



# **Magor and Undy Walkway Station**

EG3/4 Preliminary System Definition

23 May 2018



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# 1 General Description of the System

The scope of the project involves the development of a new walkway station located in the villages of Magor and Undy. The new station is to be located in between both villages, at approximately 150miles and 60 chains on the South Wales Main Line (ELR: SWM2) between Newport and Severn Tunnel Junction stations. The proposed location of the station is south of the B4245/Main Rd, at its closest point with the rail corridor. The two side platforms are to be located along the outside of the relief lines, which in turn are on the outer side of the rail corridor, with the main lines in between them. This station is proposed to be a Category F unmanned station.

The platforms are anticipated to be to Network Rail Standard design details and currently proposed to be approximately 150m in length in order to accommodate a variety of train car lengths. The platforms will be open air, with platform furniture such as lighting, benches, CCTV and waiting shelters as appropriate. No ticket office building is proposed and as such ticket vending machines and customer help points will be provided. Access to the station is anticipated to be provided by the existing subway or footbridge, with modifications as required to provide step-free access from a disabled drop off point. These details are to be developed further at GRIP 3.

## 2 Purpose

As detailed in the GRIP 1 and 2 report, the main objective of the scheme is to introduce a new station at Magor and Undy to serve residents, providing better connectivity to the South Wales Main Line. It also aims to reduce traffic through Magor and car commuter trips through the introduction of an additional stopping service within walking distance of the majority of the area of the villages of Magor and Undy.

### 2.1 Magor Action Group On Rail (MAGOR)

MAGOR is a local community action group based in Magor and Undy, formed to promote the construction of a new station to serve Magor and Undy. The MAGOR group presented their constitution in June 2013. It states the aims of the group, presented below:

1. To work towards the provision of a station and rail services to serve the residents and those who travel to the Magor and Undy area.
2. To represent the interests of users and potential users of rail (including light rail or tram) services in the area and aim to minimise the impact on any people who may be adversely affected.
3. To raise awareness, encourage and promote the use of rail travel for residents, visitors, business users and tourists, including supporting tourism/leisure, community development projects and local businesses; therefore enabling local communities to increase their economic, social and environmental welfare.
4. To foster and encourage sustainable transport and work towards maximising transport integration with the rail services for the Magor and Undy area.
5. To seek to build and maintain good working relationships with the rail industry companies, the Welsh Government, the South East Wales Transport Consortium, County and Local councils and other stakeholders as necessary.
6. To liaise, work with, or form partnerships with other user groups and organisations where this could be beneficial to the other aims of the Group.
7. To increase community involvement with the railway, by bringing together a range of local people and organisations who share the above aims.

## 3 Functions and Constituent Systems

As part of the project, there are several constituent systems that will require modifications or will be affected by the changes. These will be impacted as follows:

### 3.1 Infrastructure

#### 3.1.1 Track

As stated in the GRIP 2 stage, an alignment design may be required to support the platform design to address deviations in the vertical alignment, unless it is addressed by subsequent maintenance tamping.

#### 3.1.2 OLE Masts

OLE is currently being introduced at the location where the station is proposed as part of the Great Western Route Modernisation (GWRM) Project. It is likely the masts/gantries will interfere with the proposed platform locations and as such, modifications to the OLE system may be required to ensure the required clearances are available.

#### 3.1.3 Platforms

Two new platforms are to be introduced, as part of the project, along the cess side of the relief lines. These are proposed to be staggered to avoid infrastructure changes to the existing signalling gantry. Platform details are to be developed at GRIP 3 stage to consider required widths and platform arrangement to accommodate passenger numbers and evacuation requirements.

#### 3.1.4 Mechanical, Electrical and Telecom systems

There will be new M&E and telecoms equipment required for the new station. These requirements will be developed as part of the further development of the scheme through the relevant GRIP stages. At this stage, the extent of the M&E and telecommunication equipment is anticipated to be limited to the proposed station boundaries and step free access route. A Distribution Network Operator (DNO) equipment or system upgrade may be required if there is not sufficient supply to the vicinity.

#### 3.1.5 Station Access points and Crossing the track

Ramps will be introduced on both platforms to provide step free access. Existing ramps leading to the subway are too steep and therefore may require modifications to be used as a step free route to the platforms.

The existing subway under the tracks does not provide the headroom stated on the Department for Transport (DfT) Accessible Station guidance, and the current headroom and width are not in line with current DMRB standards. Modifications to the subway headroom will be required unless a derogation can be given. The structure shows signs of damp indicating the waterproofing may need to be addressed as part of any modifications.

#### 3.1.6 Signalling

The area is controlled from the Cardiff Signalling Control Centre, which employs Visual Display Unit (VDU) technology. The VDU will require updating to account for the new station being introduced. Any modification on the signalling system will also require updates to the VDU.

