

Option Selection Report

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1 Project Scope & Requirements

1.1 Background

The project is a third party project promoted and funded by the West of England (WoE) Councils. North Somerset Council (NSC) is acting as the delegated authority on behalf of the WoE councils

The Project proposal is to upgrade rail passenger services on the Severn Beach Line and the Bath Spa to Bristol Line and re-open the Portishead line with intermediate stops. The upgraded service is to link all three lines across Bristol Temple Meads, giving enhanced connectivity. 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. A Turnback facility is required east of Bath Spa at Bathampton and additional signalling is required on the Severn Beach Line to enable the proposed upgrade

A rail network capacity analysis has been undertaken and has identified a preferred service pattern as documented in W1097A-NPT-REP-EMG-000001 revision 1.3 – GRIP 3 Capability Analysis Report and W1097A-NPT-REP-EMG- 000003 rev 1.4 – GRIP 3 2TPH POD Line Capability Report.

Further details and a history of the line can be found in the GRIP 2 feasibility Report GS2/140569 dated July 2014.

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 and consequently are subject to the Development Consent Order (DCO) planning process. This process which provides powers to build and operate infrastructure, will be utilised for the route west of but excluding Parson Street Junction. The DCO works and process is being led by NSC.

The remainder of the works will be undertaken using Network Rail's Permitted Development rights.

The Network Rail team consists of the following major parties:

1. Arup – Responsible for the GRIP 3 design works (excluding signalling)
2. SDG – Responsible for the GRIP 3 signalling design

The client (NSC) team consists of the following major parties:

- Bond Dickinson – Planning & Legal advisors

- Ardent – Property and Land agents
- CH2M & NSC team – Responsible for Council designed elements and Environmental Impact Assessments, business case, commercial and comms,
- GWR - Operations

1.2 Scope and Requirements

This design has been based on the following key documents:

- MetroWest Phase 1 CR-T. Rev A02.1 dated 8/9/15
- MetroWest GRIP 2 design as summarised in the feasibility report GS2/140569 dated July 2014
- W1097A-NPT-REP-EMG-000001 revision 1.3 – GRIP 3 Capability Analysis Report
- W1097A-NPT-REP-EMG-000003 rev 1.4 – GRIP 3 2TPH POD Line Capability Report
- As amended by Client (NSC) and Network Rail change requests and TQs

The proposed works can be summarised briefly as follows:

- Rebuild the Portishead to Pill Line.
- Upgrade the freight line to be suitable for passenger services and an increased line speed.
- New station at Portishead.
- New footbridge next to Trinity Primary School
- Reopen former station at Pill
- Double track works at Pill and Ashton Gate area.
- Environmental mitigation measures as required.
- Enhancement to Parson Street Junction.
- Re-signalling the entire route between Temple Meads and Portishead.
- Bathampton Turn back.

- Additional signalling on the Severn Beach line to facilitate turn back (No longer part of this project, see option selection below).
 - Partial reinstatement of Down Relief Line to assist recessing / regulation of freight trains.
-

2 Preliminary Design

2.1 Selected Option

The MetroWest Phase 1 project commenced in 2013, bringing together two local rail projects; the re-opening of the Portishead line and the Greater Bristol Rail Metro which aspired to upgrade the existing passenger train service on the Severn Beach line and Bath Spa to Bristol line.

A Portishead Line reopening project produced a GRIP 3 report and design (Option Selection Report GRIP Stage 3 111797 Portishead reopening) in 2010. No previous GRIP work had been undertaken for the Severn Beach line and Bath Spa to Bristol line proposals.

The 2010 GRIP 3 work was revisited in 2013/2014 through additional feasibility studies, optioneering and a broadening of the scope to include local rail network enhancements. The project then became known as MetroWest Phase 1 and a GRIP 2 feasibility report GS2/140569 dated July 2014 was produced with an associated GRIP 2 design.

This history of previous studies led to the current GRIP 3 design for MetroWest Phase 1 having already undergone significant optioneering. The GRIP 3 remit was to produce a GRIP 3 design based on the GRIP 2 approved options. It is therefore not the intention of this option selection report to revisit decisions at previous stages or re-document the conclusions of any historical work.

The option selection documented within this report is limited to the changes required:

- A. by the Client
- B. by the RAMs
- C. by Statutory authorities
- D. due to survey information invalidating the GRIP 2 design

The following outlines the significant changes from GRIP 2:

- Line Speeds have been rationalised
- Parson Street Junction has been significantly remodelled to a parallel junction to comply with timetable requirements

- Works to Liberty Sidings (Freightliner Yard) have been introduced to comply with timetable requirements
- Repair works to underbridges and over bridges have been identified
- Significant Earthworks sites have been identified
- Pill Station requires major earthworks and platform re-building to ensure it meets current standards and to address historic deficiencies with the existing cutting.
- Avon Road Underbridge requires replacement rather than extending to facilitate construction and structural stability
- Sheepway overbridge is no longer required
- OLE at Bathampton is no longer required as part of the MetroWest Project
- Signalling works at Avonmouth are no longer required as part of the MetroWest Project

A significant change that was identified as a result of the GRIP 3 design was the extent of track works required through the Avon Gorge. The most significant assumption from the GRIP 2 study was that the existing track components from Parsons St to Portbury could be re-used by slueing with a tamper (circa 3900m) and by lifting and replacing (circa 3400m) without carrying out any treatment to the existing ballast, formation and drainage. Due to the required alignment design for the increased linespeed from 30mph to 50mph, large slues were required that invalidated this assumption. The Track Bed Investigation, topographical survey and existing condition report carried out at GRIP 3 were used to inform the design which in governed the method of construction through the gorge.

Based on these investigations / surveys, the main factors that have influenced the increase in scope were the changes to the track geometry required to achieve 50mph and the existing condition of the rail, sleepers and formation. The condition report highlighted that there were a number of sections of bullhead and pre 1976 cast rail which were not suitable for use in the new design. In addition, multiple lengths of rail with existing defects, made worse by the changes in geometry and the increased frequency of rail traffic resulting from the introduction of passenger trains, needed to be replaced. The condition report also identified that the existing track had non-compliant sleeper spacing for steel sleepers on tight radius curves. With the introduction of passenger traffic, the higher line speeds and the tight radius curves, the risk profile was increased, resulting in the non-compliant sleeper spacings needing to be rectified. The Track Bed Investigation results confirmed the presence of soft clay and in places hard rock that would need to be treated. In areas where the track is subjected to large slews, formation treatment will be required to the new track bed that has not previously experienced the loads from rail traffic.

