

Patchway Gap Drainage Renewal

03rd July – 06th July 2024 & 12th June 2025

BSW, 07m0990y – 07m1220y, Down

Mark Dennis Howells BEng (Hons) IEng MPWI Senior Asset Engineer (Drainage) Western Route, Network Rail

All photographs by author unless otherwise stated

Background

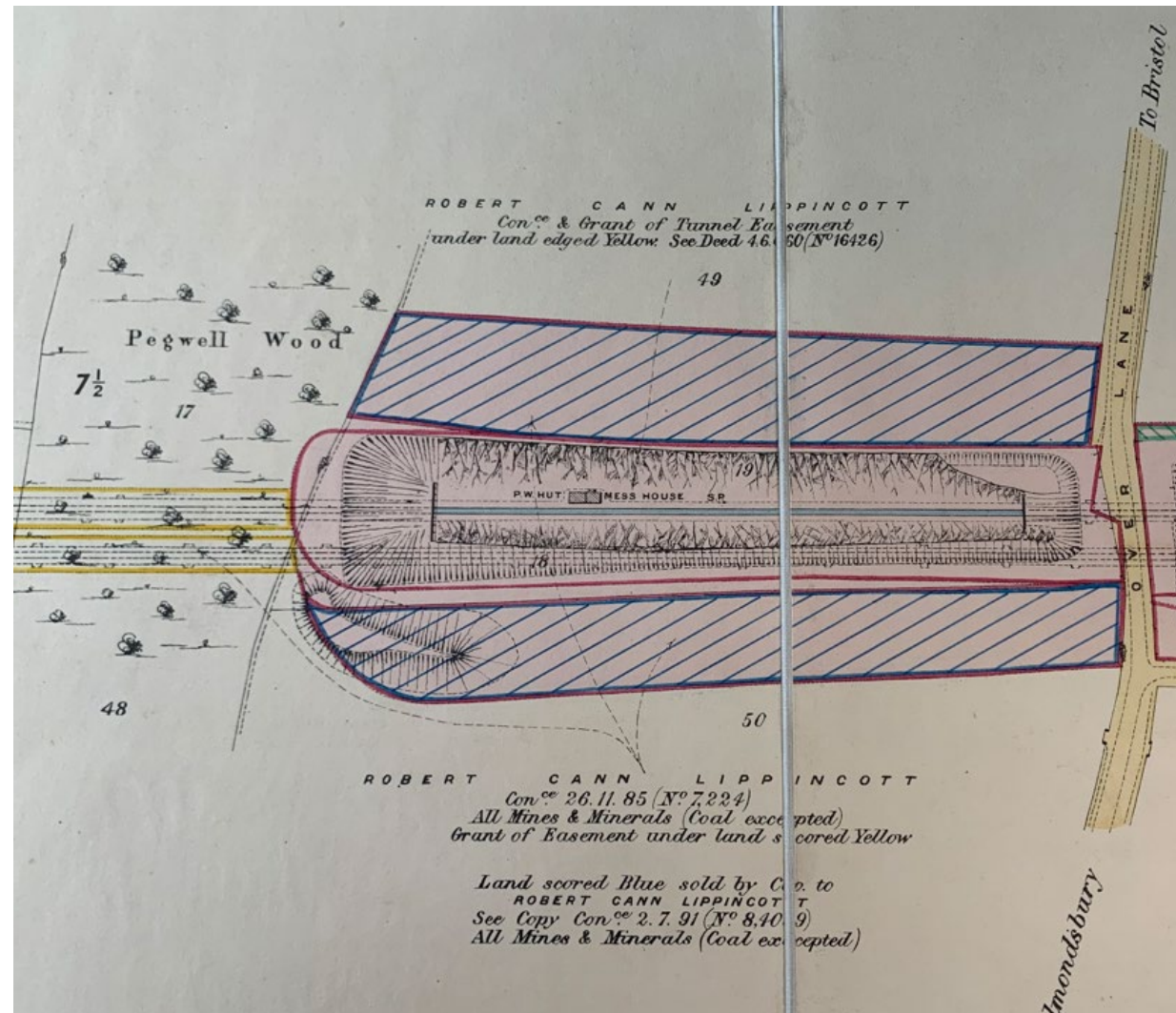
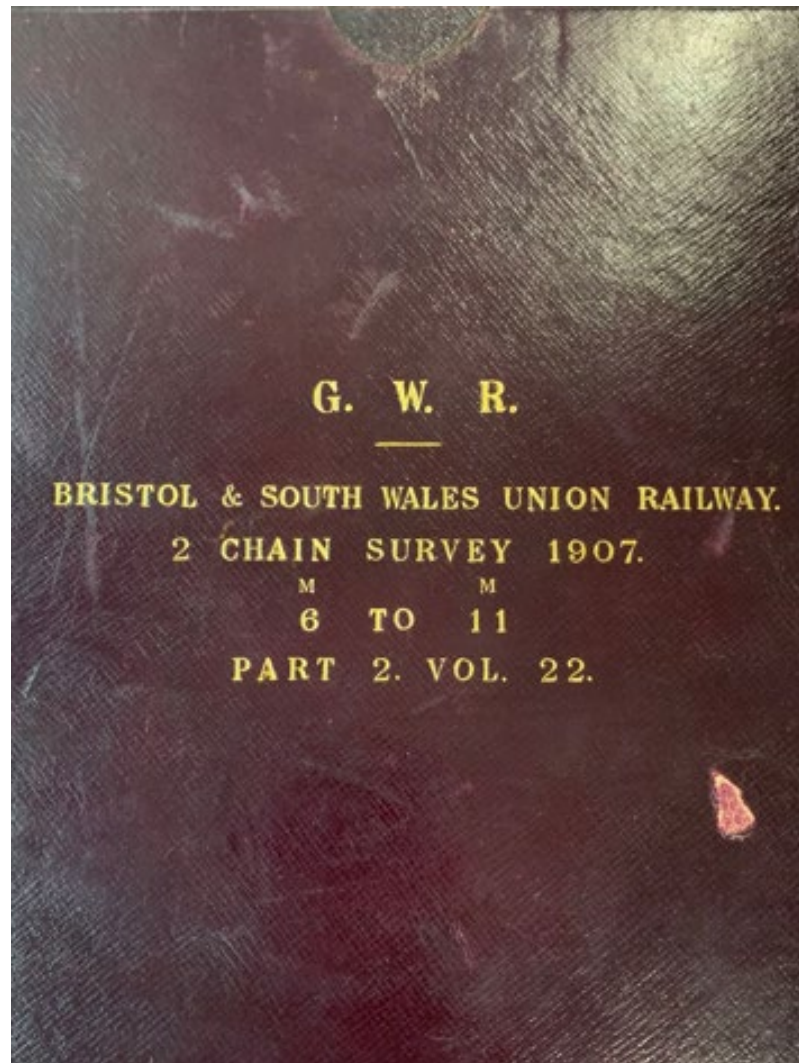
The Patchway Gap exists between 2no tunnels, namely Patchway Old Tunnel and Patchway Short Tunnel located between Patchway station to the East and Pilning station to the West.

The tunnels at this location date to the construction of the railway in 1864 and were excavated through some very challenging strata including Millstone Grit through Patchway Old Tunnel and Carboniferous Limestone within Patchway Gap and Patchway Short Tunnel.

