

Drawings

The drawings are plotted on OS (Ordnance Survey) maps to give a dimensional picture of the route. These drawings also give additional detail such as access points, crossings, Station locations etc. The index of drawings is as follows:

| Deliverable Number | Office | Discipline | Type | Number | Description |
|--------------------|--------|------------|------|--------|------------------------------------------------------------|
| 47070043 | SW | CV | DRG | 0001 | Pill Station Car Park Plan |
| 47070043 | SW | CV | DRG | 0002 | Pill Tunnel Evacuation Route Plan |
| 47070043 | SW | CV | DRG | 0011 | Galingale Way Footbridge Option 1 Plan |
| 47070043 | SW | CV | DRG | 0012 | Galingale Way Footbridge Option 2 Plan |
| 47070043 | SW | CV | DRG | 0013 | Galingale Way Footbridge Option 1 Elevations and Sections |
| 47070043 | SW | CV | DRG | 0014 | Galingale Way Footbridge Option 2 Elevations and Sections |
| 47070043 | SW | CV | DRG | 0021 | Portishead Station Option 2A Plan |
| 47070043 | SW | CV | DRG | 0022 | Portishead Station Car Park Option 2A Plan |
| 47070043 | SW | CV | DRG | 0023 | Portishead Station Option 2B Plan |
| 47070043 | SW | CV | DRG | 0024 | Portishead Station Car Park Option 2B Plan |
| 47070043 | SW | CV | DRG | 0031 | Sheepway Gate Bridge Plan |
| 47070043 | SW | CV | DRG | 0032 | Sheepway Gate bridge Elevation and Section Option 1 |
| 47070043 | SW | CV | DRG | 0033 | Sheepway Gate bridge Elevation and Section Option 2 |
| 47070043 | SW | CV | DRG | 0003 | Proposed General Arrangement Underbridge @ 126m 29.5ch |
| 47070043 | SW | CV | DRG | 0004 | Pill Station Proposed Footbridge Option 1 |
| 47070043 | SW | CV | DRG | 0005 | Pill Station Proposed Footbridge Option 2 |
| 47070043 | SW | PW | DRG | 7001 | Portishead to Pill Alignment Plan 1 of 3 |
| 47070043 | SW | PW | DRG | 7002 | Portishead to Pill Alignment Plan 2 of 3 |
| 47070043 | SW | PW | DRG | 7003 | Portishead to Pill Alignment Plan 3 of 3 |
| 47070043 | SW | PW | DRG | 7004 | Bathampton Up Loop |
| 47070043 | SW | PW | DRG | 7005 | Potential Reinstatement of part of Former Down Relief Line |
| 140569 | | | SDG | 001 | Portishead Signalling Scheme Sketch 1 of 2 |
| 140569 | | | SDG | 002 | Portishead Signalling Scheme Sketch 2 of 2 |
| 140569 | | | SDG | 003 | Bathampton Signalling Scheme Sketch |
| 140569 | | | SDG | 004 | Avonmouth Signalling Scheme Sketch |

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24. Conclusion and Recommendations

The work undertaken by this study provides technical information to support the re-opening of the Portishead line for passenger services and provide an enhanced level of passenger service for the Seven Beach and Bath to Bristol lines. The study looked at the frequency and service patterns of connecting passenger rail services between Portishead, Bath Spa and Severn Beach. The conclusion is that two options (5b & 6b) can be taken forward for further development in GRIP 3. Both options require the following infrastructure to deliver the timetable (in addition to the infrastructure identified through the previous GRIP 3 study to re-open the Portishead line), namely:

- Parson Street Junction doubling
- Intermediate signalling on the Portishead branch
- Signalling adjustments at Avonmouth for Option 6b and north of Avonmouth for Option 5b
- A new crossover at Bathampton to facilitate turning trains back to Bath Spa

The timetable modelling work undertaken has paid due cognisance to maintaining the existing freight path agreements.

The old track (rail & sleepers) is still in place for virtually the whole of the three mile disused section of line. A substantial quantity of vegetation clearance will be required before the old track can be removed and a new stabilised track formation can be built. Trackbed Investigation has identified contaminants in the trackbed of the old railway line; additional ground investigation work will be necessary in GRIP 3 to fully understand the level and extent of contamination.

