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APPENDIX 13

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TAHMOOR COAL: WESTERN DOMAIN

Residual Subsidence Monitoring Status Report No. 04
Post mining LW W1-W4 in the Western Domain

Reporting Period	30 September 2024 to 31 December 2024	
Total subsidence at end of reporting period	725 mm	at Site 24 on 31 December 2024
Maximum subsidence since MSR ground survey on 19 January 2024	39 mm	at Site 24 on 31 December 2024
Maximum change in subsidence during last quarter	10 mm	at Site 24 (30 September to 31 December 2024)

Summary of monitoring and inspections

Monitoring Activity	Total subsidence or change in distance	Change in subsidence during last quarter	Highest Trigger	Comments
GNSS units				
GNSS unit above centreline of LW W4 (Site 24)	725	10	N/A	Trend of ongoing residual subsidence observed, with rates of change reducing to low levels since Nov 2023. GNSS unit provided erratic results in March 2024. The GNSS chip was replaced on 16 April.
Main Southern Railway (ARTC)				
GNSS unit (Site 1) Picton Tunnel 87.85 km	2	6		Very minor change in subsidence since MSR ground survey on 19 January 2024. Change in subsidence less than 20 mm trigger.
GNSS unit (Site 0) Picton Viaduct (85.42 km)	42	-		Very minor change in subsidence since MSR ground survey on 19 January 2024. Change in subsidence less than 20 mm trigger. New base values 19 July 2024. Unit offline since 11 September 2024 and repaired on 7 January 2025. Results to be issued next month.
GNSS units (Site 2) Picton Viaduct (85.42 km)	-3	-2		Very minor change in subsidence since MSR ground survey on 19 January 2024. Change in subsidence less than 20 mm trigger.
Change in distance between Sites 0 and 2 across Picton Viaduct	-16	-		Small change in distance since MSR ground survey on 19 January 2024. Change in distance is less than 5 mm trigger. Site 0 offline since 11 September 2024 and repaired on 7 January 2025. Results to be issued next month.
GNSS unit (Site 26) at 88.78 km	-19	-3		GNSS unit shifted to the south-west and upwards after installation, with small changes observed since early May 2024. Minor changes observed during reporting period. Change in subsidence less than 20 mm trigger.
GNSS unit (Site 27) at 88.60 km	4	1		Very minor change in subsidence since MSR ground survey on 19 January 2024. Change in subsidence less than 20 mm trigger.
Picton-Mittagong Loop Line (THNSW)				
GNSS unit (Site 7) Culvert at 87.850 km	470	-		Very minor change in subsidence since briefing on Residual Monitoring Plan on 12 March 2024. Change in subsidence less than 20 mm trigger. Unit offline since 28 July 2024, awaiting access to investigate.
GNSS unit (Site 8) Above LW W2 at 88.110 km	682	-		Very minor change increase in subsidence since briefing on Residual Monitoring Plan on 12 March 2024. Change in subsidence less than 20 mm trigger. Unit offline since 28 July 2024, awaiting access to investigate.
GNSS unit (Site 9) Above LW W1 at 88.550 km	540	3		Very minor change increase in subsidence since briefing on Residual Monitoring Plan on 12 March 2024. Change in subsidence less than 20 mm trigger.

Monitoring Activity	Total subsidence or change in distance	Change in subsidence during last quarter	Highest Trigger	Comments
Picton-Mittagong Loop Line (THNSW) (continued)				
GNSS unit (Site 10) at 89.000 km	199	6		Very minor change in subsidence since briefing on Residual Monitoring Plan on 12 March 2024. Change in subsidence exceeded 20 mm trigger intermittently between 30 October and 15 December 2024 but has since risen upwards and does not exceed the trigger level.
GNSS unit (Site 11) at 89.629 km	75	8		Very minor change in subsidence since briefing on Residual Monitoring Plan on 12 March 2024. Change in subsidence less than 20 mm trigger.
GNSS unit (Site 19) at 89.440 km	87	-		Very minor change in subsidence since briefing on Residual Monitoring Plan on 12 March 2024. Change in subsidence less than 20 mm trigger. Unit offline since 25 April 2024, awaiting access to investigate.
Victoria Bridge over Stonequarry Creek (continues under TfNSW Management Plan)				
GNSS unit (Site 3) on eastern abutment	23	1	N/A	Minor change in subsidence. Change in subsidence less than 20 mm trigger.
GNSS unit (Site 25) on western abutment	-16	4	N/A	Very minor ongoing change in horizontal movement. Change in subsidence less than 20 mm trigger. Unit offline since 17 December 2024 and repaired on 7 January 2025. Results will be issued next month.
Change in distance between Sites 3 and 25 across Victoria Bridge	-28	-2	N/A	Very minor ongoing change in distance. Change in distance less than 5 mm trigger. Site 25 offline since 17 December 2024 and repaired on 7 January 2025. Results to be issued next month.
Natural Features				
Groundwater monitoring	Continuous Last downloaded in Dec 2023	-	-	Trend of gradually increasing groundwater levels across the area, approaching groundwater levels measured prior to the start of LW W1. Next download in Dec 2024.
Management Actions				
Other management actions since previous report: • Nil				
Any additional and/or outstanding management actions: • Nil				
Consultation with stakeholders since previous report: • Monitoring reports issued quarterly				
Forecast whether residual subsidence is likely to cause: **A. Track closure for any period unacceptable to ARTC** **B. Impact on the safety of operations on the Main Southern Railway** Based on monitoring results to date, and the controls implemented and available under the Residual Subsidence Monitoring Plan for Western Domain LW W1-W4, no triggers under this Monitoring Plan are expected to be exceeded in the next three months. Accordingly residual subsidence is not likely to result in the occurrence of either A or B above.				
Certified by Tahmoor Coal				
Name	Ross Barber			
Position	Project Manager			
Signature	*Ross Barber*			
Date	24 January 2025			

Copy of Report to:

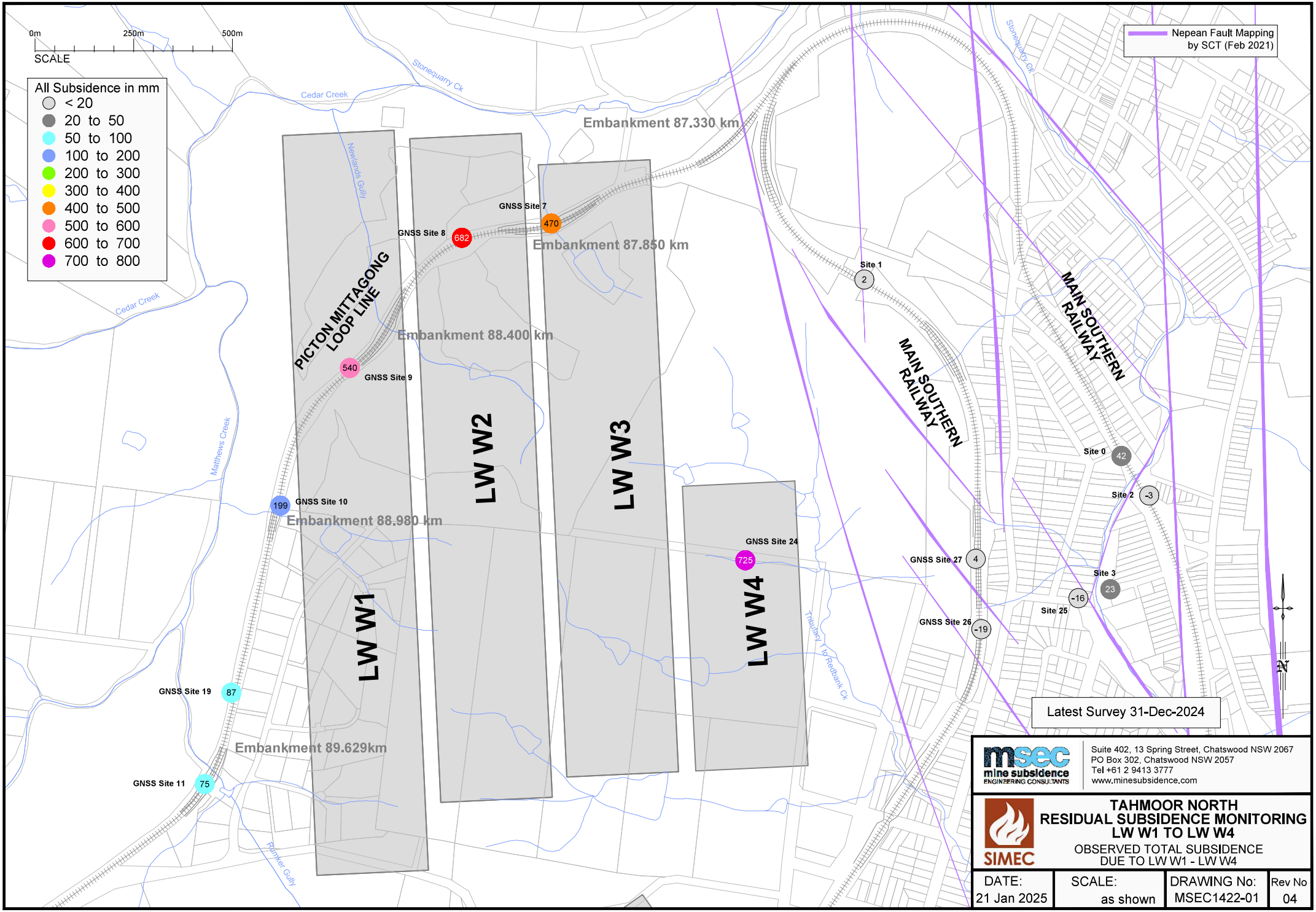
Daniel Wakefield, Area Manager Ingleburn, ARTC
Sladjan Mitic, Senior Track & Civil Engineer Sydney, ARTC
Michael Irons, Property Manager – Wagga, ARTC
Brian Cooper, Manager Maintenance North-South, ARTC;
Peter Haskard, Manager Engineering, Interstate Network, ARTC

John Thorogood, Safety, Environment & Quality Manager, Transport Heritage NSW
Les Kelleher, Track Manager, Transport Heritage NSW

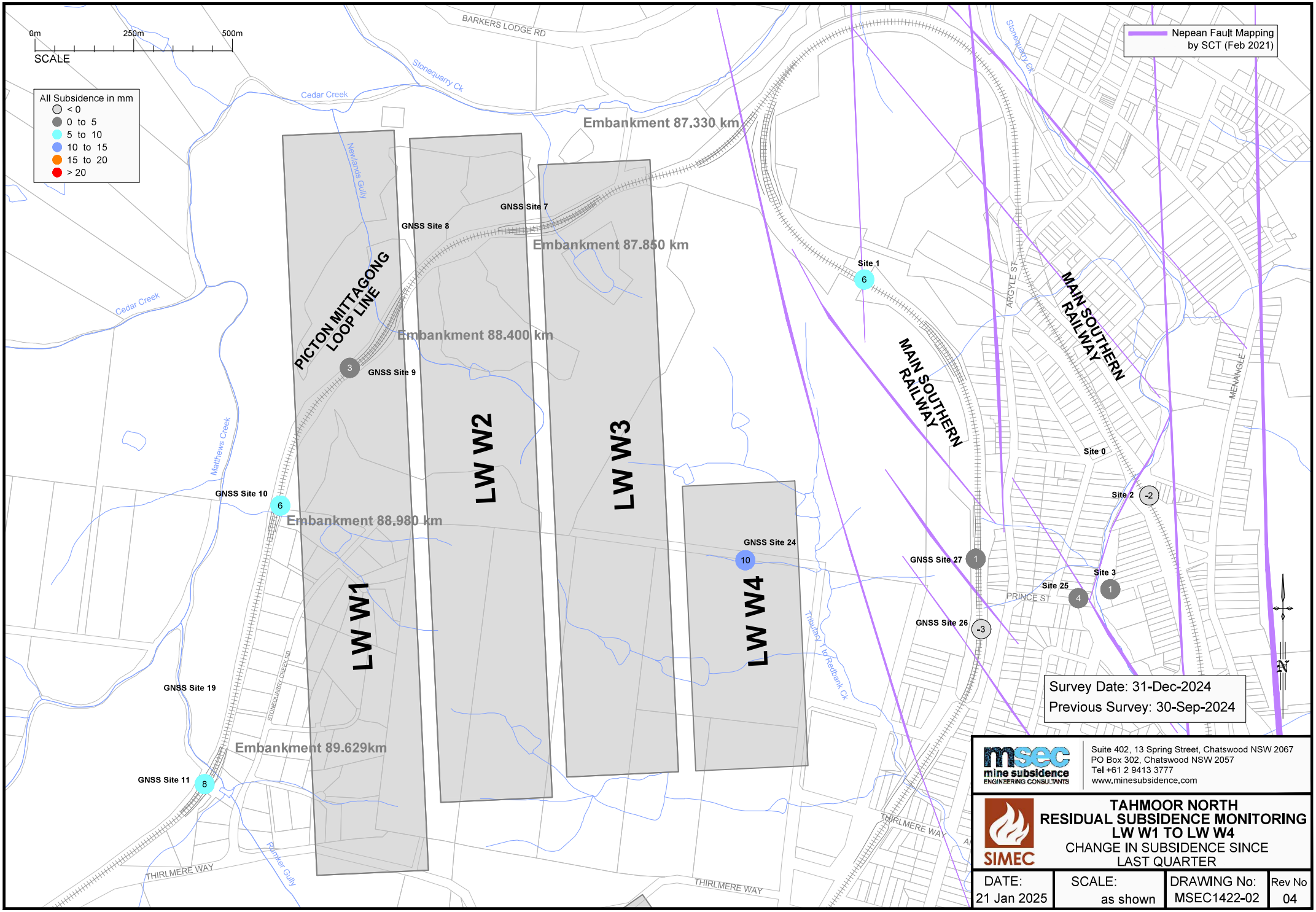
Cyril Gunaratne - TfNSW (Pavement Maintenance Planner)
Dony Castro - TfNSW (Bridge Maintenance Planner)
Richard Woods - Stantec (Senior Principal – Senior Bridge Engineer)