As a result of the above interventions, rather than the intended methodology for slueing or replacing defective rails, a much more laborious process of cutting out sections of track and replacing the formation before replacing the sleepers and rail would be required.

Following is a summary of the key option selection decisions made for the changes to the GRIP 2 work.

2.1.1 Parson Street Junction

At the outset of the GRIP 3 design, additional Railsys timetable modelling was undertaken to validate the GRIP 2 design against the wider network. This yielded a requirement to change the design at Parson Street such that parallel moves could be made across the junction. In addition it was identified that the current shunting moves carried out across the junction from Liberty Sidings would not be compatible with the MetroWest services. The existing arrangement is shown in Figure 2.1 below, Existing PSJ Arrangement.

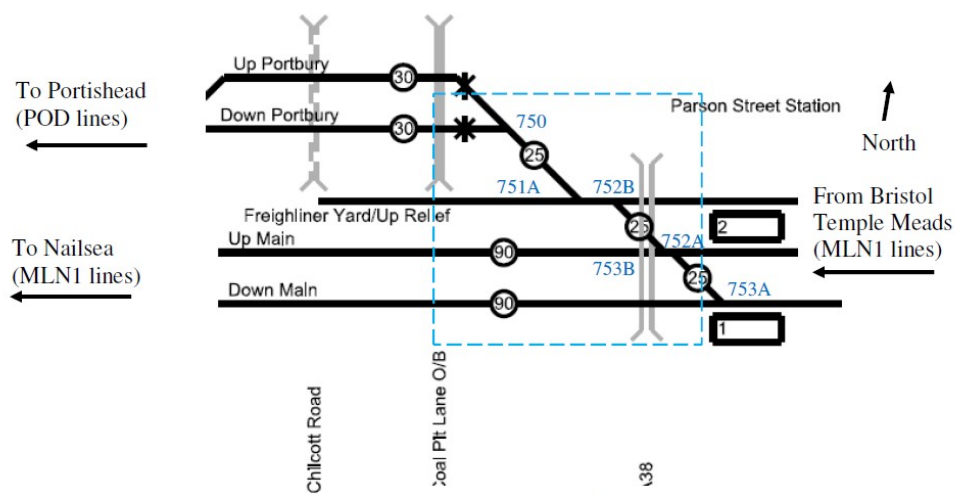
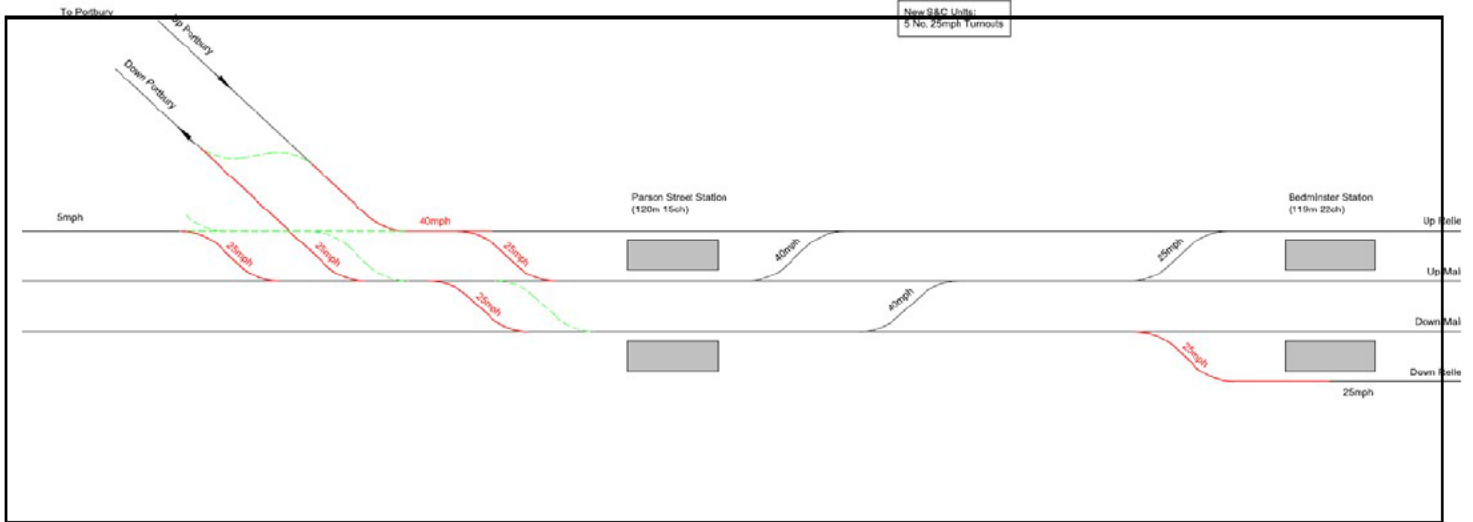


Figure 2.1 – Existing PSJ Arrangement

2.1.1.1 Summary of options

Table 2.1 below summaries the main options considered for Parson Street Junction with the major considerations. Full details of these drawings are contained within the Parson Street Junction Permanent Way Form A