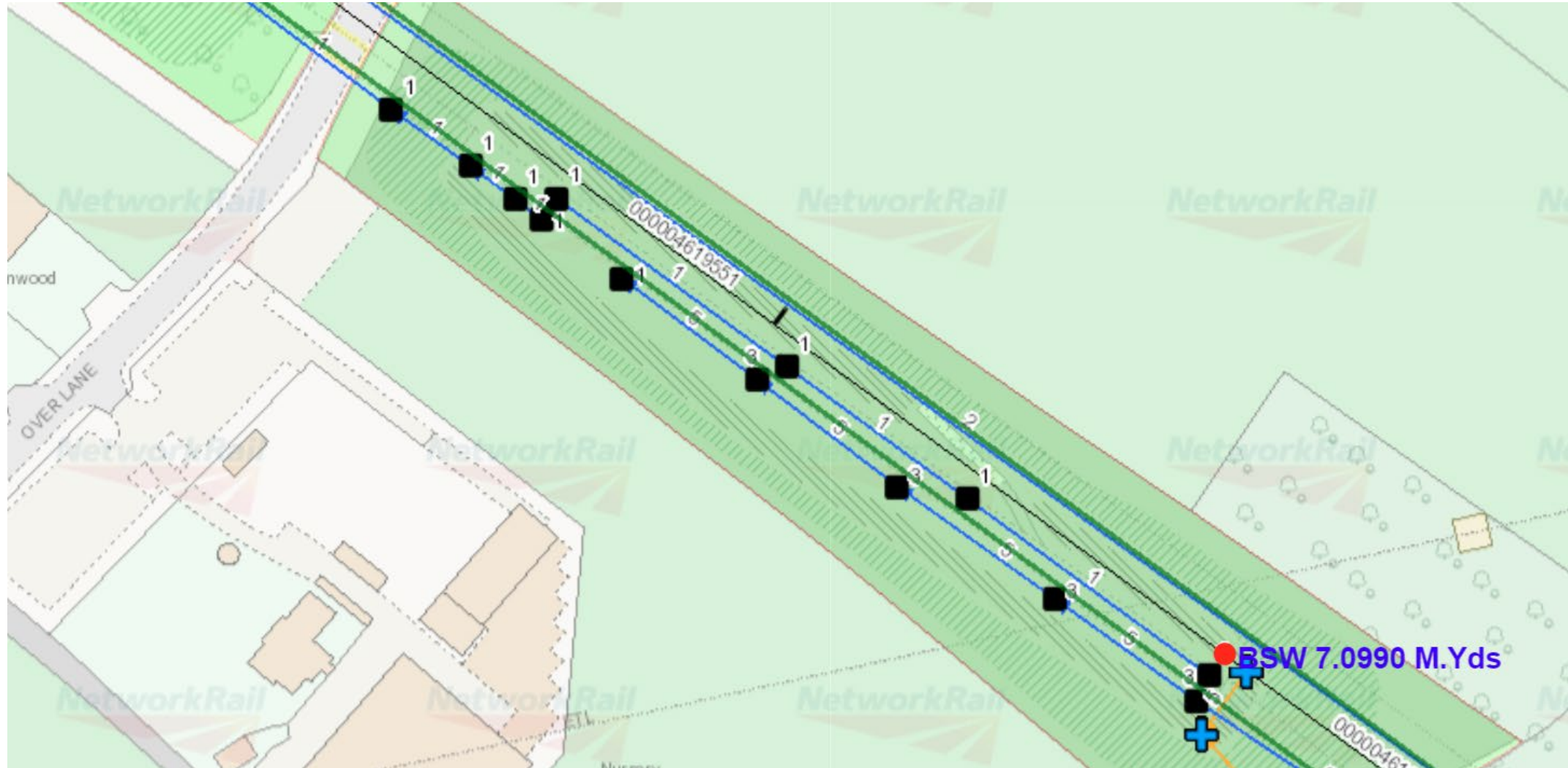
The drainage system had been investigated in February 2018 and found to be defective with mass siltation and structural failures due to installation of OLE foundations by previous projects which is likely to have caused flooding in the years preceding 2018.

Following investigation works the site was added to the drainage renewals workbank and submitted for CP6 funding. Due to limited budget in CP6, the site was deferred and added to the deferred renewals register. Reviewed yearly and inspections continued as normal by the off-track maintenance team in Central delivery unit.

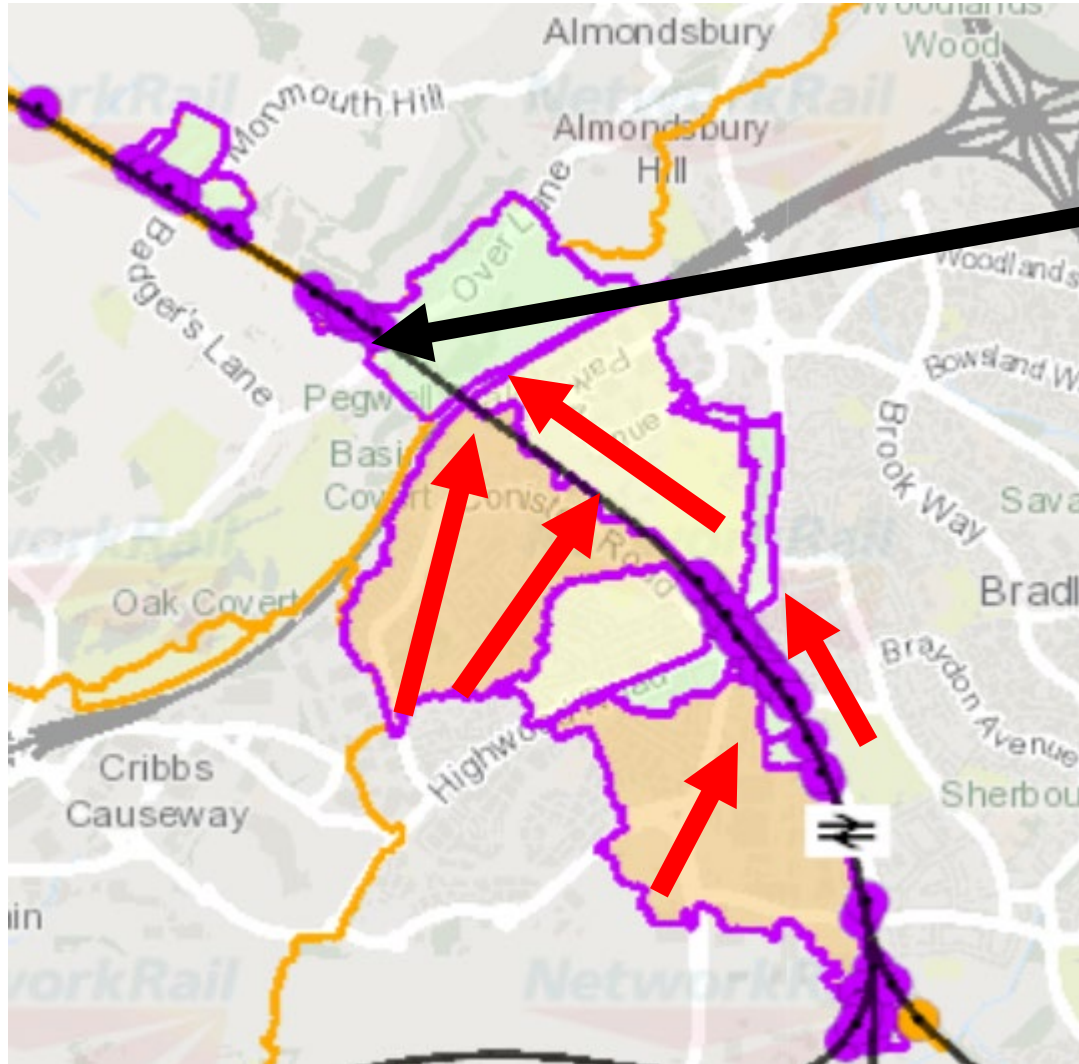
The importance of the desk study – GWR 2 Chain Plans 1907