Clint Mason, Production Manager, Tahmoor Mine
Ian Cochran, Bridges and Structures Specialist, ONRSR
Ray Ramage, Principal Inspector – Subsidence, Mine Safety Inspectorate, Resources Regulator

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I:\Projects\Tahmoor\MSEC1422 - Residual Subsidence Monitoring LW W1-W4\AcadData\MSEC1422-02 Quarterly Change in Subsidence.dwg



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Tel +61 2 9413 3777
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TAHMOOR NORTH RESIDUAL SUBSIDENCE MONITORING LW W1 TO LW W4

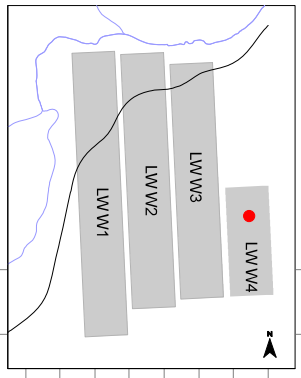
CHANGE IN SUBSIDENCE SINCE LAST QUARTER

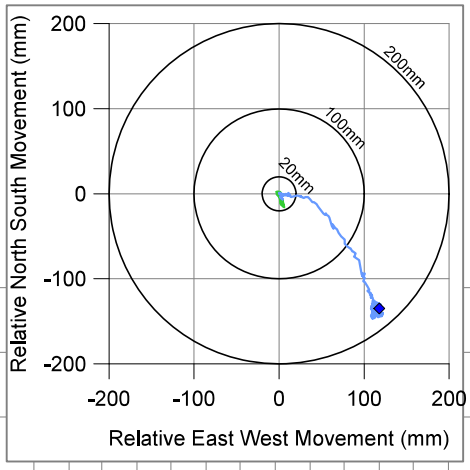
DATE:	SCALE:	DRAWING No:	Rev No
21 Jan 2025	as shown	MSEC1422-02	04

Tahmoor Western Domain - GNSS Monitoring

Site 24 above LW W4

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During LW W4

Change in easting (mm)

300 250 200 150 100 50 0 -50

Daily change

7 day running average

Change in northing (mm)

20 0 -20 -40 -60 -80 -100 -120 -140 -160 -180

Unit affected by solar flare activity in March 2024.
The GNSS chip was replaced on 16 April 2024.

Change in height (mm)
(+ve = subsidence)

0 100 200 300 400 500 600 700 800 900

LW W4

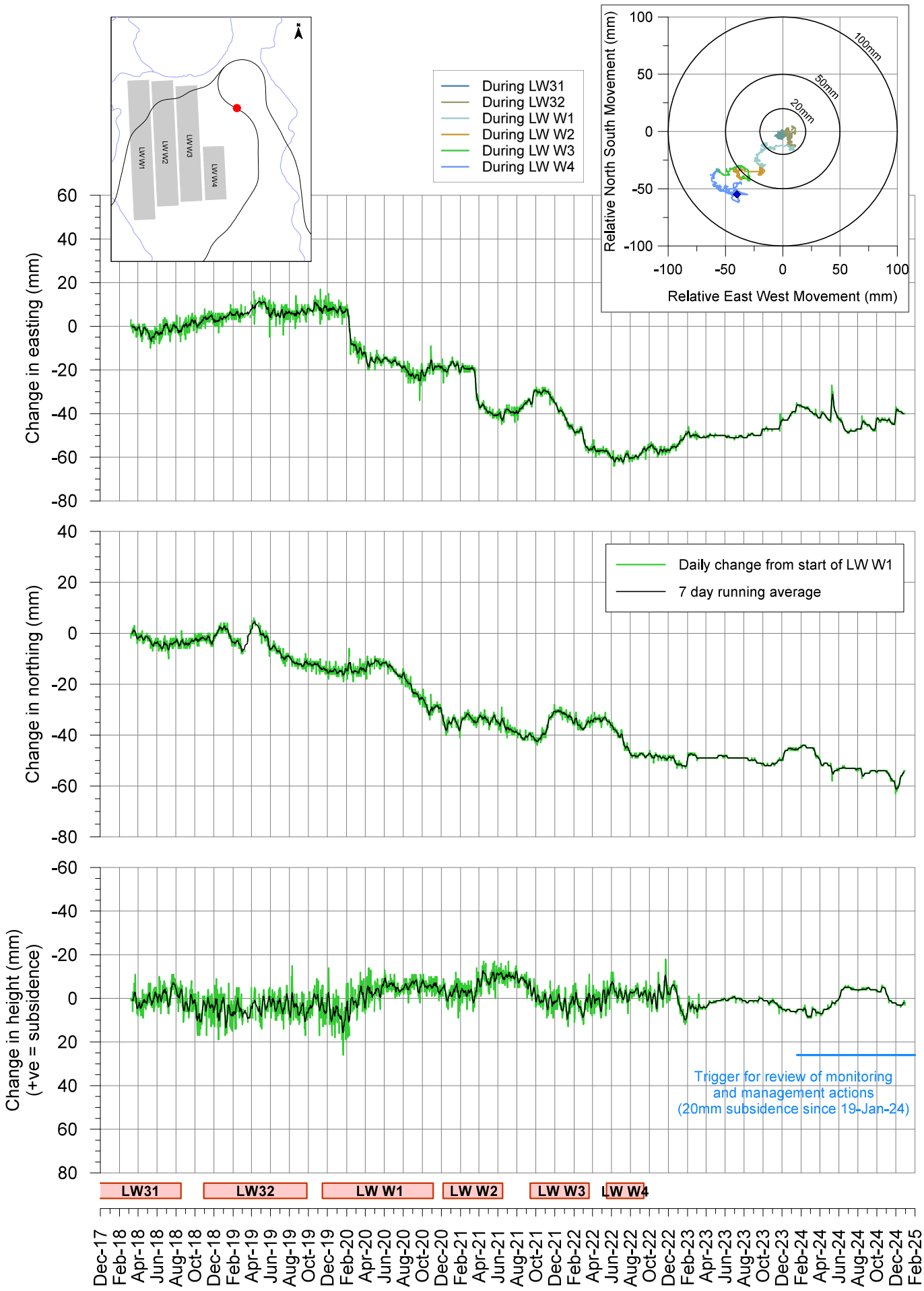
1-Mar-22 1-Apr-22 1-May-22 1-Jun-22 1-Jul-22 1-Aug-22 1-Sep-22 1-Oct-22 1-Nov-22 1-Dec-22 1-Jan-23 1-Feb-23 1-Mar-23 1-Apr-23 1-May-23 1-Jun-23 1-Jul-23 1-Aug-23 1-Sep-23 1-Oct-23 1-Nov-23 1-Dec-23 1-Jan-24 1-Feb-24 1-Mar-24 1-Apr-24 1-May-24 1-Jun-24 1-Jul-24 1-Aug-24 1-Sep-24 1-Oct-24 1-Nov-24 1-Dec-24 1-Jan-25 1-Feb-25