The study has shown that by slewing the track and installing suitable fencing the existing cycle way can be accommodated under the bridge structures.

Two options (A & B) were explored for the terminus Station with car parking facilities in the vicinity of Quays Avenue, Portishead, with both options proving feasible. Option A will require passengers to cross Quays Avenue between the car park and the Station whereas Option B offers an integrated solution with the car park and Station on connecting land. However Option B will require partial realignment of Quays Avenue. Other options for Portishead station were considered by North Somerset Council, in their 'Portishead Station Options Appraisal Report', which is attached in appendix K.

In the interest of safety the accommodation and footpath crossings are to be closed; the disused section of line has ten such crossings, some of which are historic crossings and not in active use. The study has considered alternative arrangements at two of the crossing locations, Portishead (Trinity School area) and Sheepway Farm.

- Portishead – Provision of a footbridge between Tansy Lane and Galingale Way for access to Trinity School. Two conceptual design options have been proposed and should a footbridge be the selected solution either bridge can be built at this location.
- Sheepway Farm - To replace two existing user accommodation crossings a new farm bridge for livestock and light vehicular access is proposed. The bridge would be located approximately midway between the two existing crossings.

Further consideration was given to the viability of widening Avon Road underbridge; the study concluded that with repairs a new precast concrete deck unit could be installed adjacent to the existing bridge. The embankment will need to be extended to support the new bridge deck; the earthworks can be accommodated within the Network Rail boundary. As part of GRIP 3

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surveys of both the bridge and embankment will be necessary together with ground investigation work to provide suitable information to progress design.

Whilst vegetation has encroached over the down platform at Pill Station the study shows that with clearance and work to the cutting slope a footbridge can be installed, accessed from Monmouth Road and refurbishment of the platform is possible. An area for car parking at Pill has been identified but is subject to further consideration by North Somerset Council.

As part of GRIP 3 a comprehensive survey and alignment design will be required to convert the existing freight line from Parson Street to Portbury Dock Junction to passenger status.

The study has shown that the double tracking can be restored through Ashton Level Crossing within the existing railway boundary, with the crossing deck widened, barriers and road signals moved. The footpath crossing at Barons Close (known as Container path crossing) will be closed as part of this scheme. The Bus Rapid Transit (BRT) will cross the railway in the vicinity of Ashton Gate Level Crossing by means of an over-bridge the superstructure of which will be within 2.5m of the proposed twin track. Close liaison between the rail and roadway designs will be required.

The study has shown that should a requirement be confirmed at GRIP 3 to provide facilities to regulate freight trains travelling in the down direction, extension of the Carriage Line to a point just west of Bedminster Station to form a Down Relief is possible.

It is recommended that the Bristol Area Signalling Renewal project and other CP5 track renewal or enhancement projects, consider the requirements of this project and identify opportunities to design / deliver infrastructure through a holistic approach. A key issue is the siting for the crossover to re-double Parson Street junction to enable a Down Portishead service to diverge to the Up Main, whilst enabling a parallel move with an Up Portishead service. In respect of Bathampton turnback it is recommended that the dialogue with the GW electrification team is maintained to optimise the design and deliverability of this facility.

A Hazard Identification (HAZID) workshop is to be undertaken at GRIP 3 to identify potential hazards and threats to the Maintainer, Operations, Train Operators and others who may be affected by the change in status and infrastructure to provide input to design and development decisions.

Existing structures will need to be assessed for structural capacity (where applicable) and the condition evaluated for the proposed trains. Interoperability and safe access for examination and maintenance activities should also be determined. Early discussions with the Civils Network Rail Asset Manager are recommended, to determine requirements for acceptance of redundant assets back into operation and the maintenance regime required, and acceptance for increased loadings over operational assets.

The Civils Network Rail Asset Manager will also need to clear any proposed significant track renewals over, under or adjacent to any structures, as well as any track raising or lowering over and under any structures respectively.