ELLIPSE Asset Data Mapping



Considering the Catchment



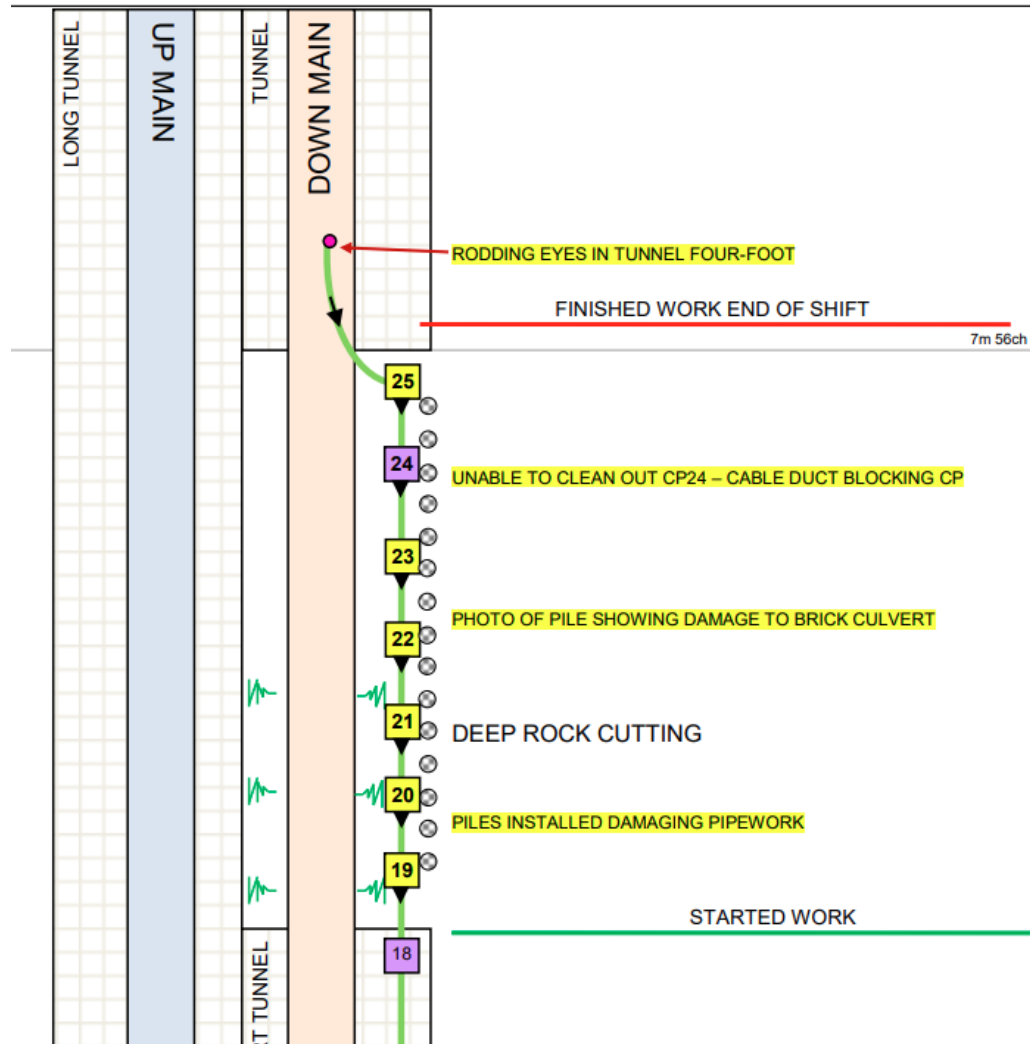
Site of Drainage
Renewal

The Patchway Gap drainage system receives half of the catchment from the East end of the tunnel plus infiltration/groundwater.

Topographic surveys of the drainage system completed previously were utilised to specify appropriate pipe diameters and provide a peak discharge value to be utilised as an input to the design work for Patchway Gap.

