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Transport for Wales
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CVL Network

A Consultation by AIW Proposing the use of the Complex Projects Procedure for the Transformation Programme

30 June 2022

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1 Contents

2 Acronyms and Abbreviations

Acronym / Abbreviation	Meaning
ABD	The Transformation works on the section of route from Pontypridd (excluded) to Aberdare via Abercynon
AC	Alternating Current
AIW	Seilwaith Amey Cymru / Amey Infrastructure Wales Ltd
AIWAP	AIW Approval Panel
ASDO	Automatic Selective Door Operation
ATFS	Auto-Transformer Feeder Station
BAY	The Transformation works on the Cardiff Bay branch
CAR	The eastern part of the CVL network from Rhymney and Coryton through Queen Street to Cardiff Bay and Cardiff Central and on to Penarth and Barry. Also used as the overarching name for the second major phase of the works (Stage Events 5 to 9).
CASR	Cardiff Area Signalling Renewal
CFS	Catenary Free Section
CIS	Customer Information System
CTL	The Transformation works on the section of route from Ninian Park to Radyr Junction
CVL	The Cardiff Core Valley Lines is the geographic extent of the rail infrastructure network from Cardiff Bay, through Queen Street to Treherbert, Hirwaun, Aberdare, Merthyr Tydfil, Cwmbargoed, Rhymney, Coryton and Ninian Park (exclusive)
CVLICC	The Core Valley Lines Integrated Control Centre, located at Taff's Well, containing signalling and electrification control equipment and personnel
ECR	Electrical Control Room
FLIRT	Fast, Light, Intercity and Regional Train (a Stadler product) – class 756s will be used on the Rhymney Valley of the CVL Network
GSM-R	Global System for Mobile communications – Railways
IM	Infrastructure Manager – the body accountable for safe operation and maintenance of a railway network
MER	The Transformation works on the section of route from Abercynon (excluded) to Merthyr Tydfil
MPLS	Multi-Protocol Label Switching - A network of connected routers allowing connections to Signalling, Telecoms and SCADA to the CVLICC and the WROC
MV	Metro Vehicle - a Stadler tram/train vehicle - class 398s will be used on the TAM side of the CVL Network
NCN	Network Change Notice
NRT	Network Rail national Telecoms group
OLE	Overhead Line Electrification System
ORS	Operational Requirements Specification
PEN	The Transformation works on the Penarth branch
PES	Permanently Earthed Section of the OLE
PZT	Points Zone Telephone
QSN	The Transformation works on the section of route from Queen Street North Junction (excluded) to Coryton and Heath High Level
QSS	The Transformation works on the section of route from Queen Street South Junction to Llandaff

Acronym / Abbreviation	Meaning
R2P	The Transformation works on the section of route from Radyr to Pontypridd
RA	Route Availability
RHY	The Transformation works on the section of route from Rhymney to Heath High Level (excluded)
SCADA	Supervisory Control and Data Acquisition
SFO	Station Facility Owner
SPT	Signal Post Telephone
SRT	Sectional Running Time
SSP	Signalling Scheme Plan
TAM	Treherbert, Aberdare and Merthyr - the western part of the CVL Network from Treherbert, Aberdare and Merthyr Tydfil down through Pontypridd, Radyr, Cathays and Queen Street to Cardiff Bay. Also used as the overarching name for the first major phase of the works (Stage Events 1 to 4).
TfW	Transport for Wales
TfWRL	Transport for Wales Rail Ltd
THT	The Transformation works on the section of route from Pontypridd (excluded) to Treherbert
TMS	Traffic Management System
TPR	Timetable Planning Rules
TVM	Ticket Vending Machine
WROC	Network Rail's Wales Route Operating Centre located at Cardiff