The Risks associated with these factors include: overloading of structures, increasing lateral pressure on retaining/ballast walls/arch faces and removal of passive resistance to sliding /undermining the foundations of retaining/abutment walls. A key Project risk is that significant strengthening or repair works above the initial scoped works may be required. These risks are to be evaluated and identified by the Project in the Hazard Log.

In conclusion the report demonstrates that the proposed services and infrastructure changes are feasible and recommends the project progresses to GRIP 3.

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References

Option Selection Report GRIP Stage 3 – 111797 Portishead Reopening
Open Street Map

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Appendix A

Drawings

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Appendix B **Cost Estimate**

GRIP 2 Estimate Report issued under separate cover

For high level cost figures refer to Section 12

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Appendix C

Qualitative Cost Risk Analysis

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Appendix D

Capacity Modelling

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Appendix E

Environmental Appraisal

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Appendix F **Signalling Appraisal**

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Appendix G

Photo Gallery

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Site Visit Observations

Further details on the proposed Galingale way Footbridge (Middle Option):

North side of line

The walkway crossing of the railway line appears to be in frequent use, especially to access Trinity Primary School. To the North of the line, there is sufficient space for an access ramp and steps for the footbridge, without excessively impacting the neighbourhood open green space. Consideration needs to be made to the impact on the views from the properties overlooking the site, and the proximity of the structure to the school boundary. There is a slight positive gradient, sloping up from the railway line, but this will not have any significant effect on the bridge design proposals.



Figure 1 - View from line to North side



Figure 2 - View looking towards line from North-West: proposed location of footbridge

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Figure 3 - View looking towards line from North

South side of line

The South side of the line appears to be slightly more constrained in terms of available space. There is a difference in elevation of approximately 0.5 – 1m between the land to the South side and the position of the track, due to the former railway embankment. However, the land to the south can be considered level. A drainage channel and culverts sit parallel to the line, but it is not expected for them to pose any significant obstruction to the positioning of bridge. A pond, as seen in Figure 3, is located further south of the proposed location of bridge. The standing water suggests that ground water may be moderately high in the area, and thus foundations for the bridge would most likely be piled. It would appear that due to the location of the lake, access to the site for large plant would be more suitably done from the north side of the site.



Figure 4 - Culvert lying to South of line

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Figure 5 - View from South side towards line



Figure 6 - View from South side towards line: proposed position of footbridge

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Figure 7 - Footpath leading to the location of the proposed bridge (looking away from location)

Further details on the previously proposed Eastern Option (Moor Lane):

The footpath at the previously proposed Eastern bridge Option (Moor Lane) location for the footbridge does not appear to be as frequently used as that of the location of the Middle Option (Galingale Way). Since 2010 a new housing estate to the north (Tarragon Place) has been constructed close to the railway boundary, this has meant that there is insufficient space available to install a fully accessible DDA compliant footbridge at the Moor Lane Crossing.

North side of line

If the Middle Option is taken forward, it would be reasonable to install steps into the embankment and a footpath between the boundary of the school and the boundary of the railway to enable the residents of the estate to walk directly to the bridge.

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Figure 8 – Previously proposed location of Eastern Option, view to the North of line



Figure 9 – View of embankment to the north of the line

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Figure 10 – View from the north towards the line



Figure 11 – School boundary fence along north side of the line

South side of line

The south side of the line is heavily vegetated, and has a drainage ditch running around the edge of the housing estate.

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Figure 12 – Footpath leading to the line (view from line towards south)

Sheepway Farm

Existing Sheepway crossing No. 1

Sheepway crossing No. 1 is in use multiple times a day for access to agricultural land by the farmer. Space for a livestock bridge is more of a constraining factor at this location on the North side of the line than the South, if the bridge is to span the line at this location.



Figure 13 - View to the South, away from the farm

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Figure 14 - View to the North, into the farm

Existing Sheepway crossing No. 2

The location of the second crossing does not have the spatial constraints that the first crossing location has, however the position would not be as convenient for the user, and therefore the position is not as desirable. The land on the south side of the line slopes down away from the line slightly, increasing the required ramp length slightly.