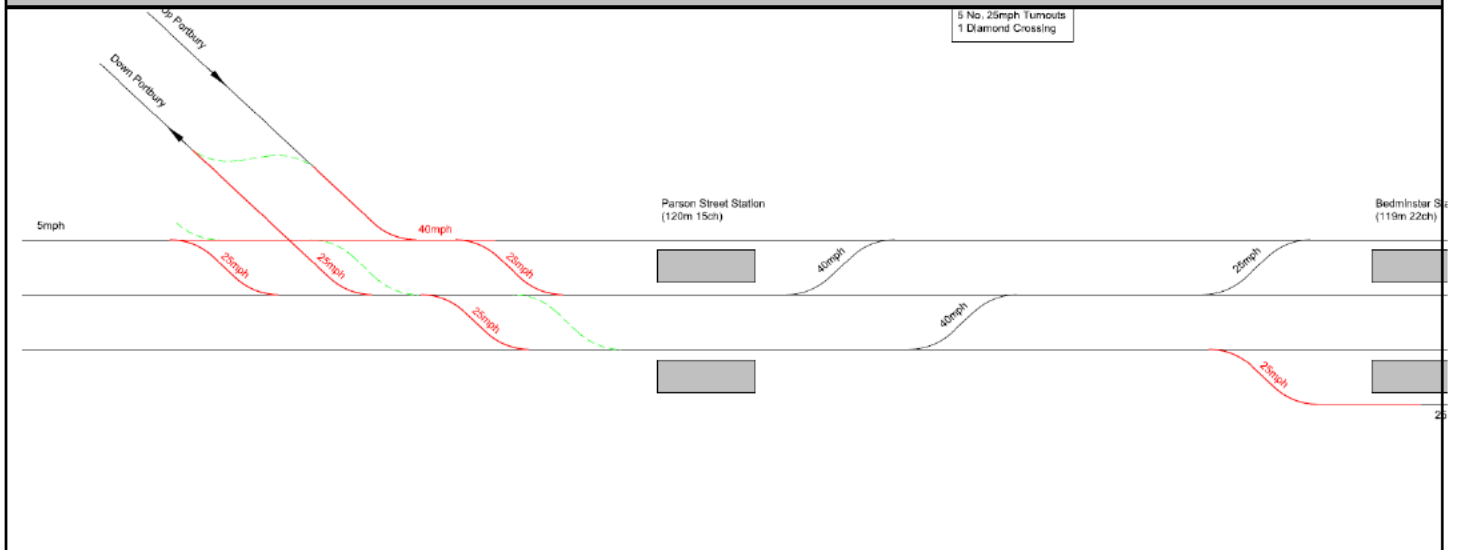
Option 1	
<ul style="list-style-type: none"> • Provides Parallel Paths across the junction • Modifications to Liberty Sidings also proposed 	<ul style="list-style-type: none"> • Requires use of Parson Street platform on Up-Relief which is currently not being used • Crossovers to Down POD would not be 40mph as required by the CR-T • Earthworks at Junction Required
Option 2	



- Provides Parallel Paths across the junction
- Modifications to Liberty Sidings also proposed

- Major Possession work required to construct
- Earthworks at Junction Required
- Large possession required to maintain the junction

Option 3



- Provides Parallel Paths across the junction
- Potentially possible to avoid works to Liberty Sidings

- Major Possession work required to construct
- Earthworks at Junction Required
- Large possession required to maintain the junction
- Non-preferred Pway components

Option 4

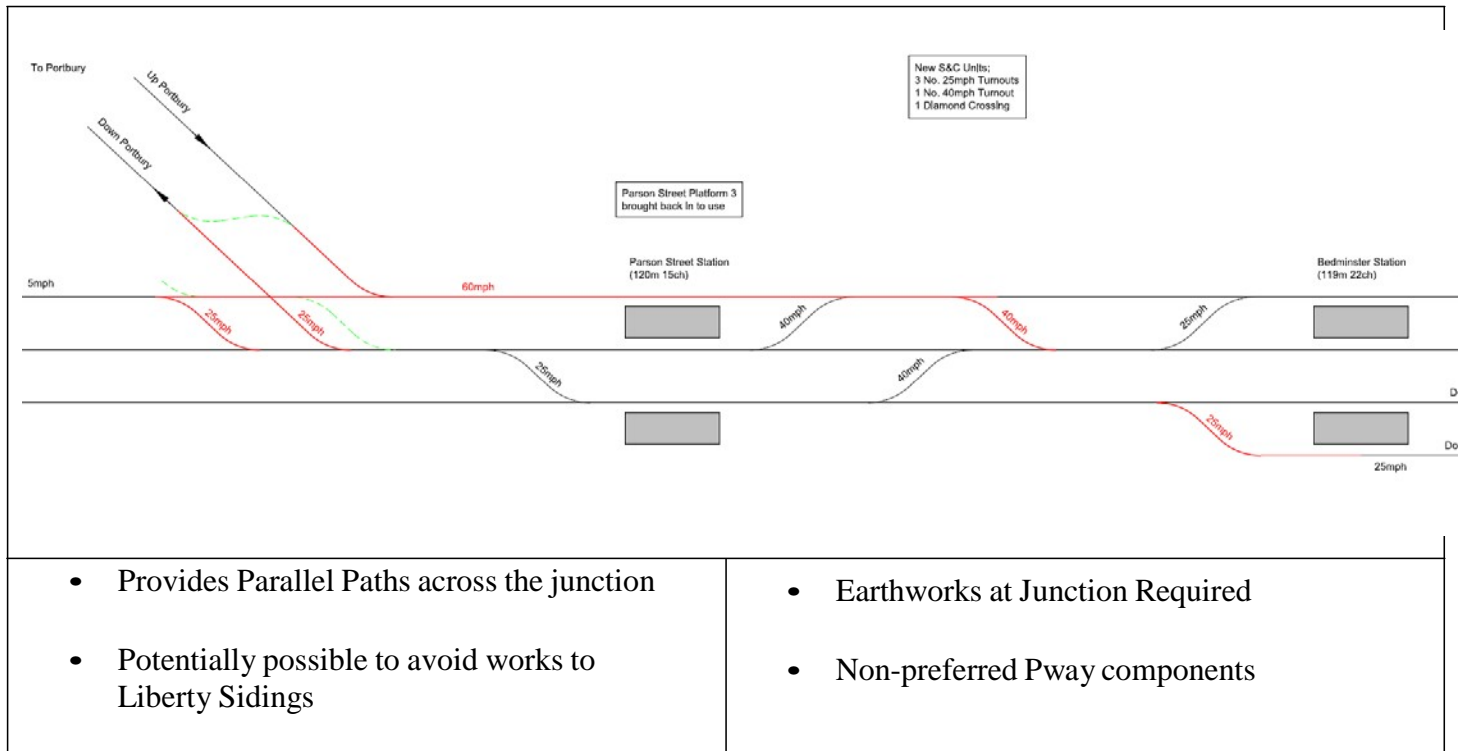


Table 2.1 – Parson Street Junction Options

The works required within Liberty Sidings were discussed with Freightliner and the NR Operations team and it was agreed that the provision of a fourth road within the sidings would remove the need for them to undertake shunting moves over the junction.

2.1.1.2 Selected Option

Option 2 was initially selected as the preferred option to develop as it fulfilled all of the operational requirements.

Following development of the GRIP 3 design it became clear that the permanent way geometry would only work with a number of derogations. Significantly, concerns were raised about the ability to maintain the arrangement and the number/size of the possessions that would be required.

The design was then revisited based on Option 1. Initial concerns regarding the use of the platform on the Up-Relief were reduced as it was confirmed the platform was never taken out of use and therefore it would not be required to bring it up to modern standards if it was used as part of MetroWest.

The option was further developed when it was agreed that all MetroWest services could use the Up Relief at Bedminster negating the need for the additional crossover to the Up Main.