3 Terms and Definitions

Access Beneficiary	A train operator who is party to a Track Access Contract with AIW
Complex Projects Procedure	The procedure set out in Condition G5 of the CVL Network Code
Consultation Period	A period for consultation with industry, as set out in the CVL Network Code, Part G, for AIW and Access Beneficiaries to consider the content of, and respond to, a Network Change Proposal
CVL Network Code	The code setting out the rules applying to all regulated access agreements for a railway Network. The CVL Network Code is available here: Core Valley Lines infrastructure manager | TfW
Establishment	The formal, documented process for approving an NCN. Once agreed Access Beneficiaries, an NCN is "Established" by the IM
Network Rail Standard	A standards document (or equivalent of such document) issued by Network Rail in relation to the type(s) of work(s) being undertaken
Pway or Permanent Way	A synonym for "Track". The Permanent Way discipline traditionally covers the entire track system above the interface with the underlying ground, earthworks or structure, including the ballast, sleepers, fixings and rails. It also includes drainage of the track system.
Rhymney valley	The eastern part of the CVL from Cardiff Central, through Queen Street to Coryton and Rhymney
Station Access Charge	As defined in the Station Access Agreement
Station Change process	As defined by the Station Access Conditions - a process to engage stakeholders regarding proposals to make alterations at stations and enter into cooperation agreements and/or compensation arrangements, as applicable

Station Facility Owner	The meaning of Facility Owner applied to the station has the meaning defined in section 17 (6) of the Railways Act 1993
Track Access Contract	An access agreement between an IM of a Network and a Railway Undertaking, which permits the operation of train service
Turnback	A siding used for terminating multiple unit passenger trains, to enable the driver to change ends and reverse their direction
Vehicle Change Process	A process to engage the other Access Beneficiaries of a Network, over proposals to introduce new vehicles to a Network and enter into compensation arrangements if applicable

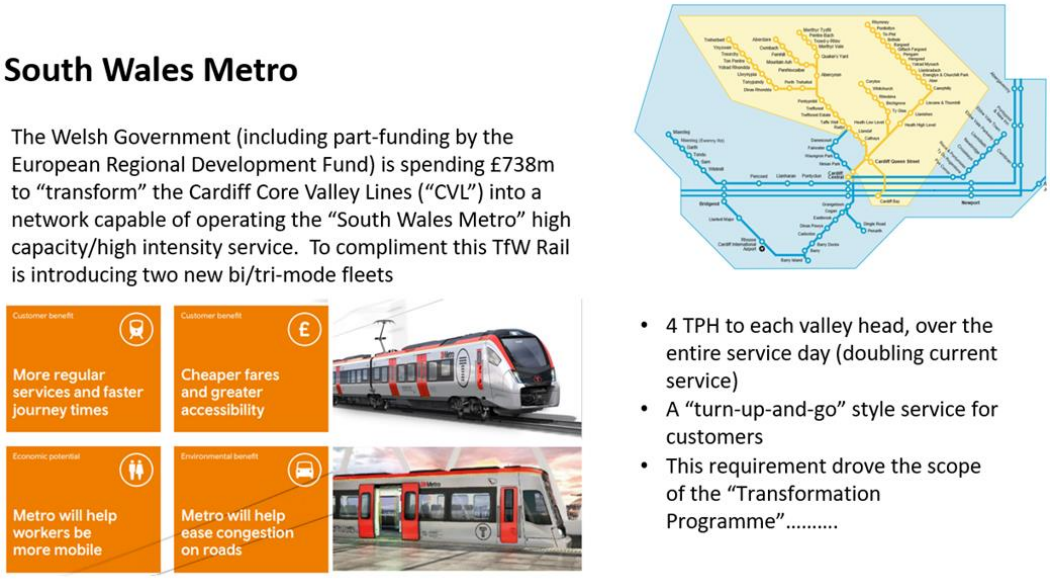
4 Background

4.1 The Welsh Government is investing heavily in public transportation and their plans for southeast Wales include the “South Wales Metro”. The South Wales Metro will be an integrated network of bus, rail and active travel that will improve connectivity and make sustainable travel easier across South Wales and the Cardiff Capital Region.