Figure 15 - Existing Sheepway Crossing No. 2

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Figure 16 - Existing Sheepway Crossing No. 2

Drain

A drain and culvert is located between the two Sheepway crossings, on the high mileage side of Mile Post (MP)128.5. The culvert appears to be in good condition, however only limited inspection has been undertaken. Further inspection work will need to be carried out to confirm the condition of the culvert. If the work is required on the culvert, it is recommended to replace the entire culvert with precast sections, to reduce future maintenance requirements.



Figure 17 - Drainage channel / culvert

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Sheepway Overbridge

The overbridge appears to be in fair condition, and no obvious serious defects were identified. Minor defects include, but are not limited to the following:

High mileage (west) side

- A hairline crack in the mortar between arch rings.
- Isolated areas of calcite staining to the arch rings.
- Isolated areas of open joints.
- Vegetation growing from and on the structure with approximately 15% coverage.
- Figures 18, 19 and 20 show details of Sheepway Overbridge



Figure 18- Sheepway Overbridge

Low mileage (East) side

- Water staining as a result of drainage hole on the spandrel wall is visible.



Figure 19 - Sheepway Overbridge

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Soffit

- Water staining as a result of a drainage hole on the spandrel wall.
- Vegetation growing from and on the structure with approximately 10% coverage.
- Isolated areas of open joints.



Figure 20 - Sheepway Overbridge

Recommended action

It is recommended that the vegetation is removed from the structure, and treated to prevent regrowth. Open joints should be repointed as necessary in accordance with NR/CIV/SD/TUM/101 and drainage holes cleared.

Oil pipeline

An oil pipeline crossing the line at a Reported depth of 1.7m below track level exists. Information confirming depth, size and protection should be sought at GRIP 3 and developed further.



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Figure 21 - Pipeline marker post

Elm Tree Farm Crossing

The crossing adjacent to Elmtree farm is proposed to be closed. No replacement structures are to be proposed at this point. Land on the South side is proposed to be made accessible via the Portbury Hundred road (A369).



Figure 22 – Elm Tree Farm Crossing

Culvert

A culvert and drainage channel was observed at the low mileage side of MP128.25. However, the condition of the culvert was not able to be assessed due to its inaccessibility.



Figure 23 – View of culvert from track

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Overbridge adjacent to the old Portbury Station (MP128m)

From a brief observation of the structure, the overbridge appears to have the following defects:

- Vegetation growth on the structure on high and low mileage sides.
- Missing bricks and an isolated area spalling to the arch rings on the high mile side.
- Isolated areas of open joints on both sides of the structure.
- Spandrel wall separation on the low mileage side.
- Silt and water staining to the arch soffit.

Further inspection of the structure should be undertaken at GRIP Stage 3 to ascertain required repairs.



Figure 24– High mileage (West) side – overbridge adjacent to old Portbury Station

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Figure 25- Arch soffit of overbridge adjacent to old Portbury Station



Figure 26- Low mileage (East) side – overbridge adjacent to old Portbury Station

The Old Portbury Station

Due to the proximity of the line, a new railway boundary fence will be required.

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Figure 27 - View of the old Portbury Station looking towards low mileage (East)

Drainage Culverts

Three culverts under the existing railway line were observed between the old Portbury Station and the overbridge carrying the Royal Portbury Dock Road. It is recommended that the replacement of the culverts with precast culvert sections should be considered, to reduce future maintenance obligations, and negate the requirement to repair. If the culverts aren't to be replaced, partial repairs to the arch rings and headwalls would be made. Full condition assessments should be undertaken to ascertain the extent of repairs required. Individual notes and figures of culverts are as follows, from high mileage to low mileage (labelled Culvert A, B and C).

These are shown in figures 23-27 inclusive.

Culvert A (MP127m 760y)

Culvert and channel require clearing out to inspect. Water did not appear to be flowing freely through it, although this may be as a result of the channel silting up.

Culvert B (MP127m 915y)

Currently has only 150mm of ballast between its crown and the underside of the timber sleepers crossing it. In order to provide an acceptable ballast depth for the proposed track form the vertical profile of the proposed alignment will need to accommodate a minimum lift of 150mm across this structure.