Drainage Investigation February 2018

OLE Foundation Damage



Schematic Drainage Diagram – 2018 Investigation



Silt removal to permit CCTV surveys – note crown indicated in blue

Patchway Gap, OLE Foundations – 19th June 2018

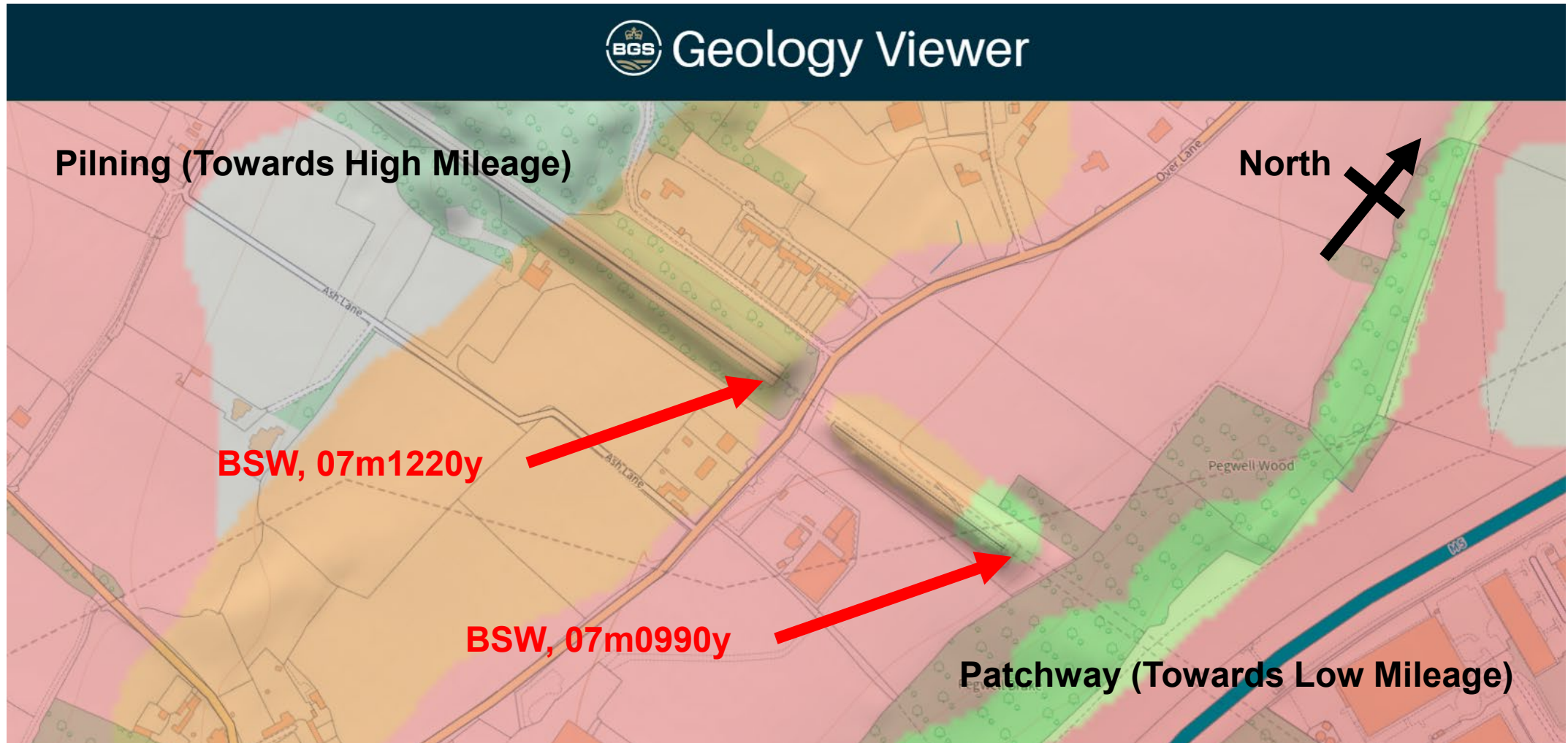


Mid Construction Visit looking to short tunnel



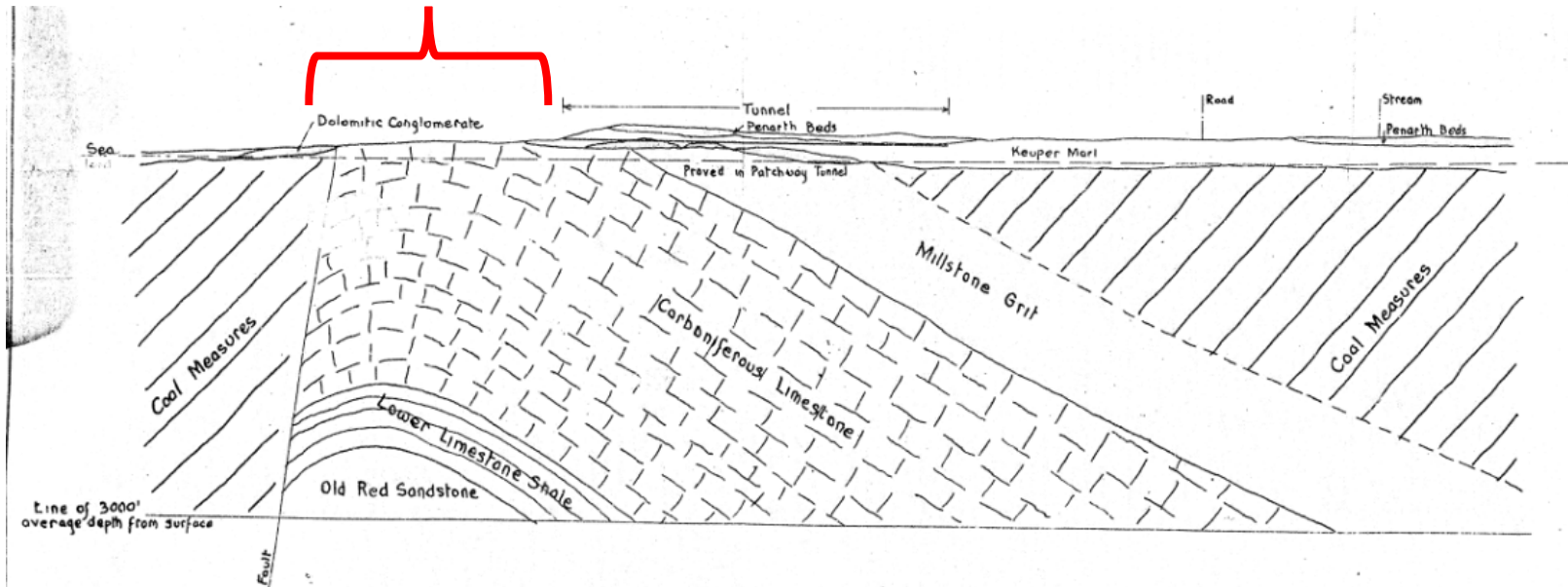
Interaction with OLE foundation in the Down cess

Geology (BGS 2024)