The works within Liberty sidings were confirmed as being required as it would not be operationally acceptable to allow the shunting movements to be carried out on the Up Main.

A final layout of the junction is provided in Figure 2.2 and Liberty Sidings in Figure 2.3

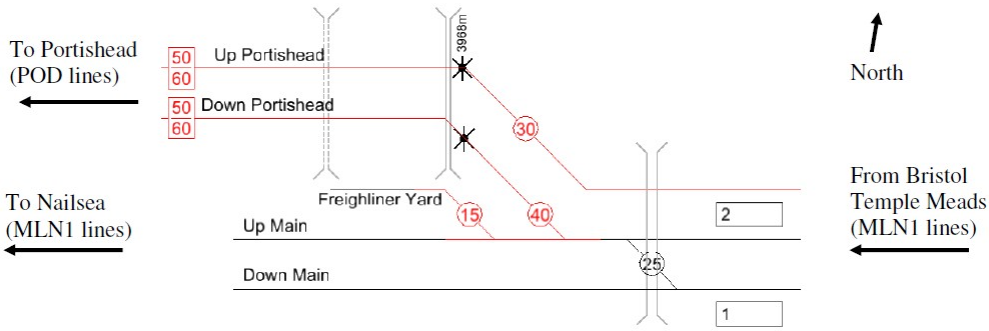


Figure 2.2 – Proposed PSJ Arrangement

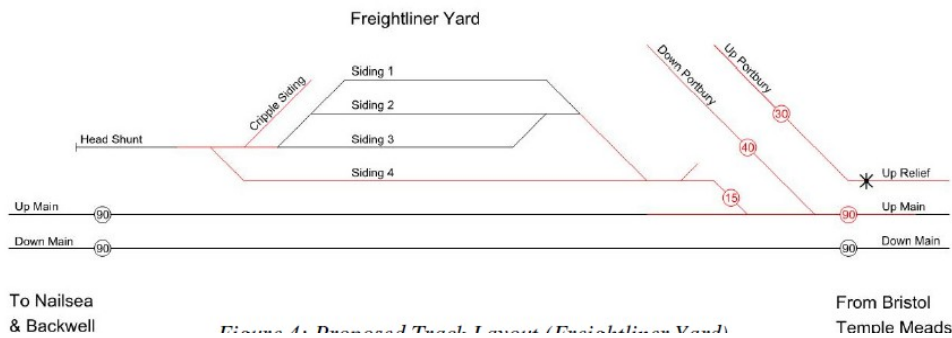


Figure 2.3 – Liberty Siding Proposed Arrangement

2.1.2 Compliance of Selected Option

Minor Pway non compliances are required as documented in the Parson Street Junction Permanent Way Form A ref W1097B-ARP-FRM-ETR-000001

Junction Speeds are reduced from those required in the CR-T. Additional Railsys timetable modelling was carried out. Report ref W1097A-NPT-REP-EMG- 000003 rev 1.4 – GRIP 3 2TPH POD Line Capability Report concludes that the reduced line speed still maintains the required timetable although it will reduce the redundancy factor.

2.1.2.1 Discarded options

The following is a summary of the options discarded:

Option 2

Disregarded due to the number of derogations required to the permanent way design and the difficulties in maintaining the junction.

Option 3

Disregarded as it was confirmed that continued shunting across the POD line would not be compatible with MetroWest Services

Option 4

Disregarded as it was confirmed that continued shunting across the POD line would not be compatible with MetroWest Services

2.2 Gorge Line Speed

Following development of the GRIP 3 permanent way design through the gorge to the required line speed of 55mph, high levels of rate of change of cant, cant deficiency, rate of change of deficiency and cant gradient were present. These high values reflected the sinuous alignment of the line and would have presented significant OPEX and maintenance issues.

2.2.1 Summary of options

Three options were considered:

Option 1

Reduce the line speed to reduce the high values encountered in the permanent way design

Option 2

Accept a high maintenance and OPEX cost

Option 3

Undertake extensive engineering works to improve the track geometry

2.2.1.1 Selected Option

Option 1 was selected as the preferred option and was taken forward for the final permanent way AiP

2.2.1.2 Compliance of Selected Option

The 55mph requirement in the CR-T has not been met.

Additional Railsys timetable modelling was carried out. Report ref W1097A- NPT-REP-EMG-000003 rev 1.4 – GRIP 3 2TPH POD Line Capability Report concludes that the reduced line speed still maintains the required timetable although it will reduce the redundancy factor.

2.2.2 Discarded options

The following is a summary of the options discarded:

Option 2

Option 2 was disregarded as the RAM would not accept this proposal. The gorge is a difficult environment to maintain and therefore there would be a high risk of temporary speed restrictions being imposed.

Option 3

Cost and environmental issues are the rationale behind why this option was disregarded. The proposed design already uses all of the available track bed and therefore track bed widening and significant civil engineering works would be required.

The alignment is constrained by a number of tunnels, bridges, embankments, walls and cliff faces which would need to be modified by this option. Construction in this area would be challenging as there is no suitable access

The area is also a SSSI/SAC which would limit the amount of heavy engineering work that could be undertaken.

2.3 Pill Station and Pill Viaduct

Pill Station and Pill Viaduct represent a very constrained area on the proposed route. During development of the GRIP 3 the following difficulties with the GRIP 2 design were found:

- The proposal to reuse Pill Station platform was not suitable as the condition of the platform was found to be sub-standard and not compliant with modern standards. Following topographical survey, it was identified that the platform ramp would require significantly more cutting works than were envisaged at GRIP 2
- The proposed Pill Junction arrangement did not provide sufficient signalling overlap to allow the junction to be located close to the platform without having a reduction on line speed
- The GRIP 2 permanent way alignment across Pill viaduct contained transition arrangements not suitable for the line speed quoted.
- The single pedestrian entrance to the Station did not provide an alternative means of escape from the platform and was not deemed acceptable by the fire officers

During GRIP 3, an opportunity arose to purchase the old Station building adjacent to the proposed station, providing an alternative access to the station without the need for a new Footbridge.

It was also agreed that the Station should be designed for 5 cars rather than for 4 cars with passive allowance for 5 cars.