At this stage, is it not anticipated that any changes will be required to the existing signalling infrastructure at the proposed station location.

### 3.1.7 Culverts

There are two existing culverts carrying Bridewell Brook and Mill Reen (as per 5 mile plan) under the tracks near the area where the stations are expected to be located. These will likely require assessments and design of the platforms will need to take their location and construction into consideration.

## 3.2 Operations

### 3.2.1 Timetable

There will be additional running time associated with the introduction of the stop at Magor and Undy. Further review will be required as the design develops to suitably consider perturbed services and emergency operational procedures that may be impacted by the introduction of an additional stop at Magor and Undy.

The timetables will likely change following the tender for the Wales and Border franchise, and the completion of the Great Western Electrification to Cardiff therefore should be reassessed as the design develops.

### 3.2.2 Station Operation

Following conversations with Arriva, the current Train Operating Company (TOC) for the route, the assumption would be that the station Magor & Undy would be a DfT category F (small unmanned) station. As such, there would be no staff required to operate at the station.

Further discussion will be required with the new Operator and Development Partner (ODP) is selected following the tender of the Wales and Border franchise to confirm this assumption.

## 3.3 Maintenance

The addition of a new station will increase the number of assets to be maintained by the Train Operating Company and the levels of maintenance in the area by Network Rail. Network Rail will have to include the station as part of its maintenance schedule/programme.

Alterations to the subway will potentially increase its use by passengers and general public. The anticipated changes will include new lighting and CCTV cameras which would require more frequent maintenance.

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## 4 Boundaries and Interfaces

### 4.1 Geographical Boundary

The existing Network Rail land ownership boundaries dictate the geographical site boundaries. There is the potential for additional land to be acquired to allow for the provision of disabled parking, drop off areas, step free access routes (ramps to the platforms and the subway). The GRIP 2 report highlights the land plots located around the station that could be required.

### 4.2 Permanent Way

It is likely that the relief lines will require modifications to allow for the running of services up to the station. The boundary for the works on the permanent way will be confirmed at later design stages once the extent of any modifications required to the track line and level have been confirmed.

There will be an interface between the permanent way and the proposed platforms. The track alignment will dictate the platform alignment through the required offsets from track to platform edges in line with the Network Rail standard design details.

### 4.3 Operations

At GRIP 2 stage, an operational review was undertaken to look at the effects of stopping services at the proposed station. The review considered the area between Severn Tunnel Junction and Newport stations to calculate the technical running times (TRTs) and sectional running times (SRTs).

Similarly, the timetable analysis in the GRIP 2 report considered services originating from Gloucester and Patchway in the east and Cardiff Central in the west.

It is expected that the majority of passengers using the proposed station will be from the villages of Magor and Undy.

### 4.4 Signalling

It is anticipated that an update to the Cardiff Signalling Control Centre, which employs VDU technology, will be required to include the new station. With regards to the actual signals, these are not expected to be moved and as such the remaining infrastructure for the system will remain unchanged.

The preferred platform arrangement identified in the GRIP 2 study is for a staggered platform arrangement, suitably spaced to co-ordinate with the existing signalling gantry and align with best practice of not locating a signalling gantry directly before a station.

### 4.5 OLE

The OLE structures being constructed as part of the GWRM project may require some modifications to provide compliant clearances from proposed platforms to electrified equipment. There will be some earthing & bonding required to structures at the station as the section of tracks is being electrified. Details for these will be confirmed at later stage.

## 5 Environment

The environment in which the new station will be operational is described in the following sections.

The people that will likely be around the system can be grouped into:

- Customers using the station
- Members of the public including children using the existing footpath/subway and adjacent highway()
- Neighbours/adjacent landowners
- Maintenance staff (Network Rail and related contractors)
- Operational Staff (TOC staff and related contractors) including train crew

The local climate based on the Met Office Usk climate station:

- Average annual Max/Min Temp (°C) 14.8/5.7
- Annual days of air frost – 45.9
- Annual sunshine hours – 1427.9 (total)
- Annual rainfall in mm – 1076.9 (total)
- Annual days of rainfall (larger or equal to 1mm) – 134.7

### 5.1 Relevant physical environment condition

#### 5.1.1 Water courses

A review of the Natural Resources Wales' website identified a number of main rivers in close proximity to the site, the closest being the River Prat and Bridwell Reen which run south of the railway line. In addition, there are numerous ordinary watercourses present within close proximity to the site in the form of an extensive reen system that forms part of the Caldicot Levels. The Mill Reen is present west of the signal gantry, close to the location of the option 1 for the eastbound platform outlined in the GRIP 2 study.