Geology (Western Region New Works Section) Undated

Patchway Gap



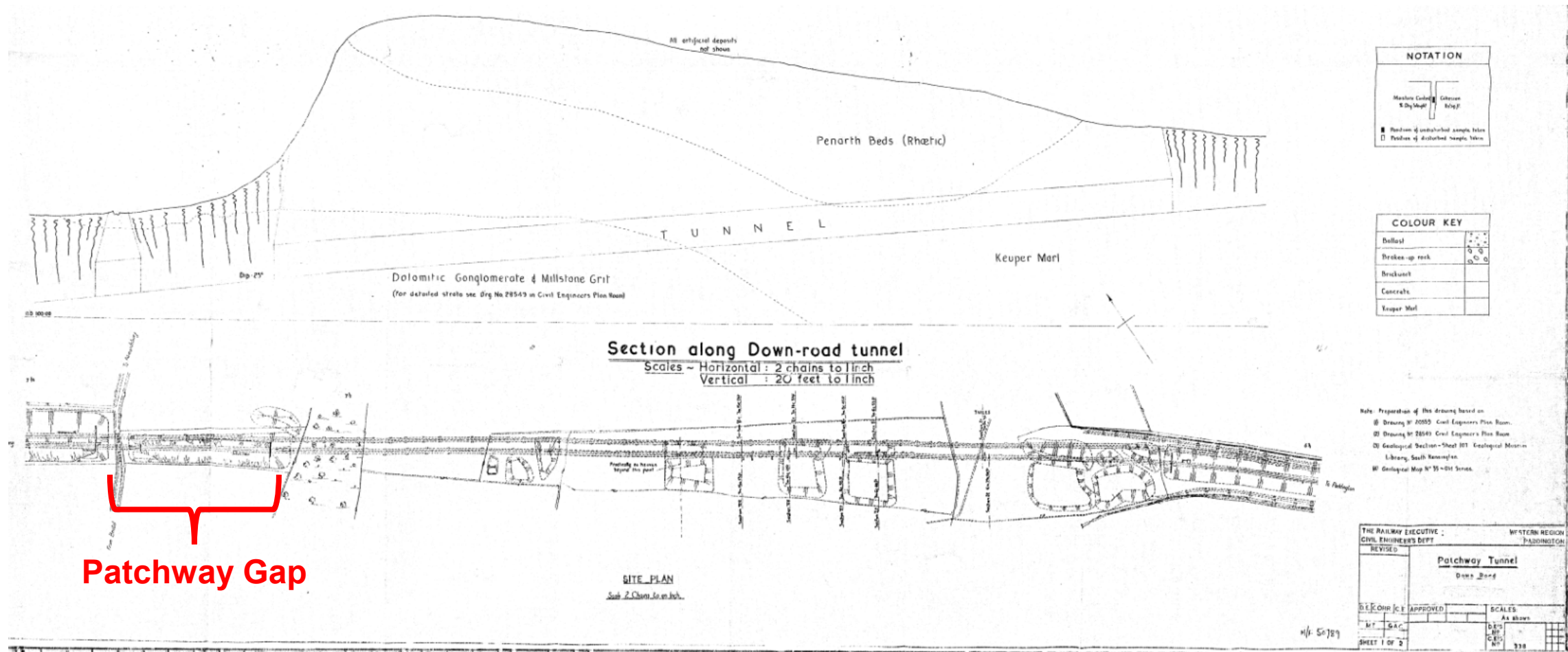
Geology of the Site

Copied from Geological Section No.107

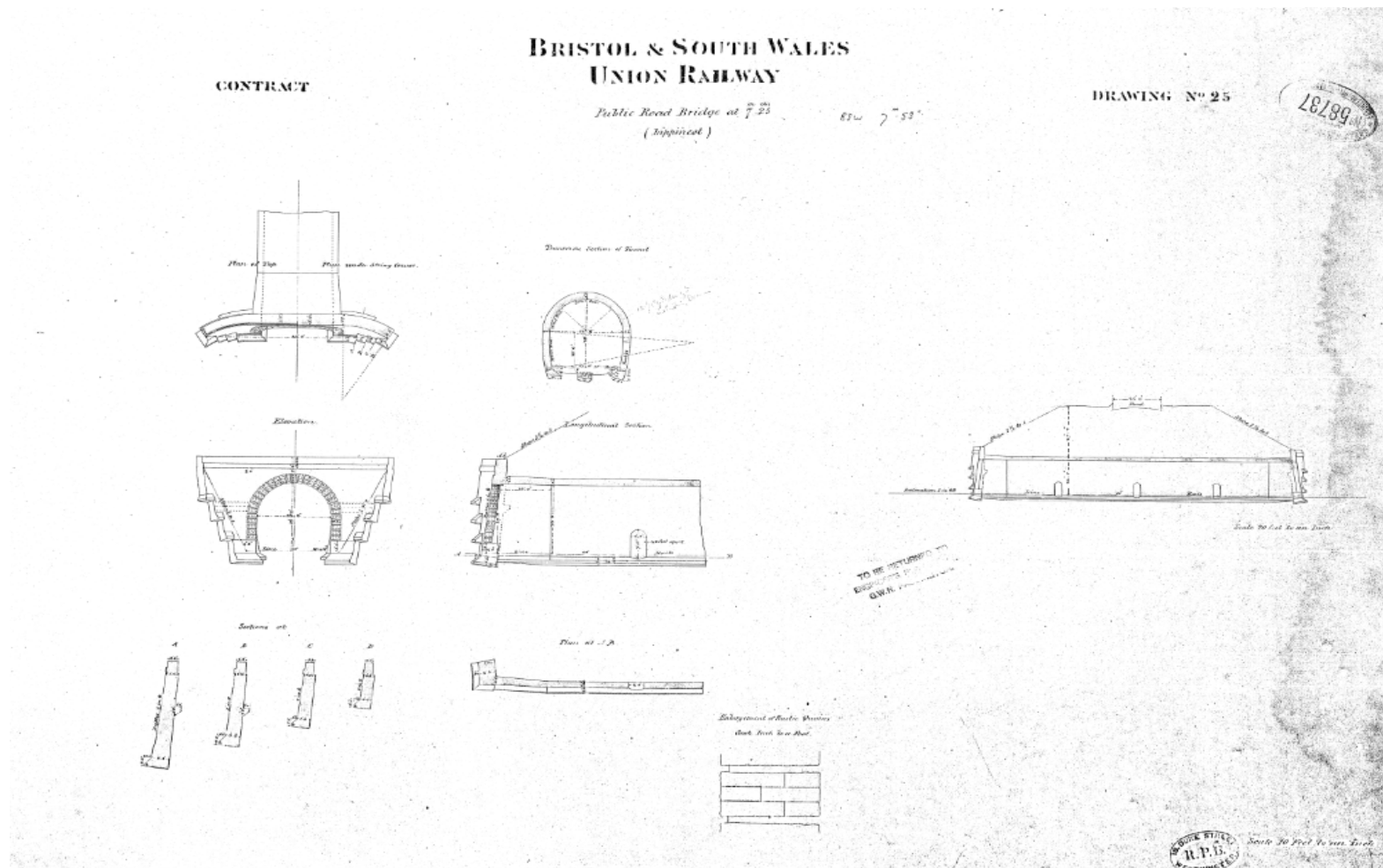
THE RAILWAY EXECUTIVE		WESTERN REGION	
CIVIL ENGINEER'S DEPT.		NEW WORKS SECTION	
REVISED		PADDINGTON	
		Patchway Tunnel	
		Down Road	
D.E. CORR.	C.E.	APPROVED	SCALES
MT	GAC		
SHEET 2 OF 2		CHIEF ENGINEER.	D.E./S. N°
			C.E./S. N°
			338 a

m/L50790

Geology (Western Region New Works Section) Undated



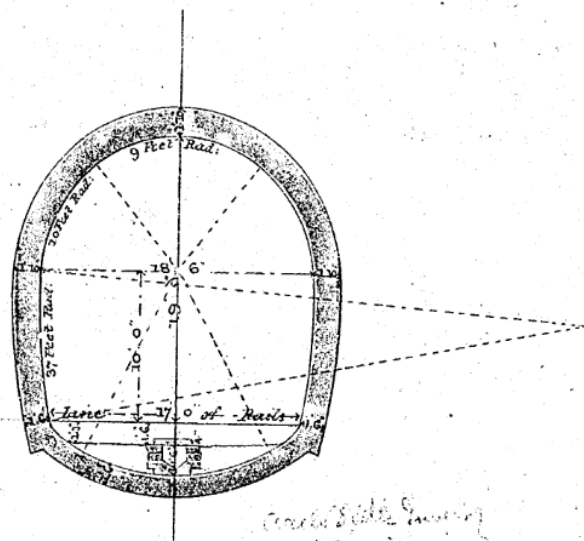
The importance of archive information



[Asset Related Records Management \(sharepoint.com\)](https://sharepoint.com)

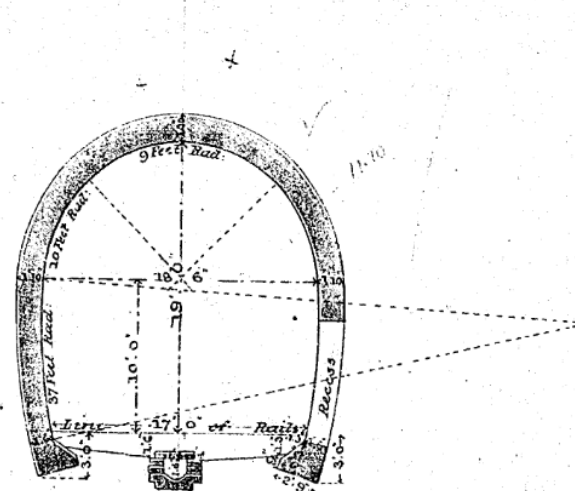
The importance of archive information

Section with Invert.



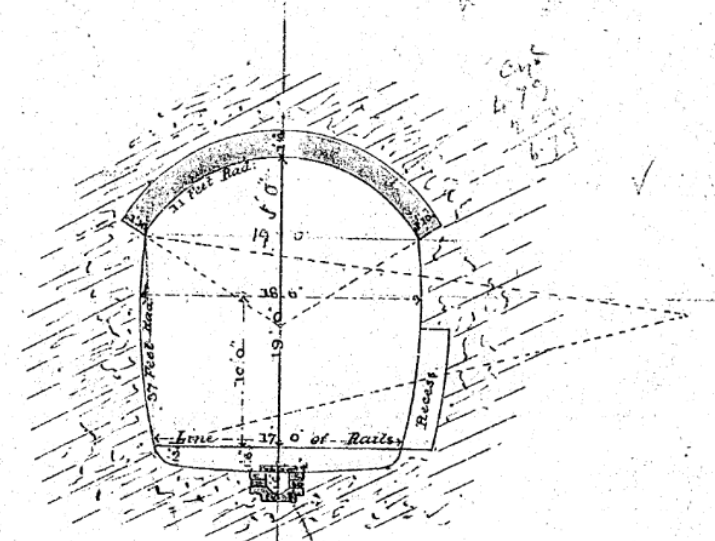
*Corrected from original
1. Drainage - 3*

Transverse Section of Tunnel.