2.3.1 Summary of options

Pill Station

The following options were considered for Pill Station:

Option 1

GRIP 2 based design with footbridge, but new platform and modified retaining wall design to reflect the topographic survey

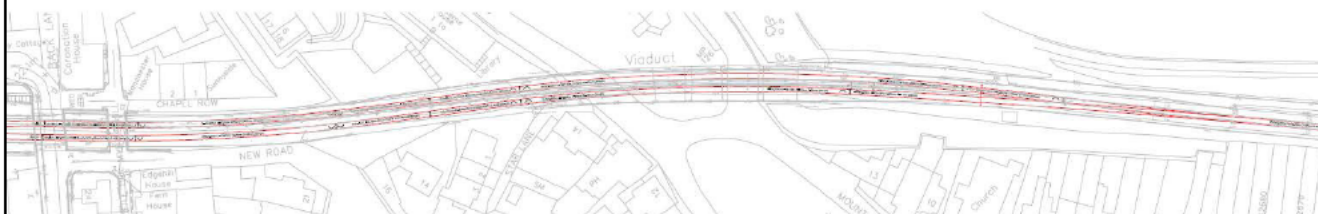
Option 2

New entrance from demolished Station building without the need for a footbridge

Pill Track Alignment

The following options were considered for the permanent way alignment at Pill:

Option 1



- The two tracks are taken through the viaduct with the EV15 transitioned turnout to the south.
- This option gives 30mph on the passenger and 30mph on the freight line.
- Compatible with signaling overlap required

- Dual tracking required across Pill Viaduct
- Reduction in line speed to 30mph across viaduct

Option 2



- An EV15 transitioned turnout is positioned in the curve at the north of the viaduct. This is away from the arches but still on the retained ground.
- This option gives 40mph on the passenger line and 30mph on the freight line.

- Reduction in line speed to 40mph across viaduct
- Distances for required Signalling Overlap not possible. Line speed through and on approach to station would need to be reduced

Option 3



- An EV15 transitioned turnout is positioned on the straight at the north of the viaduct.
- This option gives 40mph on the passenger line and 30mph on the freight line.

- Pill station platform must move approximately 40m to the north west.
- Reduction in line speed to 40mph across viaduct
- Distances for required Signalling Overlap not possible. Line speed through and on approach to station would need to be reduced

2.3.2 Selected Option

Pill Station

The option to provide a new access to the site from Station road and remove the need for a footbridge was proposed (Option 1).

To resolve the fire egress issues, a refuge area has been added at the western end of the platform.

The additional cutting works required a change to the ramp philosophy. Due to the size of the asset it was agreed with NR maintenance that the structure of the cutting and ramp would be combined to provide a more efficient design and to reduce future maintenance costs.

Pill Track Alignment

Option 1 was selected as the preferred option.

Structural assessment of Pill Viaduct had indicated that the additional of an extra track was not a controlling factor in the strength of the viaduct.

All other options would have not provided the required signalling overlap which would have necessitated a significant speed reduction through Pill Station from Portishead or the relocation of Pill Station.

2.3.3 Compliance of Selected Option

The 50 mph requirement in the CR-T has not been met.

Additional Railsys timetable modelling was carried out. Report ref W1097A- NPT-REP-EMG-000003 rev 1.4 – GRIP 3 2TPH POD Line Capability Report concludes that the reduced line speed still maintains the required timetable although it will reduce the redundancy factor.

2.3.4 Discarded options

Pill Station

The footbridge option has been discounted as the alternative represents an improved station frontage, improved safety and the reduction in number of assets to be maintained.

Numerous options have been reviewed regarding providing an alternative exit for fire egress. This included an additional path and entrance to the Station from Avon Road and the provision of a bridge direct to the Car Park. These have been discounted on cost and maintenance grounds.

Sheet piles for the retaining solution to the cutting as noted in the GRIP 2 design have been discounted for geotechnical reasons. A separate ramp (such as a typical steel design) has not been favoured due to the restrictions this would place on maintaining the cutting stabilisation works required behind the ramp.

Pill Track alignment

Options 2 and 3 were not acceptable to the signalling engineers without a further reduction in line speed to provide the required signalling overlaps. This further reduction was deemed as not acceptable to the timetable given the line speed reductions undertaken elsewhere.

Repositioning the Station further to the West was not considered acceptable due to the track geometry, the increased civils works and/or the station becoming less accessible to the residents of Pill.

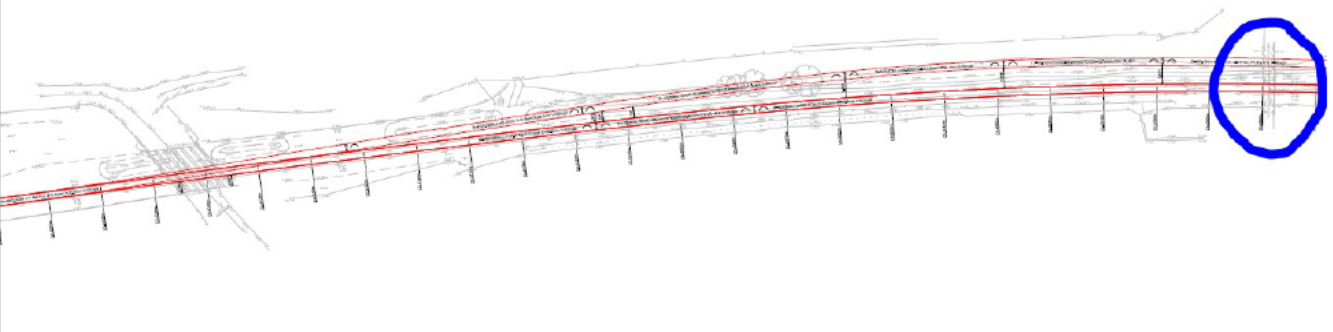
2.4 Clifton Junction

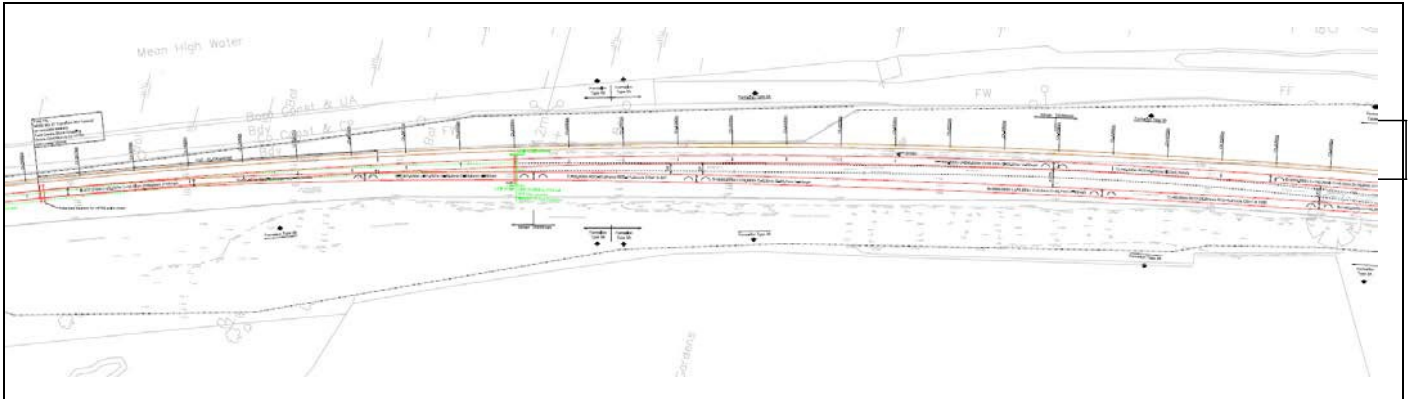
Clifton Junction is required by the CR-T to be 60mph and outside of the SSSI. Following the results of the topographic survey and the gauging of the permanent way design it was identified that the GRIP 2 layout would not be possible without