msec

Fig. 1-R04

Tahmoor Western Domain - Main Southern Railway
GNSS Monitoring at Picton Tunnel (Site 01)

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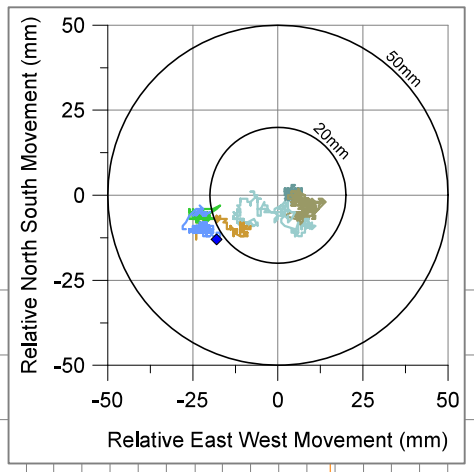


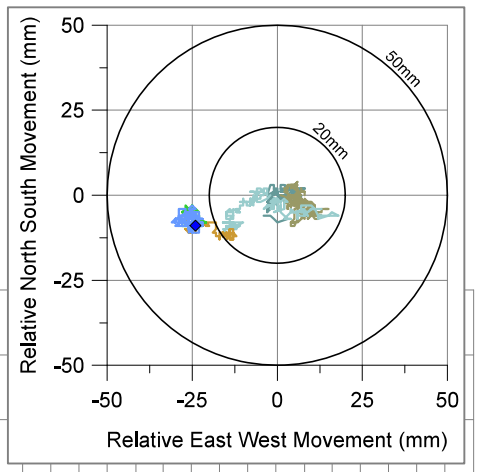
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Fig. 2-R04

Tahmoor Western Domain - Main Southern Railway
GNSS Monitoring at Picton Viaduct (Sites 00 and 02)

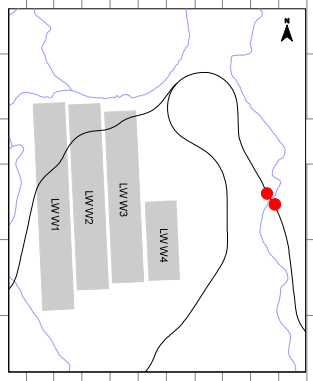
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During LW31
During LW32
During LW W1
During LW W2
During LW W3
During LW W4

Change in easting (mm)



Daily change from start of LW W1 - Site 0 at Northen end
Daily change from start of LW W1 - Site 2 at Southern end
7 day running averages

Change in northing (mm)

Change in height (mm)
(+ve = subsidence)

Trigger for review of monitoring and management actions (20mm subsidence since 19-Jan-24)

Unit offline 11-Sep-24 to 31-Dec-24.

Trigger for review of monitoring and management actions (20mm subsidence since 19-Jan-24)

Site investigation on 28 June confirmed drift due to sensor sliding down post as a result of vibration caused by passing trains. Sensor unit fixed to post on 4 July 2019.

Sensor unit replaced on 4 July 2020.

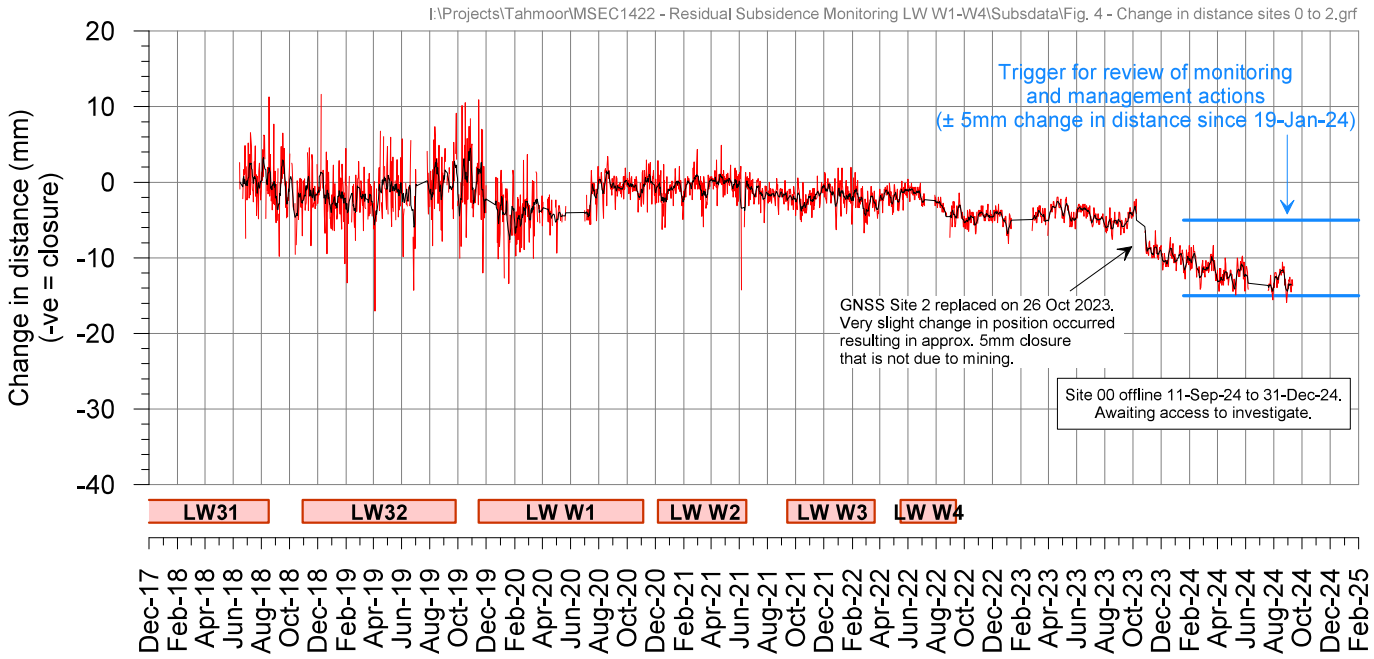
LW31 | LW32 | LW W1 | LW W2 | LW W3 | LW W4