*Corrected from original
1. Drainage - 3*

Section in Rock.



Drainage 2

3no cross sections through Patchway Old tunnel indicating 3no different ground types throughout the tunnel

Intervention

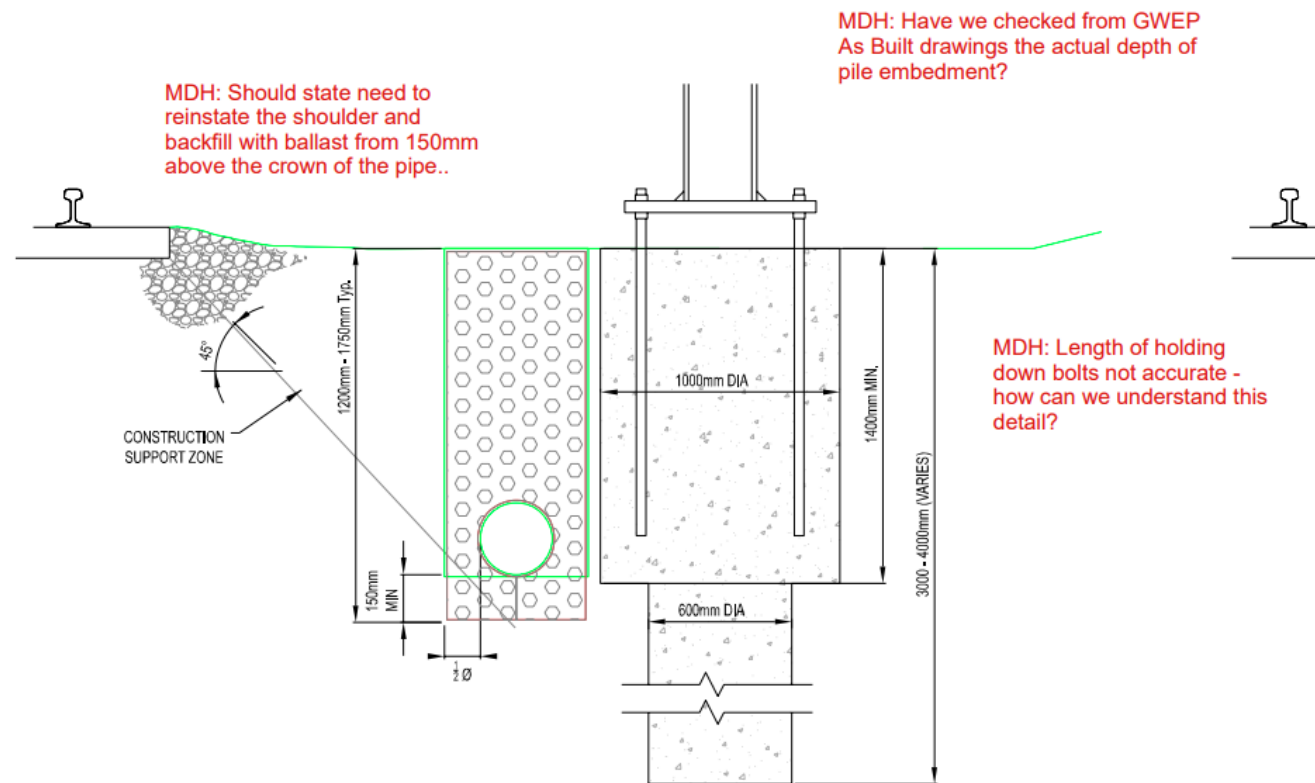
The works were included in the CP7 year 1 drainage renewals business plan and access agreed during the closure of the Severn Tunnel for track renewals.

The contractor undertaking the drainage renewal works was Colas, supported by the Readypower Group for road rail plant and route services for trains and tampers. Design works completed by AECOM working within the South Rail Systems Alliance (SRSA).

Works completed between 03rd July 2024 and 06th July 2024 with completion on the 12th June 2025.

Drainage Particular Specification						
		Status	AFC			
		IMT	Bristol SRSA			
		Plan Year	24/25			
		Route	Western			
		UID	DRKNHGE7D861			
		Version	2.000			
1. GENERAL INFORMATION						
Site Location: Patchway Gap						
Original Proposed Remit	ELR	TID/Position	Start	End	Extent	
Renwal of Drainage System	BSW	2100/Up-DN Cess	007m0990y	007m1220y	230	

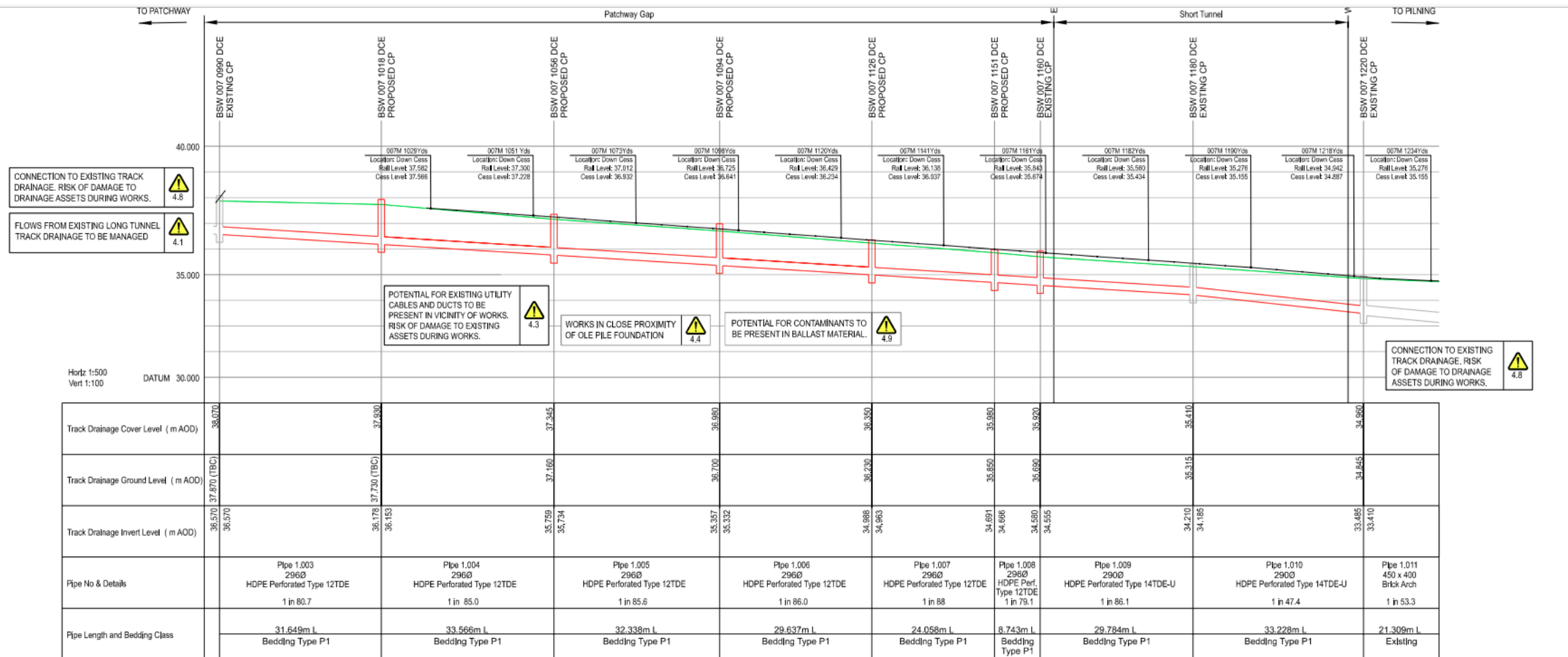
Interaction with OLE foundations – *Shallow hollow steel with mass concrete*