significant works and probable re-construction of the footbridge at 5974m

2.4.1 Summary of options

The table below presents the options and considerations

Option 1	
	
<ul style="list-style-type: none"> • Provides a 60mph turnout • Situated outside of the SSSI as per the GRIP 2 	<ul style="list-style-type: none"> • New Footbridge required where circled blue • New Footbridge would be likely to need ramps making it significantly larger than existing • Option for removal of footbridge without replacement was ruled out by council
Option 2	
Provide a 60mph turnout outside of the SSSI to the east of the footbridge	
<ul style="list-style-type: none"> • Provides a 60mph turnout • Situated outside of the SSSI as per the GRIP 2 	<ul style="list-style-type: none"> • Reduces the length of dual tracking and hence has timetable implications
Option 3	



<ul style="list-style-type: none"> • Provides a 50mph turnout partially within the SSSI to the west • Works to footbridge not required • Increased length of double track helps timetable 	<ul style="list-style-type: none"> • Additional length and cost of dual track • Works are within the SSSI • Requires minor earthworks to the west of Clanage Road over bridge (Rownham Hill)
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2.4.2 Selected Option

Option 3 is the selected option.

The reduction in line speed elsewhere results in an increase in dual tracking length being beneficial to help meet the timetable and a speed of 50mph here is consistent with the adjoining gorge line speed.

The council has shown less concern over these works being within the SSSI than initially envisaged and this consent process is being actively managed through the DCO application.

2.4.3 Compliance of Selected Option

The 60 mph requirement of the junction in the CR-T has not been met. Additional Railsys timetable modelling was carried out. Report ref W1097A-NPT-REP-EMG-000003 rev 1.4 – GRIP 3 2TPH POD Line Capability Report concludes that the reduced line speed still maintains the required timetable although it will reduce the redundancy factor.

The location of the junction has been moved to be within the SSSI.

2.4.4 Discarded options

Option 1

Option 1 was discarded due to the cost and visual impact of a new bridge with ramps

Option 2

Option 2 was disregarded due to the impact this would have on the timetable following the reduction in dual track length

2.5 Ashton Gate Level Crossing

As per the GRIP 2 design Ashton Gate Level Crossing was due to be widened to accommodate the double tracks. During the development of the GRIP 3 the following issues were identified:

- Due to the increased barrier downtime to allow for MetroWest services, the left turn lane from Winterstoke Road to the crossing would need to be extended to avoid blocking the road junction
- The increased barrier downtime of the crossing would be significant (between 12 and 20 minutes each hour, depending on freight traffic). This would cause considerable disruption to the industrial estate, through which this is their only access
- During Football matches at Ashton Gate, this crossing is used as a thoroughfare for pedestrians accessing the Stadium. The prolonged downtime would present an increased safety risk and likelihood of crossing misuse

2.5.1 Summary of options

Option 1

As per the GRIP 2 design, locally addressing the junction issues by minor works to the junction, traffic signals and managing the safety implications on match days through operational procedures

Option 2

Adjusting the timetable to maximise the barrier up time at the crossing

Option 3

Removing the crossing and providing alternative routes for Pedestrians and Vehicles

2.5.2 Selected Option

Option 3 was the selected Option.

Numerous options for the alternative access routes have been prepared by the council/CH2M and have been presented for public consultation. The final option chosen consists of a new vehicle access from the west (with the final alignment to be determined through further technical work and public consultation) and a new pedestrian ramp from the west side of the crossing up to Ashton Road.

This option removes the safety risk presented by the crossing.

2.5.3 Compliance of Selected Option

This option is not compliant with the CR-T but is compliant with industry best practice to close crossings where reasonable alternatives exist

2.5.4 Discarded options

Option 1

Option 1 was disregarded due to the safety risks and traffic congestion implications. There were considerable risks to the scheme being accepted in the DCO process with the disruption that was likely to have been caused

Option 2

This option was discounted because the number of other constraints on the timetable would have significant impact on the service pattern viability.

2.6 Bathampton OLE

The CR-T requires the new crossover at Bathampton to be electrified. Due to the delays in electrification along the Bath corridor, no design was available to integrate the crossover OLE design into. There is considerable uncertainty as to when this area will be electrified. The current understanding is that the line will be electrified after the MetroWest works are complete.

2.6.1 Summary of option

Option 1

Produce a standalone OLE design for the Junction

Option 2

Integrate the two programmes

Option 3

Work on the basis that MetroWest will be completed prior to electrification

2.6.2 Selected Option

Option 3 was selected.

This option was considered the most realistic and practicable option to allow the design and MetroWest works to move forward given the uncertainties around electrification.

2.6.3 Compliance of Selected Option

Not compliant with the CR-T

Once the programme of works for electrification is understood it is assumed this electrification design for the crossover would most likely be varied in to the wider electrification remit.

2.6.4 Discarded options

Option 1

Option 1 was discounted as the crossover does not need to be electrified as part of the MetroWest project if the mainline is not electrified. It is highly likely that any design developed in isolation would need to be amended by the wider electrification project

Option 2

Option 2 was discounted due to the uncertainties around the electrification programme

2.7 Avonmouth Signalling Works

The CR-T states that a turn back facility shall be provided at Avonmouth Station on the Up Main Line to turn trains back to Bristol Temple Meads. It suggests that 2 options shall be assessed to enable turn back movements at Avonmouth. They are either signalling enhancement north of Avonmouth station or signalling enhancement at Avonmouth station.