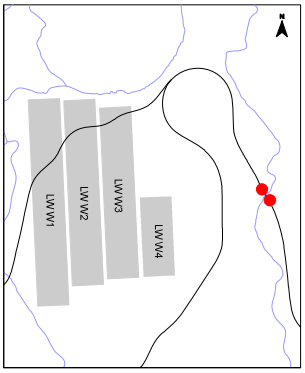
Dec-17 Feb-18 Apr-18 Jun-18 Aug-18 Oct-18 Dec-18 Feb-19 Apr-19 Jun-19 Aug-19 Oct-19 Dec-19 Feb-20 Apr-20 Jun-20 Aug-20 Oct-20 Dec-20 Feb-21 Apr-21 Jun-21 Aug-21 Oct-21 Dec-21 Feb-22 Apr-22 Jun-22 Aug-22 Oct-22 Dec-22 Feb-23 Apr-23 Jun-23 Aug-23 Oct-23 Dec-23 Feb-24 Apr-24 Jun-24 Aug-24 Oct-24 Dec-24 Feb-25

msec

Fig. 3-R04

Tahmoor Western Domain - Main Southern Railway
GNSS Monitoring at Picton Viaduct (Sites 00 and 02)

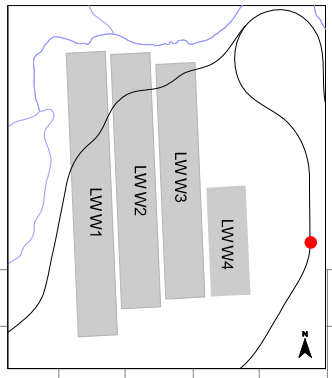


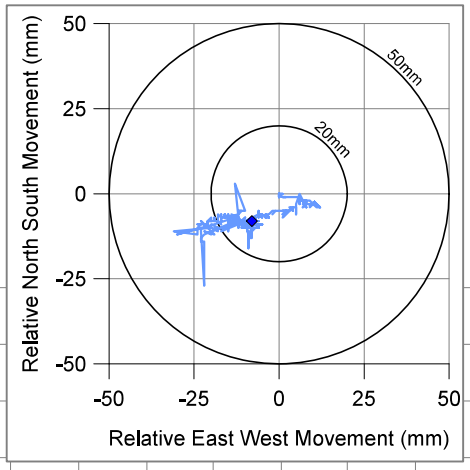


Tahmoor Western Domain - GNSS Monitoring

Site 26 - MSR at 88.78km

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Post LW W4

Change in easting (mm)

40
30
20
10
0
-10
-20
-30
-40

Daily change
7 day running average

Change in northing (mm)

20
10
0
-10
-20
-30

Change in height (mm)
(+ve = subsidence)

-50
-40
-30
-20
-10
0
10
20
30

Daily rain (mm)

160
140
120
100
80
60
40
20
0

Trigger for review of monitoring
and management actions
(20mm subsidence since 19-Jan-24)

1-Aug-23
1-Sep-23
1-Oct-23
1-Nov-23
1-Dec-23
1-Jan-24
1-Feb-24
1-Mar-24
1-Apr-24
1-May-24
1-Jun-24
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1-Dec-24
1-Jan-25
1-Feb-25

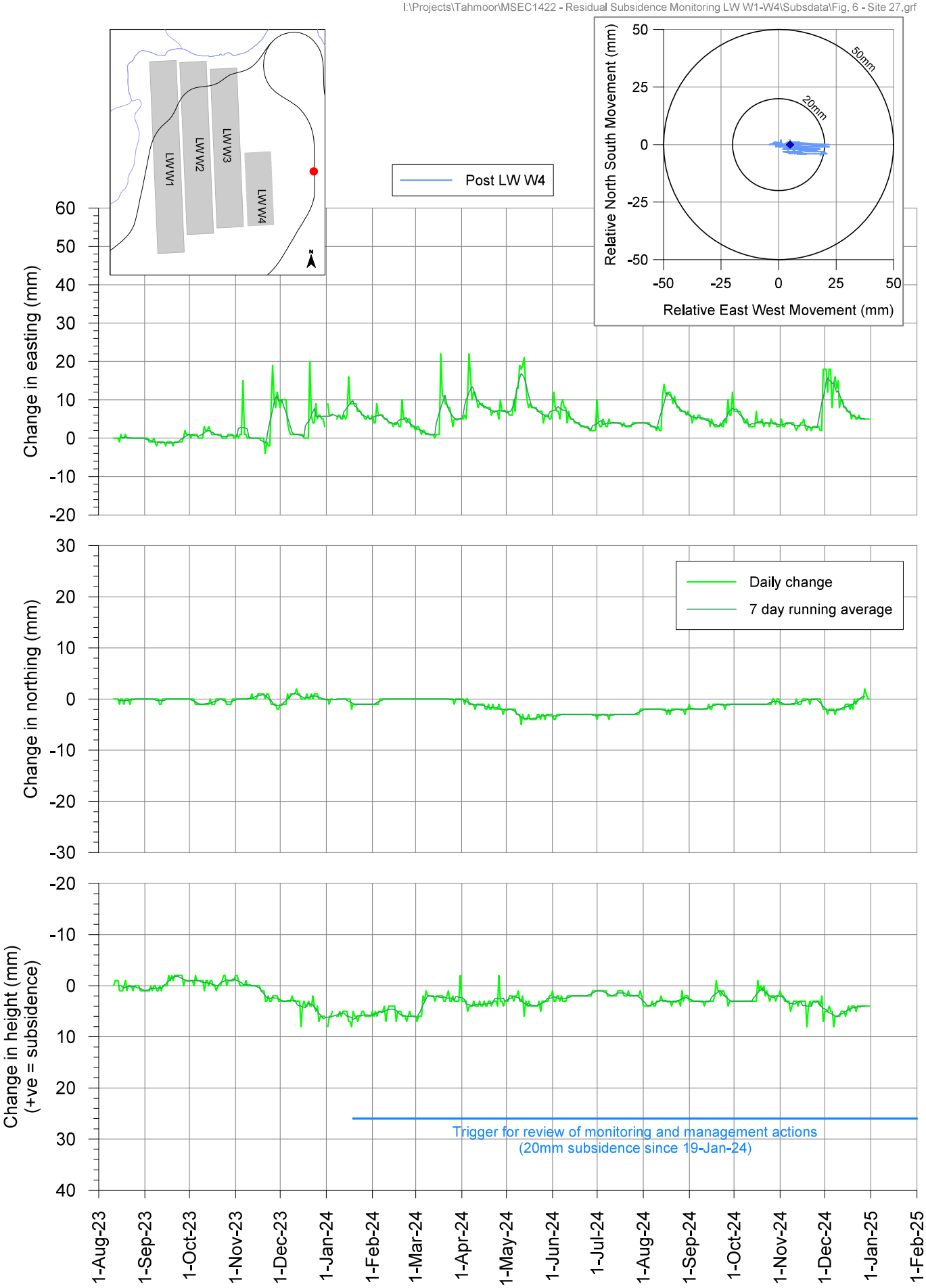
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Fig. 5-R04