TRACK DRAIN AT OLE FOUNDATIONS
TYPE P2 BEDDING

Original Design (Drainage Renewal – Down Cess)

Average gradient 1 in 85



Proposed Patchway Gap and Short Tunnel Track Drainage Upgrade
Long Section PN 1.003 - PN1.010
Existing 2250 pipe upsized to 3000 (2960)
Chambers relocated away from OLE columns
NR 11 2023

Derogation (Undertrack Crossing)

Application Reference Number

TR108048

Application Type

Network Rail Standard Application

Application Status

Application Approved

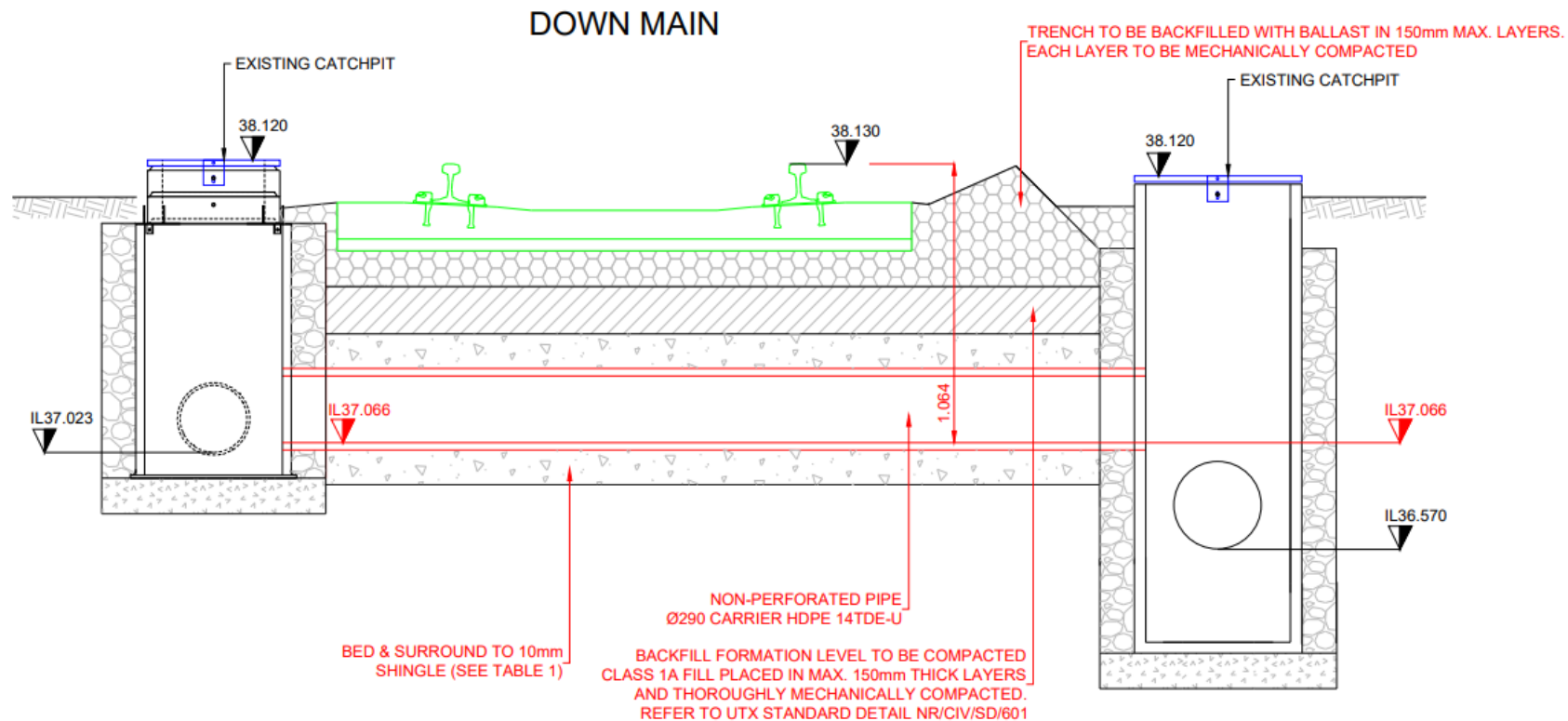
Date of application

30/07/2024

Submitted Application Details

Date (variation first identified)	03/07/2024	🕒
Standard and Module Details		
Standard	NR/L2/CIV/044 - Planning, Design and Construction of Undertrack Crossings [Issue 4]	
Standard Owner	Buildings and Civils Engineering	
Compliance Date	01/06/2020	
Is the application for a module?	No	🕒
Clause No(s)	8.4.1 Depth Cover page 24	🕒
Copy the text from the Standard where the variation is sought:	The minimum depth of cover shall be 900 mm, provided between the underside of the sleeper and the crown of the UTX.	🕒