2.7.1 Summary of options

Option 1

Provide bi-directional signals at Avonmouth station to allow trains to pass. Timetable option (II) assumes a 32½ minute turnaround at Avonmouth and 10½ minutes turnaround time at Severn Beach

Option 2

Train detection / signalling alterations to allow movement over Holesmouth Junction. Timetable option (III) assumes a 10 minutes turnaround at Avonmouth and 37 minutes turnaround time at Severn Beach

2.7.2 Selected Option

Option 2 was selected. The client had a preference for timetable III (37 minute turnaround time at Severn Beach, based on the latest available Railsys timetable modelling). Therefore to allow freight train movements over Holesmouth Junction whilst there is a train on the Severn Beach line beyond the junction, it was agreed that the interlocking between 137 and 138 points is to be modified to allow freight trains to cross the junction once a passenger train has cleared the points on its way towards the single line section.

2.7.3 Compliance of Selected Option

Not compliant with the CR-T. The work to remove the interlocking between the points has been removed from scope and varied in to a separate contract and is planned to be implemented in advance of the MetroWest project.

2.7.4 Discarded options

Option 1

Option 1 was discarded due to the client's preference for adopting timetable III (as opposed to option II).

3 Structural & earthworks Optioneering works

The following elements of design have been subject to detailed optioneering studies.

- Cattle creep underbridge
- Avon Road Bridge
- Earthworks
- Quarry Underbridge No 2

The work contained within these studies is not repeated here but reference is made to the location of the option selection work.

3.1 Cattle creep Underbridge

Cattle creep underbridge sits on the disused section of line. Following structural assessments it was identified that the structure would be in need of significant repair. A number of options were put forward and it was concluded that the best value solution would be to infill the structure. Refer to technical note ref W1097B-ARP-REP-ECV-000037 for details. It was identified that protection works and relocation of some of the utilities passing beneath the bridge would be required.

Further to a Flood Risk Assessment carried out by CH2M, it was identified that a new culvert would be required to the west of Cattle Creep to cater for flood flows.

3.2 Avon Road Bridge

Following assessment of the GRIP 2 design, detailed surveys and GI it was identified that widening the structure at Avon Road would not be a sustainable solution due to:

- This solution not addressing the defects in the existing structure
- The risk of differential settlement between the old and the widened section
- The amount of works needed to the existing abutment
- The construction process in a spatial and time limited environment

It was therefore agreed that a new bridge structure would be proposed. Refer to W1097B-ARP-REP-ECV-000028 for details.

3.3 Earthworks solutions

Following completion of the Earthwork change of use assessment (W1097B- ARP-REP-EGE-000002) a number of earthwork sites were identified as needing to be modified to accommodate the new track alignment.

A series of feasibility studies were prepared to review the options. There were presented and agreed with the RAM before the associated earthworks Form 1's were produced. Refer to the following feasibility reports for details:

- Rownham Hill Feasibility Report (W1097B-ARP-REP-ECV-000007)
- Parson Street Cutting Feasibility Report (W1097B-ARP-REP-EGE- 000005)
- Mount Pleasant Earthworks Feasibility Report (W1079B-ARP-REP-EGE-000008)

- Hardwick Cutting Feasibility Report (W1079B-ARP-REP-EGE-000009)
- Avon Road Embankment Feasibility Report (W1097B-ARP-REP-EGE- 000010)
- Ashton Gate Cutting Feasibility Report (W1097B-ARP-REP-EGE- 000006)

3.4 Quarry underbridge No.2

Following structural assessment of Quarry underbridge No 2 it was concluded that there were concerns over its condition. It was therefore agreed that remedial works were required and the options were presented on the following two sketches:

- W1097B-ARP-SKE-ECV-022001
- W1097B-ARP-SKE-ECV-022002

It was subsequently agreed that a corrugated arch structure with mass concrete backfill was the preferred solution. The restricted head room provided by this design was agreed with North Somerset Council. However, later discussion with the National Trust (owners of the land accessed by the bridge) have revealed that it is not acceptable to reduce the headroom as required by the design. Therefore an alternative solution may be required. This will need to be reviewed at GRIP 4 / 5.

3.5 Compliance of Selected Option with Project Requirement Specification

abc

3.6 Constructability Assessments

Refer to the following documents for Constructability Assessment

- Outline Construction Strategy ref W1097B-ARP-REP-EMF-000002
- Track Delivery Constructability Study version 0.1 dated 25/10/16

3.7 Discarded Options

The discarded options are discussed within the report.

3.8 Access and Possession Strategy

Refer to the following documents for Access and Possession Strategy

- Outline Construction Strategy ref W1097B-ARP-REP-EMF-000002
- Track Delivery Constructability Study version 0.1 dated 25/10/16

3.9 Project Programme

The project has the current timescales as shown in the table below:

GRIP 4	Completion 28th July 2017
GRIP 5	Completion 25th March 2019
GRIP 6	Completion 2nd December 2020
GRIP 7	Completion 13th January 2021
GRIP 8	Completion 26th January 2022

The introduction of passenger train services is scheduled for December 2020.

The project also undertook a programme assessment of the proposed construction strategy. This is shown in Appendix A.

3.10 Whole Life Cost Assessment of Options

Whole life cost analysis was not assessed for the chosen option but was used in high level option selection. The project anticipates this to be carried out in GRIP 4/5 to provide a full Cost benefit analysis.

3.11 Estimates (including whole life costings)

The estimate was produced by the project and presented through the NR Regional panel for release to the 3rd party funders. The estimate report is available in a separate NR document.

3.12 QRA

A collaborative NR, ARUP and North Somerset Council QRA was held in November 2016 and the output to this is available in a separate NR document. A further workshop was held in March 2017.

3.13 Risk Register

NR and ARUP project team have collaboratively produced a risk register which is held locally within the NR project team and managed through Active Risk Manager (ARM).

The full NR/ARUP ARM risk register can be found in the Active Risk Management database.

The following work is being considered by NR to conclude and reduce the risk within the GRIP 3 design:

- Culverts on the discussed section – CCTV and structural assessment. Detailed Cable Survey at Parson Street Junction to understand the diversions required.
- Additional Risk Assessments for Over bridge Parapets, Over bridge Train Strike, Underbridge Train Strike and incursion of road traffic from adjacent roads.

- Retaining Walls further assessment following their de-vegetation. Pill viaduct.
- Validation of the GRIP3 design against the Railsys Model.

3.14 Assumptions

The full list of assumptions for MetroWest Phase 1 can be found in the QCRA Report

3.15 Signed Engineering Compliance Certificate

The signed Engineering Compliance Certificate is available as a separate NR document.