4.2 As part of this wider strategy, the Welsh Government is investing in the CVL Network to increase its capability. That capability increase will be delivered by:

- Signalling enhancements
- Track doubling
- Electrification
- Line speed improvements
- Devegetation
- Improving the sighting of signals and signs for drivers
- Creating two new stations, upgrading all other stations, and making provision for at least two further new stations in the future
- Improving accessibility including level boarding at all stations
- Creating a new tram-train fleet depot at Taff’s Well
- Creating a new Integrated Control Centre at Taff’s Well
- Conversion of the Cardiff Bay line into a non-mainline line-of-sight operation to allow tram-train operation and facilitate future on-street extensions of the network

4.3 Further information regarding South Wales Metro is available here: Metro | Transport for Wales (tfw.wales)



4.4 In addition to being the Infrastructure Manager ("IM") of the CVL Network, Seilwaith Amey Cymru/Amey Infrastructure Wales Ltd ("AIW") is working as the programme management organisation to deliver this capability increase under contract to TfW. These works are referred to as the "Transformation Programme".

4.5 The scope of AIW's Transformation Programme also includes some infrastructure works on Network Rail's Network. Those proposed alterations will be communicated separately by Network Rail, in accordance with its Network Change process.

5 Geographical Boundaries

5.1 The scope of the Transformation Programme covers the railway network from: Treherbert, Aberdare, Merthyr, Cwmbargoed, Coryton and Rhymney to the CVL West Boundary and the CVL East Boundary with Network Rail i.e., the entire Cardiff Core Valley Lines railway network (the "CVL").

5.2 A map indicating the scope and geography of the Transformation Programme is shown below:

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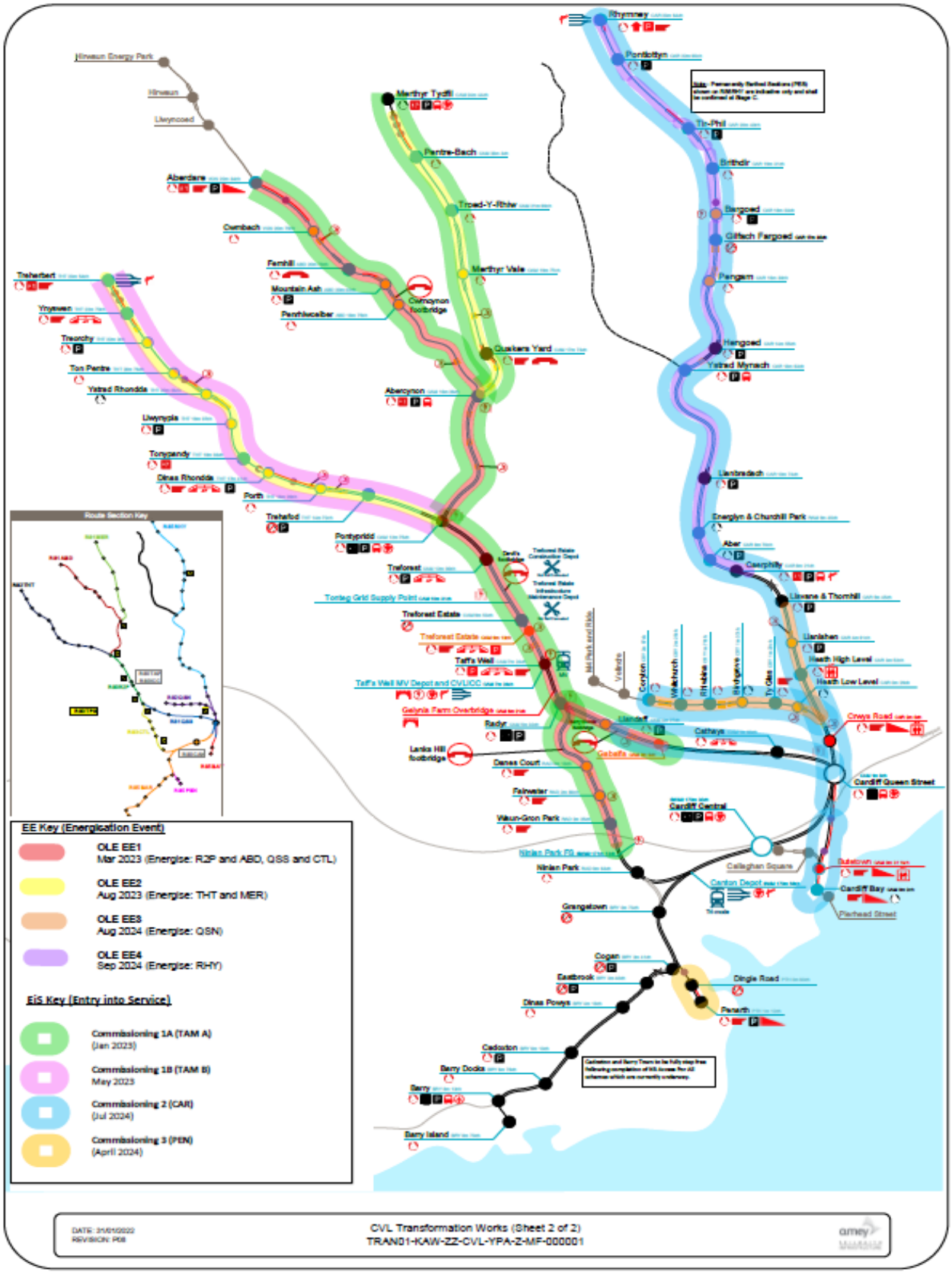