Undertrack Crossing, BSW, 07m0990y

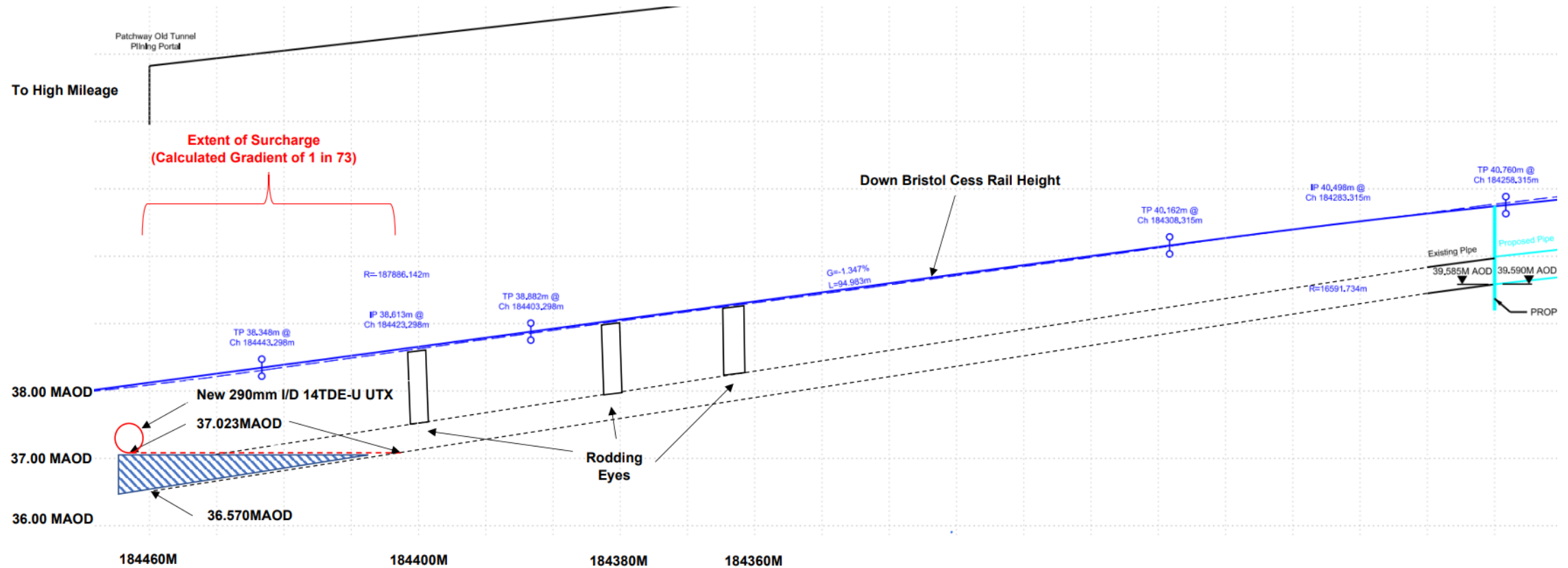


CROSS SECTION @ CH.12169m
SCALE: 1:50
CROSS DRAIN

Surcharging due to the shallow bedrock

Patchway Gap – UTX Surcharge Extents Annotated Sketch, based on drawing W1008F-ARP-DRG-ETR-123005 Revision A01

Produced by Mark Dennis Howells BEng (Hons) IEng MPWI MIAM Senior Asset Engineer (Drainage), Network Rail, Western Route 25th April 2025



Mid Construction Assurance Visit – 04th July 2024

04/07/2024, 10:04:11
GPS: 51° 32.5441' N 002° 35.2302' W
ELR: BSW 7Mi 1006Yds 2yds away



04/07/2024, 10:10:16
GPS: 51° 32.5357' N 002° 35.2286' W
ELR: BSW 7Mi 994Yds 3yds away



Mid Construction Assurance Visit – 04th July 2024

04/07/2024, 12:01:35
GPS: 51° 32.5655' N 002° 35.2907' W
ELR: BSW 7Mi 1093Yds 6yds away



04/07/2024, 10:43:40
GPS: 51° 32.5358' N 002° 35.2338' W
ELR: BSW 7Mi 995Yds 6yds away



AMP 15/16 Walkout (06th July 2024)

06/07/2024, 08:57:47
GPS: 51°32.5376' N 002°35.2297' W
ELR: BSW 7Mi 999Yds 6yds away



06/07/2024, 08:15:47
GPS: 51°32.5817' N 002°35.3259' W
ELR: BSW 7Mi 1150Yds 7yds away

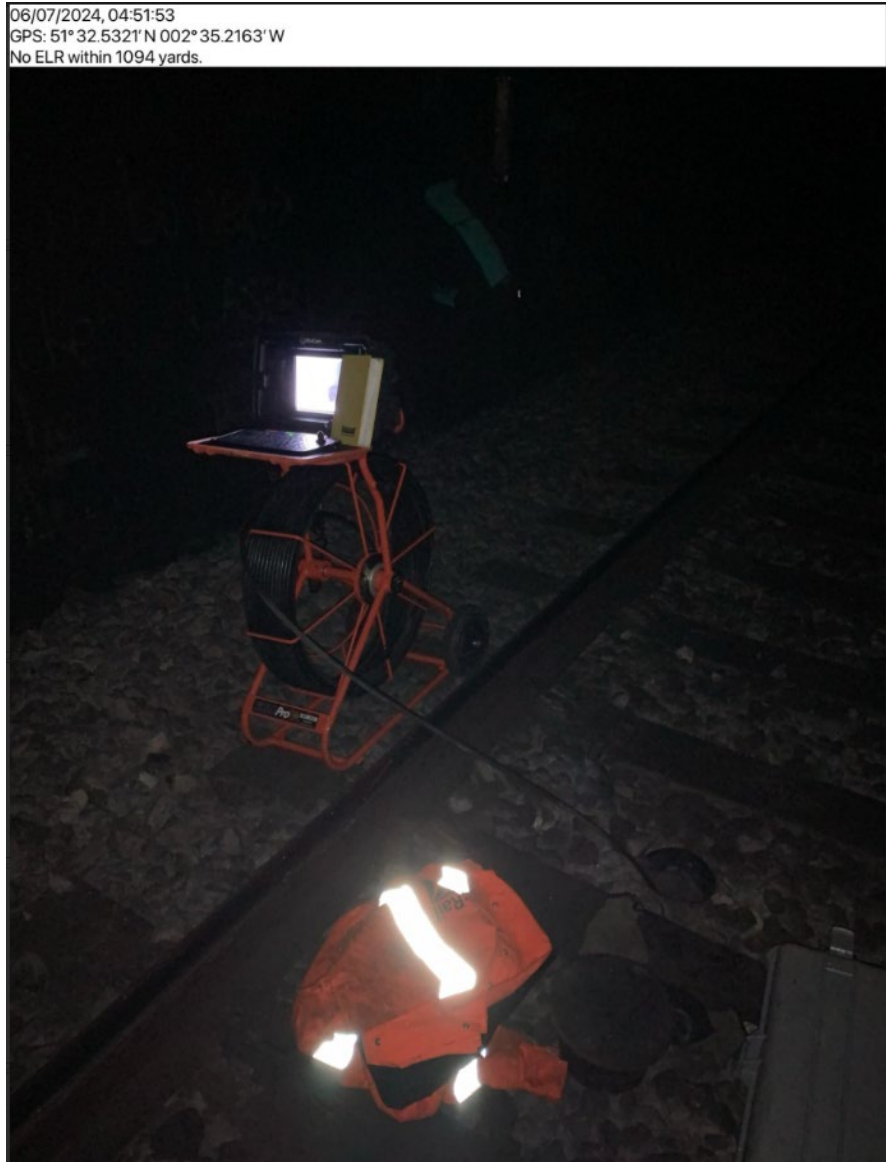


AMP 15/16 Walkout (06th July 2024)

06/07/2024, 04:32:55
GPS: 51°32.5806'N 002°35.3307'W
ELR: BSW 7Mi 1154Yds 1yds away



Checking other assets in the area...



Installation of UTX at BSW, 07m0990y (June 2025)



Picture credits: Garret Doman Cann, Colas Rail

June 2025 Scope of Works

Due to very hard rock and the lack of contingency time available due to the transit of trains for the Severn Tunnel blockade there was a need to return in June 2025 to complete the following work:

1no Catchpit

1no UTX (5m length)

65m 296mm I/D SDR17 (TDE-E) perforated pipe

All works are now fully completed.

Derogations & Technical Queries

With respect to non-compliance to Network Rail or RSSB standards do you always consider applying for a derogation or temporary variation as identified through design using the TRACKER system?

Derogation – Permanent, approved departure from standard with appropriate mitigations. For example, a shallow depth UTX utilising SDR11 pipe.

Temporary Variation – Temporary, approved departure from standard with appropriate mitigations. For example, a clamped rail defect for removal within 7 days.

Technical Queries – How do you manage change in a construction project?

Any Questions?