3.16 Asset Condition Surveys / GI / Topographical

The following Topographical Surveys have been undertaken and are located on ProjectWise

- Topographic Survey 18/9/15 undertaken by Severn Partnership (Parson Street Junction to Portishead) as part of this Project. With minor additions in 2016
- Topographic Survey (dated 25/4/14 in NR ProjectWise) undertaken by URS/Scott Wilson Ref 47066812-SW-SU-MOD-0001 (Bedminster to Parson Street Junction) as part of another project

The following documents summarise the Geotechnical Investigation works undertaken as part of the GRIP 3 design:

- Geotechnical Desk Study for Portishead & Pill Train Stations (W1097B- ARP-REP-EGE-000001)
- Geotechnical Factual Reports for Portishead & Pill Train Stations (W1097B-ARP-REP-EGE-000011)

The following Form BA documents summarise the Structural Coring works undertaken as part of the GRIP 3 design

- Pill Viaduct, Form BA (W1097B-ARP-FRM-ECV-000004)
- Chilcott Underbridge, Form BA (W1097B-ARP-FRM-ECV-000010)
- Miles Dock Underbridge, Form BA (W1097B-ARP-FRM-ECV-000008)
- Miles Underbridge, Form BA (W1097B-ARP-FRM-ECV-000006)
- Single Span Masonry Underbridges Form BA (W1097B-ARP-FRM-ECV-000014)

The following document summarises the Track Bed Investigation works undertaken as part of the GRIP 3 design

- Track bed Report (W1097B-ARP-REP-ETR-000008)

The following documents summarises the Qualitative Condition Surveys undertaken as part of the GRIP 3 design

- Minor Civils Condition Report (Appendix G in Minor Civils Form 1 W1097B-ARP-FRM-ECV-000018)
- Track Componentry and Condition Report (W1097B-ARP-REP-ETR-000003)
- Over bridge Condition Assessment (W1097B-ARP-REP-ECV-000002)
- Pill Platform Assessment (W1097B-ARP-REP-EST-000001)

4 Contracting Strategy

4.1

The finalised contracting strategy has not been completed at this early GRIP stage. The project has provisionally set out a total of 5 packages to enable the smooth running of the project. These 5 provisional packages are outlined below;

Package 1- Procure the Track Works GRIP 5 – 8 the proposed procurement strategy is to deliver the required works through the Regional Delivery Frameworks available to network Rail Western Region

Package 2- Procure the Civils Enabling Works GRIP 5-8 the proposed procurement strategy is to competitively tender the works utilising RISQS for supplier selection and applying the NR process under the Utilities directive. It is proposed to utilise a NR9 form of contract.

Package 3- Procure the Main Civils Works GRIP 5-8 the proposed procurement strategy is to competitively tender the works utilising RISQS for supplier selection and applying the NR process under the Utilities directive.

Package 4 Procure the Building Works Grip5-8 the proposed procurement strategy is to competitively tender the works utilising RISQS for supplier selection and applying the NR process under the Utilities directive. It is proposed to utilise a NR9 form of contract.

Package 5, to use the existing Signalling Renewals / Enhancement Projects (BASRE/BASE) to provide the Railway Signalling Systems utilising the Regional Signalling Framework Agreement.

NOTE: An Implementation Agreement will need to be put in place between the Client (NSC) and NR for the funding and contractual agreements for packages 1 to 5.

5 Interfaces with other projects

5.1

The following list the significant interfaces with other parties other than Arup/NR MetroWest Project Team and SDG

- The DCO process is being led by North Somerset County Council (NSC), Bond Dickinson and Ardent
 - The design of council elements including highways and Station Car parks are being developed by the NSC appointed consultants CH2M
 - The Environmental Impact Assessment and Mitigation works are being developed by the NSCC appointed consultants CH2M
 - BASRE re-signalling works are currently ongoing and are assumed to be complete prior to MetroWest
 - Renewal of the mainline crossover at Bedminster is being undertaken by the NR renewals team. It is proposed to integrate this with the MetroWest Bedminster works
 - A project to upgrade to existing stations to suit the MetroWest phase 1 is being undertaken by others with GWR
 - A proposed bridge at Ashton Gate and adjacent guided Bus way is being installed by the MetroBus project prior to MetroWest Phase 1
 - Bristol East Junction Remodelling works currently in development phase and assumed to be complete prior to MetroWest
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6 CDM Information

6.1

The Arup GRIP 3 documents contain individual CDM risk Registers. A combined Arup CDM/CSM register is included in a separate NR document.

A NR CDM plan is available as a separate document.

7 Safety Verification Recommendations (CIP)

7.1

The project went before the SRP panel and the panel determined that the project was significant and that RIR sign off was not required. This was at a meeting on the 18th September 2014.

The project has produced a safety plan, system definition and a hazard record. These documents are available as separate NR documents.

8 Compliance with Corporate objectives (inc 7DR, Operational impact, maintenance impact)

8.1

A compliance exercise was completed in accordance with NR governance and the output is available as a separate NR document.

9 Consents Strategy

9.1

The Land and consents strategy for this project has been outlined in the document contained in NR document control and is available on request.

10 Environmental Impact Assessment

10.1

The majority of the works are covered by the DCO and a full Environmental Impact Assessment has been prepared by the council and CH2M. This can be found under document reference EN1 Environmental Appraisal_Portishead Branch Line DCO Scheme_V1.xlsx

For the areas outside of the DCO, Arup have produced the following documents:

- MetroWest Phase 1 Habitat Survey (W1097B-ARP-SUR-EEN-000001)
- Environmental Appraisal Bedminster to PSJ (W1097B-ARP-REP-EEN-000001)

- Environmental Appraisal Bathampton (W1097B-ARP-REP-EEN-000002)
 - Environmental Action Plan Bedminster to PSJ (W1097B-ARP-RAR-EEN-000001)
 - Environmental Action Plan Bathampton (W1097B-ARP-RAR-EEN-000002)
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11 GRIP 3 Deliverables

11.1

The GRIP 3 deliverables can be broadly split into the following three categories

- Arup GRIP 3 design
- Signalling Design group GRIP 3 designs
- Miscellaneous supporting documents

The ARUP GRIP 3 submission is contained within the GRIP 3 Engineering Compliance Certificate.

The SDG GRIP submission is available as a separate NR document.

The NR Railsys team conducted a number of reviews, the most recent being in November 2016 and the report is available as a separate NR document.

12 Formal Acceptance of Selected Option by Client, Funders and Stakeholders

12.1