#### 5.1.2 Flooding

The Natural resources Wales online flood map indicates that the site has a risk of flooding from rivers of the sea (between 1 in 1000 and 1 in 100). The area west of the signal gantry and north of the tracks is susceptible to "medium" risk of flooding from surface water.

#### 5.1.3 Geotechnical Details

The following section is based on information provided by Network Rail as part of an investigation undertaken for the Great Western Electrification Project.

##### 5.1.3.1 Published Information

The British Geological Survey (BGS) GeoIndex online application indicates that the drift geology underlying the site is a mixture of Head Deposits to the north, comprising clays, silts, sands and gravel, and Tidal Flat Deposits to the south, comprising clays and silts. These are predominantly consolidated soft cohesive materials. The underlying solid geology is the Black Rock Limestone Subgroup comprising packstones, mudstones and limestones. The Mercia Mudstone Group (Marginal Facies) outcrops to the east of the site, comprising of conglomerates.

### 5.1.3.2 Existing Ground Investigation Information

Two ground investigations are pertinent to the site (relevant exploratory hole references in **bold**):

- Structural Soils, Final Factual Information on Ground Investigation for GWRM Section F – Severn Tunnel Junction to Llandavenny Road, Report No: 730064, November 2015.  
**GWRM-F-BH09, GWRM-F-CPT04, GWRM-F-DP41, GWRM-F-DP42**
- Geotechnical, Undy Halt Footbridge – Factual Report on Ground Investigation, Report Re: 30374, May 2015.  
**BH02, BH03, WS01**

Made ground is encountered in all exploratory holes to depths ranging from 1.20m to 3.00m. Below this, some clay is encountered prior to reaching the underlying Tidal Flat/Head Deposits. Limestone bedrock is encountered below the superficial deposits, and is described as very weak.

Further, targeted investigation in the locations of the proposed platforms and station access will be required to inform the design development.

## 5.2 Existing assets

### 5.2.1 Subway

The existing subway provides less than the 3m recommended clearance detailed in the DfT Design for Accessible Stations Code of Practice and the access ramp leading from the pavement to the subway steeper than that outlined. The waterproofing of the subway has deteriorated and allows for damp spots throughout. This issue may need to be addressed in order to use the subway as the main step free access between platforms.

### 5.2.2 OLE Masts and associated elements

The electrification of the mainline is currently underway, and whilst there are no masts installed now, it is expected that these will be introduced before the end of 2018. As such, the masts and wire configuration will need to be reviewed as construction progresses and design co-ordinated as appropriate.

## 5.3 Maintenance environment.

A new platform could provide access to the tracks from the existing platforms by the introduction of gated ramps or steps to the tracks. Vehicular access to the station can be provided by the existing roads. Structural inspection will likely involve working on the line to access the face of the platform, or working within 1.25m from the platform edge.

Maintenance of any additional infrastructure required at the station will likely be accessible from platform level or from publicly accessible areas.

## 6 Safety Measures and requirements

Currently, a boundary fence is present along the Network Rail boundary to prevent unauthorised access to the railway line. The existing footbridge has 1.8m high parapets to provide suitable separation of pedestrians from the OLE infrastructure due to be installed, and the entrances to the subway have high fence lines and anti-climb fences to prevent unauthorised access.

The key risk following completion of the new station will be the introduction of public access adjacent to the live railway. The design should be developed to accommodate appropriate platform widths and platform edge warning. The design should be developed in collaboration with the ODP in order to agree operational procedure to minimise the risk of unauthorised access at the station.

It is anticipated that further monitoring to mitigate risks will be required during the temporary construction phases of the project. These will need to be developed further to understand the risks and how they can be mitigated as part of the design development.

The new station and associated infrastructure are all to be design to relevant standards and TSIs. Hazard records are to be maintained throughout design phases. Further information of safety measurements and requirements are to be detailed as design progresses. A hazard log has been developed and will be considered to be a live document throughout the design process.



# 7 Assumptions

The design is still in the early stages of the development. An assumptions log will be created and maintained as the design progresses. These assumptions will need to be reviewed and validated with the stakeholders including Network Rail, Monmouthshire County Council, MAGOR and the ODP/TOC.

## 7.1 General

- The design assumes no changes to signalling layout. No new signalling required for station and no issues regarding signal sighting (signal sighting activity included within design and project management costs).
- GWRM project will be completed ahead of the station design being completed and as-built information will be made available.
- One customer help point, one customer information system and one ticket vending machine will be provided per platform. Additional customer information system will be provided at each station entrance.
- All telecommunications systems are networked back to the control centre.
- Secondary means of escape from platforms assumed to be via steps at ends of platforms onto safe cress area.
- The existing subway condition is suitable for modification. Further investigation and assessment of the structure will be required to confirm existing structural arrangement and condition.
- Existing maintenance/operation arrangements can be extended to the station