6 Justification

6.1 The reasons for increasing the capability of the CVL Network are to:

- facilitate increased, affordable access to Cardiff for the residents of the valleys region
- facilitate regeneration of the Cardiff valleys area and improved connectivity within the valleys
- provide sustainable travel choices
- provide an electrified railway in line with the Government's decarbonisation target
- increase the capacity of the existing rail network to provide a more frequent passenger train service with reduced journey times

7 Benefits

7.1 The benefits realised upon completion will include:

- improved passenger experience
- improved accessibility for persons with reduced mobility
- better National Passenger Survey scores
- increased revenue
- removal of existing diesel-only service operation, with a corresponding reduction in carbon emission
- increased access to local employment centres
- reduced road traffic congestion
- safety improvements through the closure or upgrade of several level crossings
- linking of the Butetown and Atlantic Wharf communities
- improved access to the Brecon Beacons

8 Governance

8.1 This document is the initial engagement with Access Beneficiaries, to establish the Complex Projects Procedure.

8.2 As defined by Condition G7 of the CVL Network Code, AIW will follow Condition G1 in order to consult with Access Beneficiaries and to establish changes to the CVL Network.

8.3 Consultation periods for all Network Change Notices will be in accordance with requirements defined by the CVL Network Code.

8.4 In accordance with Conditions 5.7 and 5.12 of Part G of the CVL Network Code, any variation to the scope of the Programme, including further detail to previously consulted scope, will be consulted with Access Beneficiaries.

8.5 AIW will continue to maintain close communication with Access Beneficiaries via the already established Timetable Working Group and other communication channels, so that all parties remain informed and able to influence the Programme.

8.6 Other related workstreams or forums with Access Beneficiaries are:

- Timetable Working Group (to define the effects of the line speed and other infrastructure alterations)
- Station & Rail Operations Working Group (to define the future operational requirements of infrastructure and rail services)
- Network Change consultations
- Station Change consultations
- Vehicle Change consultations
- Access Rights reviews
- Driveability reviews
- Signal Sighting Committee workshops

9 Technical Compliance

9.1 All infrastructure alterations and solutions proposed as part of the scope shall conform to industry technical standards, Network Rail standards and legal requirements, unless specific deviations or Temporary Non-Compliances are authorised through the AIW Approval Panel (“AIWAP”).

10 Application of Condition G5 – proposed use of the Complex Projects Procedure

10.1 Because of the complex interdependencies between the constituent elements of the Transformation Programme, AIW is hereby proposing to consult in accordance with Condition G5 of the CVL Network Code.

10.2 Using Condition G5 of the CVL Network Code will facilitate early engagement with Access Beneficiaries, to support finalising elements of the scope of Transformation Programme.