Tahmoor LW W4 - GNSS Monitoring

Site 27 - MSR at 88.60km

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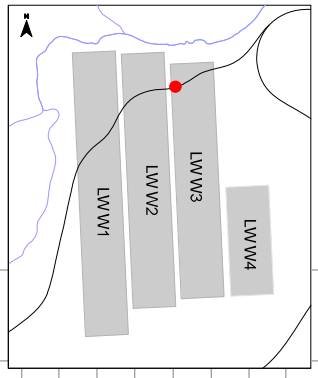
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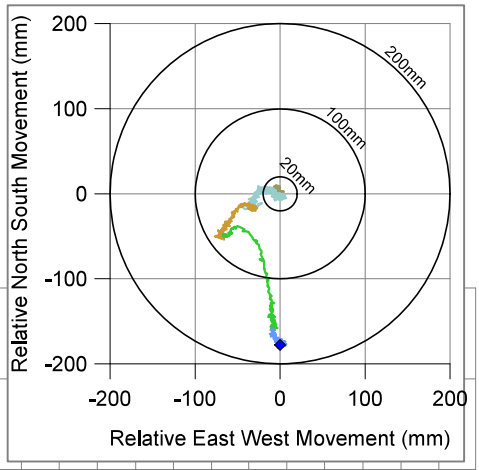
Fig. 6-R04

Tahmoor Western Domain - GNSS Monitoring

Site 7 - PMLL culvert at 87.850km

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During LW W1
During LW W2
During LW W3
During LW W4

Change in easting (mm)

150
100
50
0
-50
-100

Change in northing (mm)

50
0
-50
-100
-150
-200
-250

Daily change from start of LW W1
7 day running average

Unit offline since 28-Jul-24.
Awaiting access to investigate.

Change in height (mm)
(+ve = subsidence)

-100
0
100
200
300
400
500
600

Trigger for review of monitoring and management actions
(20mm subsidence since 12-Mar-24)

LW W1
LW W2
LW W3
LW W4

Nov-19
Jan-20
Mar-20
May-20
Jul-20
Sep-20
Nov-20
Jan-21
Mar-21
May-21
Jul-21
Sep-21
Nov-21
Jan-22
Mar-22
May-22
Jul-22
Sep-22
Nov-22
Jan-23
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Nov-24
Jan-25
Mar-25

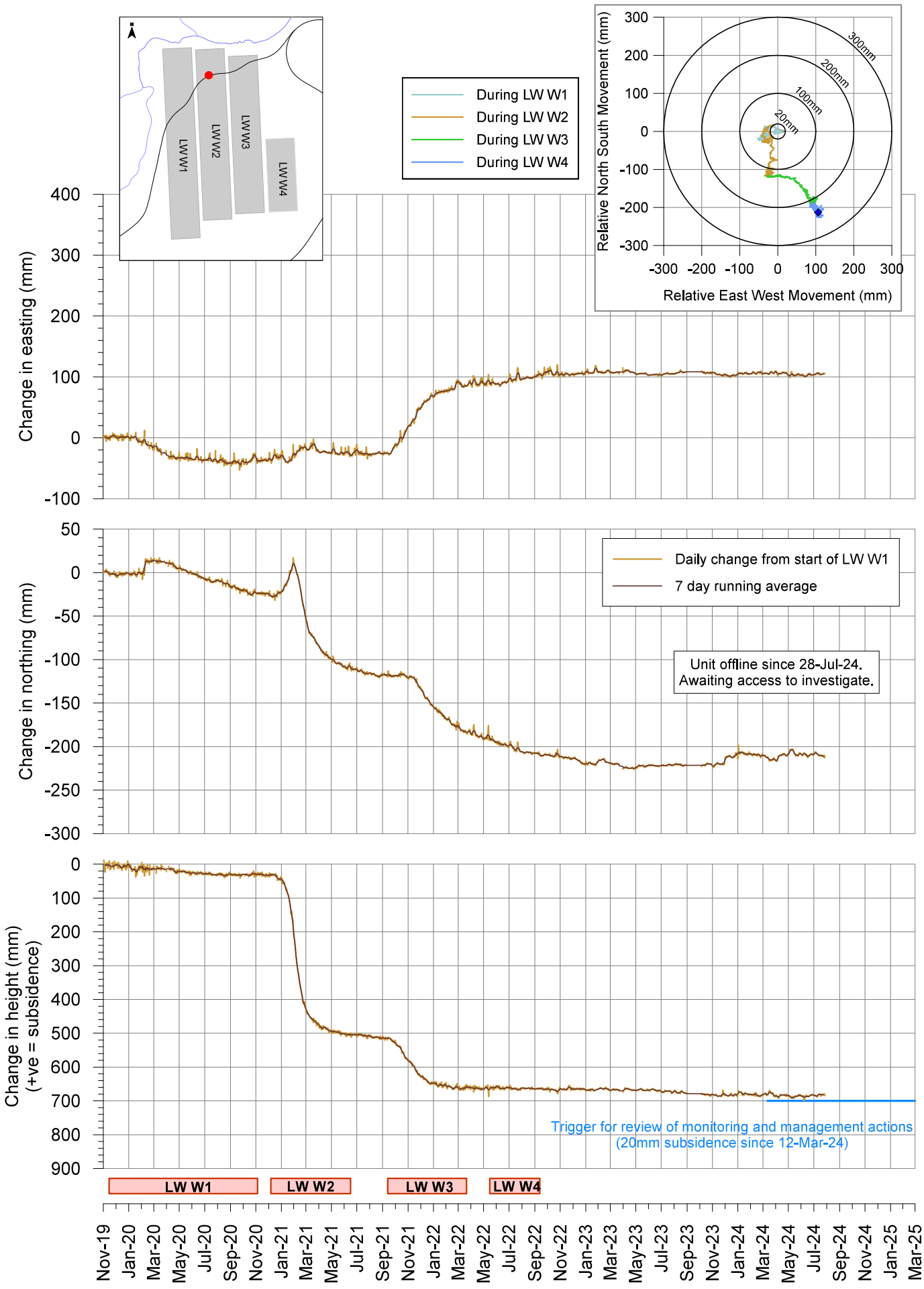
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Fig. 7-R04