# Appendices

A. Railway Subsystems

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# A. Railway Subsystems

Item No	Railway subsystems – structural area						
	Level 1	Level 2	Level 3	Level 4	Level 5		
1.01.01.01	Trackside command, control and Signalling	Signalling	Mechanical	Signals	Semaphore		
1.01.01.02					Shunt signals		
1.01.01.03					Other		
1.01.02				Point ends	Mechanical		
1.01.03				Track circuits			
1.01.04				Interlocking / frames			
1.02.01.01				Multiple aspect	Signals	Signals	Colour light (main aspect)
1.02.01.02							Position lights
1.02.01.03							Other
1.02.02					Location cases & cabling		
1.02.03.01			Point ends			Point machines	
1.02.03.02						Clamp locks	
1.02.03.03						Other	
1.02.04.01			Train detection			Track circuits	Track circuits
1.02.04.02							Axle counters
1.02.04.03							Other
1.02.05			Location cases				
1.02.06			Electrical supplies				
1.02.07.01			Interlocking				Relay
1.02.07.02							SSI / CBI
1.02.07.03	Other						
1.02.08	Signal power supplies						
1.02.09.01	Train protection systems				TPWS		
1.02.09.02					AWS		
1.02.09.02					ATP		
1.02.09.02				Other			
1.03		RETB					
1.04		ETCS					
1.05		Control centres (inc PSB, etc)					
1.06.01		Level crossings		Gated – operated by railway staff			
1.06.02				MCB			
1.06.03				MCB-OD			
1.06.04				ABCL			
1.06.05				AOCL			
1.06.06				Open crossing			
1.06.07				User worked crossing for vehicles			
1.06.08				Footpath and bridleway crossing			
1.06.09				Station foot crossings			

Item No	Railway subsystems – structural area					
	Level 1	Level 2	Level 3	Level 4	Level 5	
1.07.01	Trackside command, control and Signalling	Signalling	Miscellaneous	TWS		
1.07.02				Hot axle box detector		
1.07.03				Wheel flat detector		
1.07.04				TASS balise		
1.07.05				Train describer		
1.07.06				Rock fall detection		
1.07.07				Other		
1.08				Other (inc signage)		
2.01.01		Telecoms	Line side telephone system	Signal post		
2.01.02				Track		
2.01.03				Other		
2.02.01			Radio systems	GSM-R		
2.02.02				CSR		
2.02.03				Other		
2.04.01			Data transmission systems	DNO		
2.04.02				Global crossing		
2.04.03				Other		
2.05				Station information & security systems		
2.06				DOO equipment		
2.07				Other (inc signage)		
3.			On board command, control and Signalling			
4.01.01	Energy	Electrification	Contact systems	25kV OLE DC systems		
4.01.02				750v DC third rail systems		
4.02			Distribution systems			
4.03.01			Plant	Tunnel lighting		
4.03.02				Points heating		
4.03.03				Generators & standby power supplies		
4.03.04				Other		
4.04				Other (inc signage)		
5.01	Infrastructure	Track	Plain line			
5.02			Switches & crossings			
5.03			Directly fixed track			
5.04			Buffer stops & train arrestors			
5.05			Speed signage			
5.06			Track drainage			
5.07			Line side fencing			
5.08			Track access point			
5.07			Other			

Item No	Railway subsystems – structural area					
	Level 1	Level 2	Level 3	Level 4	Level 5	
6.01.01		Buildings & civil engineering	Bridges	Over line bridges		
6.01.02				Under line bridges		
6.01.03				Footbridges		
6.01.04				Culverts		
6.01.05				Other		
6.02.01			Earth structures	Cuttings		
6.02.02				Embankments		
6.03.01			Tunnels	Bored tunnels		
6.03.02				Covered ways		
6.04.01			Retaining walls	Gravity		
6.04.02				Cantilever		
6.04.03				Embedded		
6.04.04				Reinforced earth		
6.05			Platform structures			
6.06.01.01			Buildings	Station buildings		Building fabric
6.06.01.02						Building services
6.06.01.03						Architectural finishes
6.06.02				Train sheds / canopies		
6.06.03				Equipment buildings / enclosures		
6.07			Track slabs (directly fixed track)			
6.08			Under track crossings (UTX)			
6.09.01	Equipment support structures	Signalling				
6.09.02		Traction power (OLE)				
6.10.01	Drainage	Surface water				
6.10.02		Foul water				
6.11	Other					
7.01	Rolling stock	Locomotives and power heads				
7.02		Electric or diesel multiple units, power units and railcars				
7.03		Passenger coaches and light freight wagons				
7.04		Heavy freight wagons				

Item No	Railway subsystems – functional area			
	Level 1	Level 2	Level 3	Level 4
8.	Operation and traffic management			
9.	Maintenance			
10.	Telematics applications for passenger and freight services			