10.3 Using Condition G5 of the CVL Network Code will allow AIW to agree with Access Beneficiaries the outline scope in principle, with further levels of detail agreed

through subsequent Network Change consultations using Condition G1 of the CVL Network Code.

10.4 This document, the initial engagement with Access Beneficiaries, is being used to establish the Complex Projects Procedure which introduces the Transformation Programme.

10.5 In accordance with Condition G5 of the CVL Network Code, AIW will issue the Notice of Intended Scope to Access Beneficiaries, 30 days after the issue of this document.

11 Scope

The proposed scope of the Transformation Programme on the CVL Network will comprise:

11.1 Signalling enhancements to reduce headways, to increase capacity. There will also be an increase in operational flexibility. The signalling works will be delivered using UK mainline conventional Track Circuit Block (using axle counters for train detection) and multiple aspect colour light signalling. This solution will allow retention of the nearly new equipment installed throughout the Rhymney valley, as part of the previous Cardiff Area Signalling Renewal ("CASR") resignalling scheme. All CVL signals will be controlled from the CVLICC and will have the prefix "VC".

11.2 Doubling of single line track sections with new passing loops at various locations, to increase capacity. The existing Route Availability (RA) of each line will be preserved. The existing loading gauge of each line will be preserved.

11.3 Remodelling of the Cardiff Queen Street area, to increase capability. The Queen Street area will not be electrified meaning that electric trains required to pass through this area will be required to use their other form(s) of energy.

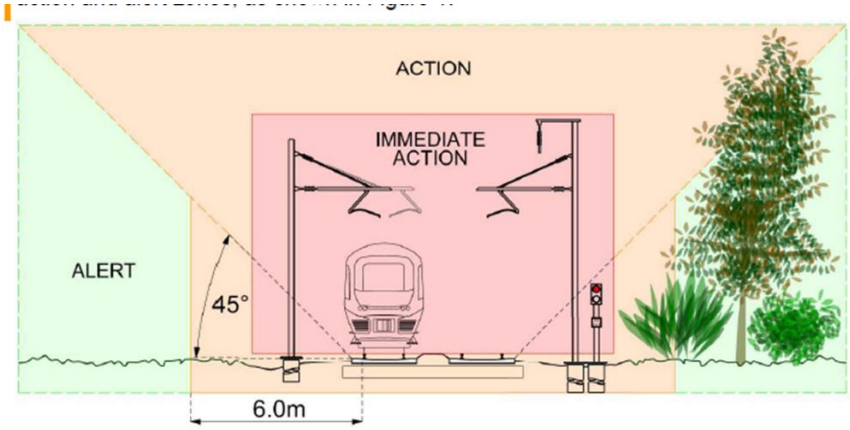
11.4 Electricity for traction will be provided via OLE at 25kV AC. The OLE system will be compatible with that currently being implemented by Network Rail across the UK, ensuring simple operational interfaces with the mainline network. The OLE system will be fed from a new substation at Tonteg and the expansion of an existing substation at Cardiff Canton/Ninian Park (which is Network Rail's infrastructure). Where existing over line structures are not high enough to allow for both physical and electrical clearances, the requirement for electrical clearance will be eliminated using either Permanently Earthed Sections ("PES") of OLE in the immediate vicinity of the structure, or catenary free sections ("CFS") with track-mounted beacons controlling pan up / pan down functionality. It is expected that there are up to 20 sites where an intervention is unavoidable due to insufficient physical clearances. As the intervention only needs to provide sufficient clearance for the implementation of a PES, these interventions will generally be a simple track lower.

11.5 An access and charging regime for the use of electricity for traction will be implemented

11.6 The traction power system will be operated from the new Electrical Control Room ("ECR") integral to the CVLICC with remote switching and protection provided. Additional remote switching will also be provided for efficient isolations. In areas that are not being electrified, electric trains passing through these areas will be required to use other form(s) of energy. Trains transitioning between electrified and non-electrified areas will be required to read a track-mounted beacon to enable their auto pan-up/pan-down capability.