Tahmoor Western Domain - GNSS Monitoring

Site 8 - LW W2 centreline - PMLL at 88.110km

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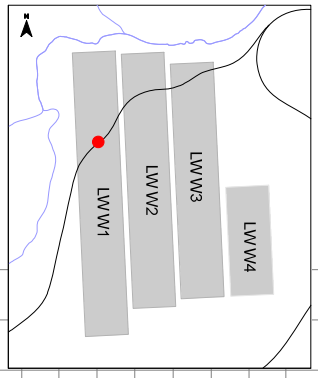
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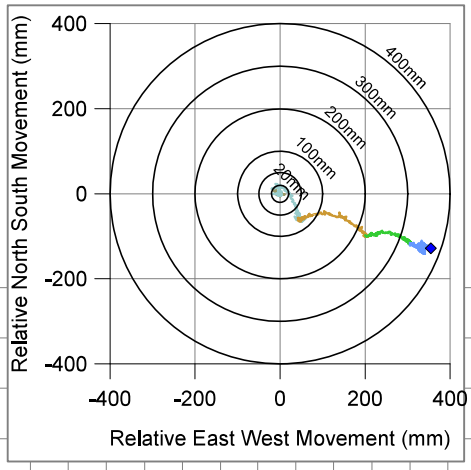
Fig. 8-R04

Tahmoor Western Domain - GNSS Monitoring

Site 9 - LW W1 centreline - PMLL at 88.550km

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During LW W1
During LW W2
During LW W3
During LW W4

Change in easting (mm)

800 700 600 500 400 300 200 100 0 -100

Change in northing (mm)

50 0 -50 -100 -150 -200

Daily change from start of LW W1
7 day running average

Change in height (mm)
(+ve = subsidence)

-100 0 100 200 300 400 500 600 700

Trigger for review of monitoring and management actions
(20mm subsidence since 12-Mar-24)

LW W1 LW W2 LW W3 LW W4

Nov-19 Jan-20 Mar-20 May-20 Jul-20 Sep-20 Nov-20 Jan-21 Mar-21 May-21 Jul-21 Sep-21 Nov-21 Jan-22 Mar-22 May-22 Jul-22 Sep-22 Nov-22 Jan-23 Mar-23 May-23 Jul-23 Sep-23 Nov-23 Jan-24 Mar-24 May-24 Jul-24 Sep-24 Nov-24 Jan-25 Mar-25

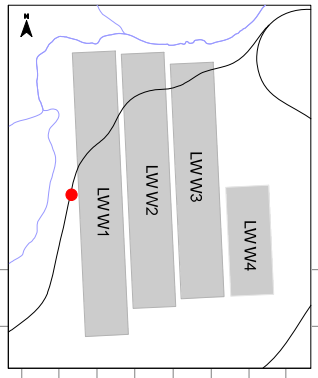
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Fig. 9-R04

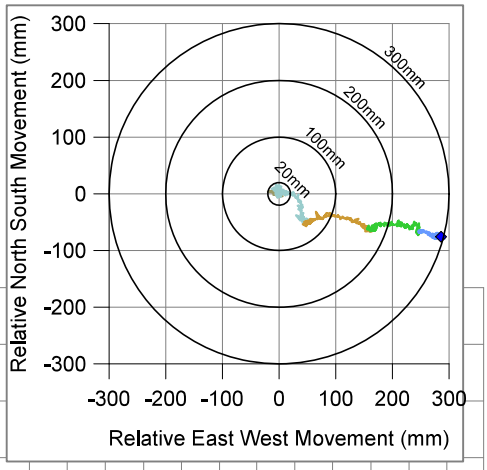
Tahmoor Western Domain - GNSS Monitoring