Culvert C (MP127m 1320y)

Culvert and channel require clearing out to inspect. Further investigations required due low vertical clearance.

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Figure 28 – Culvert A: view from South of the line

Culvert B (High mileage side of MP127.5)



Figure 29 – Culvert B: view South side of line: spalled masonry and open joints visible

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Figure 30 – Culvert B: view North side of line: collapsing wingwalls

Culvert C (Low mileage side of MP127.5)



Figure 31 - Culvert C: spalled masonry and silted up channel

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Figure 32 - Culvert C: channel silted up

Overbridge carrying Royal Portbury Docks Road

The overbridge presented no obvious issues. It may be desirable to remove the graffiti from the bridge abutments following the installation of the boundary fence. The overbridge is shown in Figure 28 below.



Figure 33 - Overbridge carrying Royal Portbury Docks Road

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Overbridge carrying Marsh Lane

The overbridge requires vegetation removal and treating to prevent regrowth. The bridge appears to be in fair condition. However there are isolated areas of spalling and open joints which require repairing. The coping stones on the wing walls require relaying due to fractured joints. These are shown in figures 29 to 32 inclusive.



Figure 34 - Overbridge high mileage end – Marsh Lane



Figure 35 - Overbridge low mileage end – Marsh Lane

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Figure 36 - Wing wall fractured joints on coping stones – Marsh Lane



Figure 37 - Stones under newel cap missing

Culvert between overbridge carrying Marsh Lane and MP 127

The culvert should be inspected prior to GRIP Stage 4.

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Figure 38 - Culvert adjacent to overbridge requires inspection

Cattle creep

The arch underbridge (as shown in Figures 34 and 35) appears to have areas of open joints and drainage issues. It requires the vegetation to be removed and treated to prevent regrowth prior to a full structural examination being undertaken. It is recommended to remove the asset by breaking the arch and infilling. The ground should be graded to match that of the adjacent embankment.



Figure 39 - Cattle creep

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Figure 40 - Cattle creep: open joints visible in the arch rings and spandrel wall

Overbridge carrying M5 motorway (120.76m at centre)

The underbridge seems to be in fair condition for the majority of the structure. There are isolated areas of spalling and visible corroded reinforcing bar in the abutments particularly towards the low mileage end. Areas of offensive graffiti exist on the abutment walls. It is recommended that the asset owner addresses the defects prior to the reopening of the line to traffic.



Figure 41 – View from high mileage end of underbridge – overbridge carrying M5 motorway

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Figure 42 – Isolated areas of spalling and visible corroded reinforcing bar



Figure 43 – Isolated areas of spalling and visible corroded reinforcing bar

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Figure 44 - Spalling to the abutments



Figure 45 - Overbridge carrying M5 motorway: view from low mileage end

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Underbridge over path between Lodway close and Avon Road

The underbridge requires a structural assessment at the next stage to ascertain the repairs required, due to the full length fractures in the up and downside abutments. Spalling of the abutments and minor spalling in the soffit was observed, and should also be taken into consideration when scoping repairs. Further works are required in this area to confirm the requirements for double tracking. The details of this structure are shown in in figures 41 – 47 inclusive.



Figure 46 - North side of underbridge



Figure 47 – South side of underbridge

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Figure 48 – Bridge soffit: isolated spalling and visible corrosion



Figure 49 – Spalling to masonry on buttress and abutments

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Figure 50 – Spalling and hairline full height fracture (<5mm) to high mileage abutment. Vegetation requires removal from structure and treating to prevent regrowth.

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Figure 51 – Spalling and full height vertical fracture in low mileage abutment (<25mm). Stepped hairline fracture visible at top of the abutment.

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Appendix H **Trackbed Investigation Factual Report** **Trackbed Investigation Interpretative Report** **Hazard Waste Online Classification**

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Appendix I

Galingale Way Bridge Visualisation Option 1

Galingale Way Bridge Visualisation Option 2

Sheepway Gate Farm Visualisation

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Appendix J

Interdisciplinary Design Certificate

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Appendix K

Portishead Rail Station Options Appraisal Report