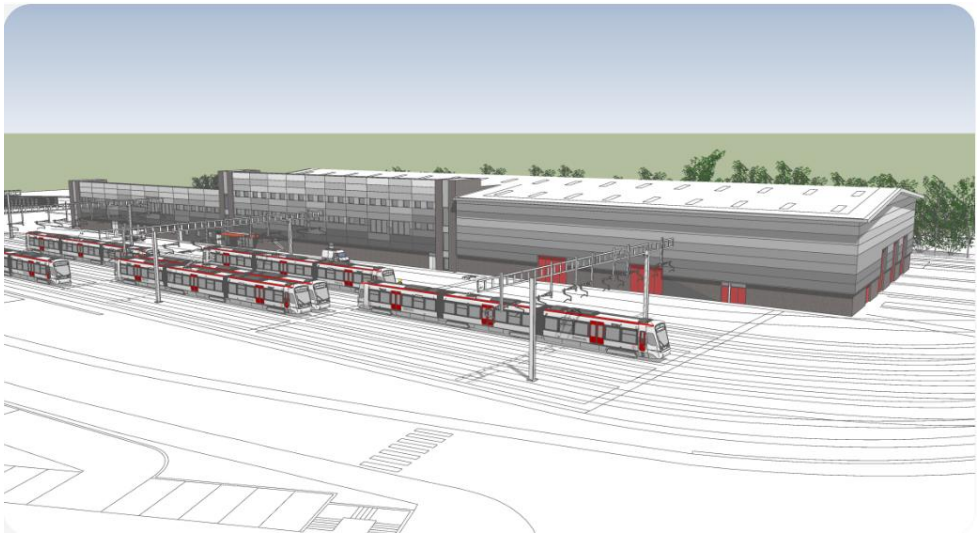
11.7 Line speed alterations will be undertaken at many locations, to enable the signalling headway improvements and provide for reduced journey times for trains compliant with GKRT00075 Appendix C. These alterations will also improve overall resilience and reduce perturbation.

11.8 An extensive programme of vegetation clearance will be executed to facilitate electrification. A diagram taken from Standard NR-L2-OTK-5201-MOD 2 ISSUE 3 is shown below to indicate the clearance work required for electrification and ongoing maintenance:



11.9 Compliant sighting of signals and signs for train drivers will be achieved through a collaborative approach to signal sighting by the Signal Sighting Committee ensuring that all signals and signs are placed at optimum positions.

11.10 A new fleet depot for the class 398 MV tram/train vehicles is being created at Taff's Well on a brownfield site. Alterations to the road layout and the creation of a new road-over-rail bridge at Ffordd Bleddyn will facilitate the creation to a new double-track connection to the depot, from the existing line to the south of Taff's Well station. Once built and commissioned, the depot will be operated by TfW Rail Ltd. and therefore, a new Connection Contract will be entered into between AIW and TfW Rail Ltd. Signals within the depot will be controlled from a separate Taff's Well depot workstation within the CVLICC and will have the prefix "TW". In addition to being a maintenance facility, the site will have stabling sidings with 25Kv AC OLE available for the re-charging of MV tram/train units.



11.11 A new Integrated Control Centre at Taff's Well (the "CVLICC") will provide an integrated traffic management centre which will include the strategic and tactical command, control and communications functions. The signalling and electrification systems will be integrated through a modern Traffic Management System ("TMS"). Comprehensive cross-boundary indications will allow the efficient hand-over of train services from WROC to/from CVLICC at the CVL boundaries. The retention of GSM-R will ensure communication between driver and the correct signaller are seamlessly established. New operating procedures will be provided in accordance with the Operational Requirements Specification ("ORS"). Network Rail will retain signalling and control of their infrastructure from a fringe at Danes Court on the City Line, throughout Cardiff Central and everything to the southwest of Cardiff Queen Street. Network Rail will continue to provide the attribution of delays as a service, by its attribution team based at the WROC. The picture below shows the CVLICC under construction:

11.12 Works will be undertaken at 13 under bridges to facilitate the track doubling and maintain the existing RA over each structure.

11.13 Works to lower the track at 17 locations will be undertaken to facilitate OLE works under low bridges. The existing loading gauge will be preserved.

11.14 The programme of station improvements will include new and refurbished toilets, waiting rooms, shelters and the installation or upgrade of help points, CCTV cameras, Ticket Vending Machines ("TVMs"), smart ticket validators, Wi-Fi and CIS screens at all CVL stations. New footbridges will be provided at three stations to provide access to new platforms and a further seven new footbridges will be provided for improved accessibility at existing platforms or to facilitate level crossing closures. Platform extensions will be implemented at six stations (nine platforms in total) in addition to the 17 new platforms to service the new passing loops, double-tracking and new stations.

11.15 Support for Automatic Selective Door Operation ("ASDO") is to be provided.

11.16 Level boarding will be provided at all stations, to improve accessibility. The level boarding will complement the new fleets being introduced, namely: class 398 MV tram/trains on the TAM side and class 756 FLIRT trains for the Rhymney Valley. The existing loading gauge will be preserved.

11.17 A comprehensive programme of level crossing risk assessments has been undertaken. Several high-risk level crossings will be closed and replaced with alternative means whilst others will be upgraded to ensure risks are reduced so far as is reasonably practicable.

11.18 Enhancements to the telecommunications system will include the installation of a new fibre backbone telecoms network across the CVL Network. A new network based on MPLS technology will then be connected to this fibre backbone, to interconnect signalling, telecoms and SCADA systems to the CVLICC, along with the Station Facility Owner's ("SFO") station systems connectivity. The existing GSM-R network will be retained throughout the CVL and provided as a regulated commercial service by the Network Rail national Telecoms group ("NRT"). New signaller-end GSM-R equipment will be provided within the CVLICC.

11.19 A review of the lineside telephony arrangements has been undertaken and it is proposed to remove the majority of the Signal Post Telephones ("SPT") and where they exist, Points Zone Telephones ("PZT"), with the proposal that primary driver to CVLICC communication be undertaken using in-cab GSM-R phones.

11.20 For the Cardiff Bay line[1] specifically, the track will be doubled, to increase capability. The existing turn-back-north facility (which currently exists by shunting

[1] Queen Street South Junction exclusive to Cardiff Bay inclusive

trains out onto the Bay line) will be preserved and will be available within Queen Street South Junction (and will be subject to the same existing operational requirements). To increase capacity and facilitate the operation of MV tram/train vehicles:

- the regulatory status of this line will be changed to “non-mainline” during 2023 and
- from mid-2024, the style of operation will become line-of-sight with tram style signalling on the lineside. This means that only tram-train capable vehicles will be able to access the Bay line from this time.
- A new station will be provided at Butetown.
- Two new footpath crossings will be provided to link the Butetown and Atlantic Wharf communities
- The Bay line will be electrified with 25kV AC OLE from Butetown to Cardiff Bay inclusive, with safety ensured at the new footpath crossings through elevated wire heights in accordance with standards for mainline level crossings.
- Provision is being made at Butetown station to allow for a future extension of the tram system, onto the highway environment toward Callaghan Square.
- Passive provision is being made at Cardiff Bay station for a third platform which will allow for a future extension of the tram system, onto the highway environment toward Pierhead Street.
- The conversion of the Bay line into a line-of-sight with tram/train style of operation will create a transition between the existing CVL mainline rail network and a future[2] tram operation on the streets of Cardiff.

[2] currently not part of the CVL Transformation Programme although the Welsh Government is actively raising funds to provide for the on-street operation of the MV tram/train vehicles

12 Possessions

12.1 Possessions will be planned in accordance with the CVL Network Code Part D process, whilst providing minimal delays and impact to train and freight operators during construction and between stages.

12.2 Indicative possession plans developed from the staging strategy are attached and outline the various possession requirements. The project will be delivered using overnight All Line Blocks which will be required six nights per week, plus various blockades throughout 2022-2024. The remainder of the construction will aim to be completed off track / clear of the operational railway. Further details will be provided in the relevant Network Change Notice.

12.3 The possession plan is subject to change throughout the lifecycle of the project. Any changes shall be processed and agreed in accordance with the CVL Network Code Part D.

13 Staging Strategy

13.1 The CVL Transformation project will be delivered in distinct stages. These stages are detailed in Appendix B.

14 Network Change Notices

14.1 The physical infrastructure alterations will be implemented using a staged migration approach. Each infrastructure change will result in a changed configuration state of the Network and so each proposed change, will be communicated via a Network Change Notice, under the Complex Projects Procedure. In practice, the process at this point is identical to a Network Change as set out in Condition G1.

14.2 The stages are listed in Appendix B, where each will require a Network Change Notice to be issued

14.3 In addition, there are other changes required which will be subject to the Network Change process, including:

- Changes to operating procedures and operating instructions
- Change of status of the Cardiff Bay line to non-mainline
- Change of operation of the Cardiff Bay line to a line-of-sight/tram operation
- Implementation of an access and charging regime for the use of electricity for traction
- Changes to Timetable Planning Rules (“TPRs”)

15 Timetable Change

15.1 Alterations to the CVL Network described herein will mean that the Train Planning System will have to be altered to reflect the new configuration of the Network, at each commission stage. New Timetable Planning Rules ("TPRs") associated with changes to the CVL Network will be develop by the Timetable Working Group and then consulted/implemented in accordance with the CVL Network Code Part D.

15.2 Calculations for new SRTs ("Sectional Running Times") and the other TPRs will be delivered by Network Rail's Advanced Timetable Team and the TPR Specialists, on AIW's behalf. These calculations will be based upon the Signalling Scheme Plans ("SSPs") provided by the AIW design team.

15.3 Performance modelling will be undertaken and will be used to inform Network Change Notices.

15.4 New TPRs and SRTs proposed for the CVL Network will be incorporated into Network Rail's normal timetable change TPR consultation process.

Appendix A – Signalling Scheme Plans

The Signalling Scheme Plans for the TAM side of the CVL Network are listed below and are attached:

- 19-CVL-04_01 A02_Merthyr SSP_AFC
- 19-CVL-04_02 A03_Aberdare SSP_AFC
- 19-CVL-04_03 A01_Treherbert SSP_AFC
- 19-CVL-04_04 A02_Abercynon SSP_AFC
- 19-CVL-04_05 A01_Pontypridd SSP_AFC
- 19-CVL-04_06 A01_Radyr SSP_AFC
- 19-CVL-04_07 A01_City Line SSP_AFC
- 19-CVL-04_08 A01_Llandaff SSP_AFC

Further Signalling Scheme Plans for the Rhymney Valley, the Cardiff Queen Street area and the Cardiff Bay line will be supplied shortly.

Appendix B – Stage Activity Strategy

The CVL Transformation will require several stages, prior to increased passenger services taking place and the following sets out the high-level proposed stages at this time:

Stage Activity Name	Date
Stage Event 1 - Testing & Commissioning TAM Phase 1 (R2P, ABD, MER & CTL) Inc CVLICC	Jan / Feb-23
Stage Event 2 - OLE Energisation R2P, ABD, QSS & CTL (Waun Gron and Llandaff to Aberdare via Radyr and Pontypridd))	Mar-23
Stage Event 3 - Testing & Commissioning TAM Phase 2 (THT) Inc CVLICC	May-23
Stage Event 4 - OLE Energisation MER, THT (Abercynon to Merthyr and Pontypridd to Treherbert)	Jul-23
Stage Event 5 - Phase 2 Testing & Commissioning CAR (QSS, QSN, PEN & RHY)	Jul-24
Stage Event 6 - OLE Energisation QSN (Queen St to– Coryton and Lisvane & Thornhill)	Aug-24
Stage Event 7 - OLE Energisation RHY (Caerphilly to Rhymney)	Sep-24
Stage Event 8 – Commissioning of the Bay line as a non-mainline line of sight light rail system	Dec-24
Stage Event 9 – Increased Passenger Services (4tph to the heads of the valleys at Treherbert, Aberdare, Merthyr, Coryton & Rhymney)	May-2025