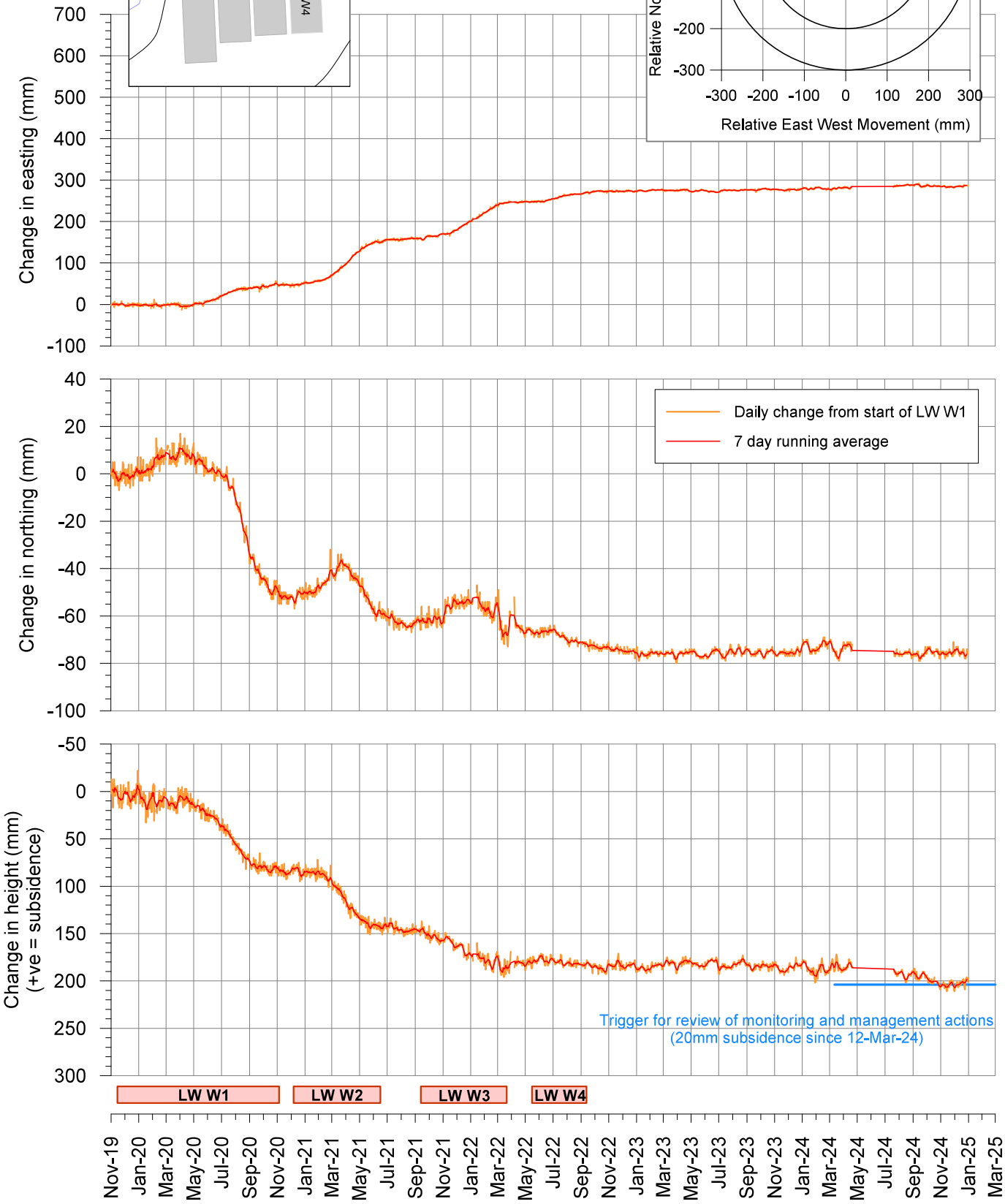
Site 10 - PMLL at 89.000km

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During LW W1
During LW W2
During LW W3
During LW W4





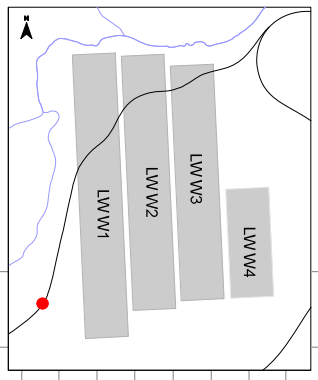
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Fig. 10-R04

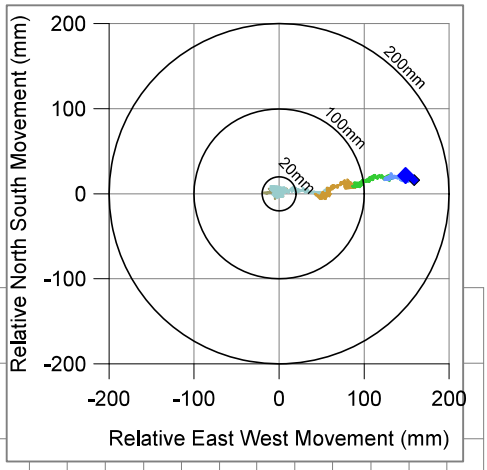
Tahmoor Western Domain - GNSS Monitoring

Site 11 - PMLL at 89.629km

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During LW W1
During LW W2
During LW W3
During LW W4



Change in easting (mm)

500
400
300
200
100
0
-100

Change in northing (mm)

Daily change from start of LW W1
7 day running average

80
60
40
20
0
-20
-40

Change in height (mm)
(+ve = subsidence)

-20
0
20
40
60
80
100
120

Trigger for review of monitoring and management actions
(20mm subsidence since 12-Mar-24)

LW W1 | LW W2 | LW W3 | LW W4

Nov-19 Jan-20 Mar-20 May-20 Jul-20 Sep-20 Nov-20 Jan-21 Mar-21 May-21 Jul-21 Sep-21 Nov-21 Jan-22 Mar-22 May-22 Jul-22 Sep-22 Nov-22 Jan-23 Mar-23 May-23 Jul-23 Sep-23 Nov-23 Jan-24 Mar-24 May-24 Jul-24 Sep-24 Nov-24 Jan-25 Mar-25

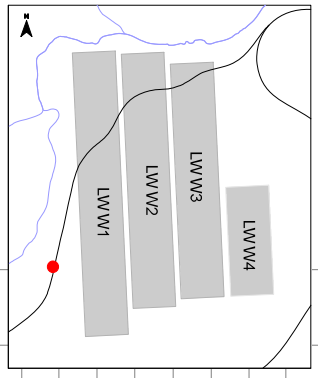
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Fig. 11-R04

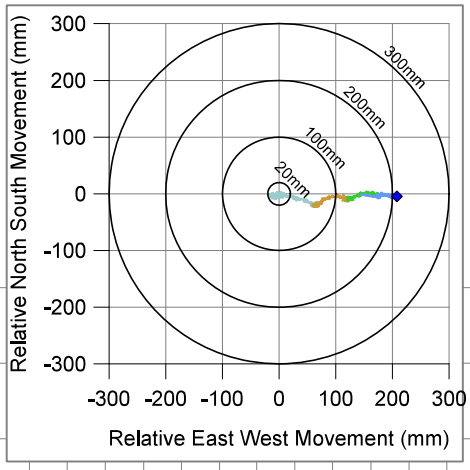
Tahmoor Western Domain - GNSS Monitoring

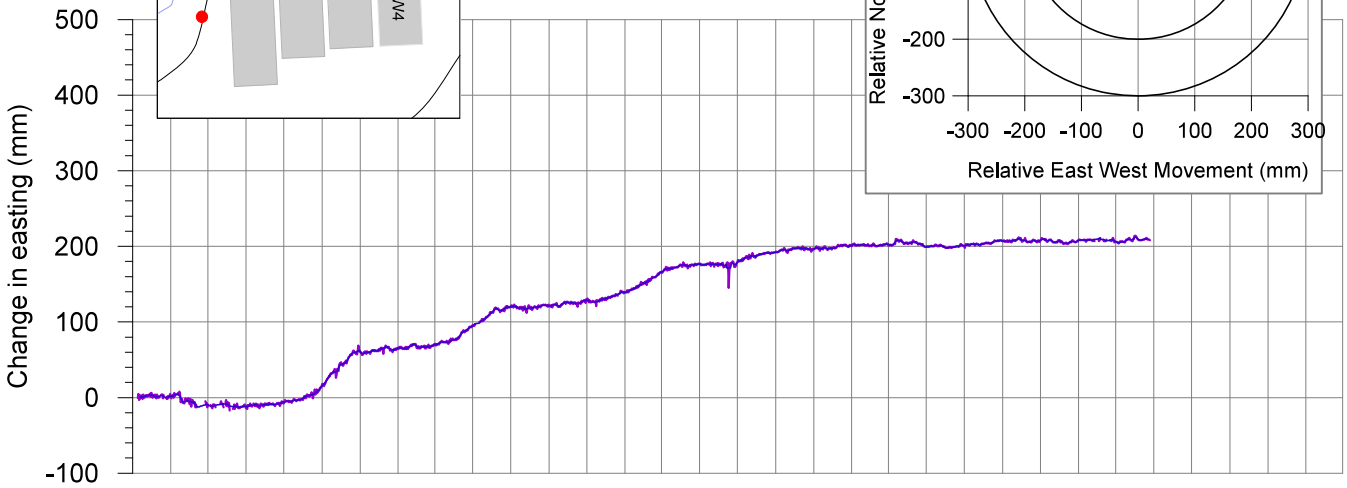
Site 19 - PMLL at 89.440km

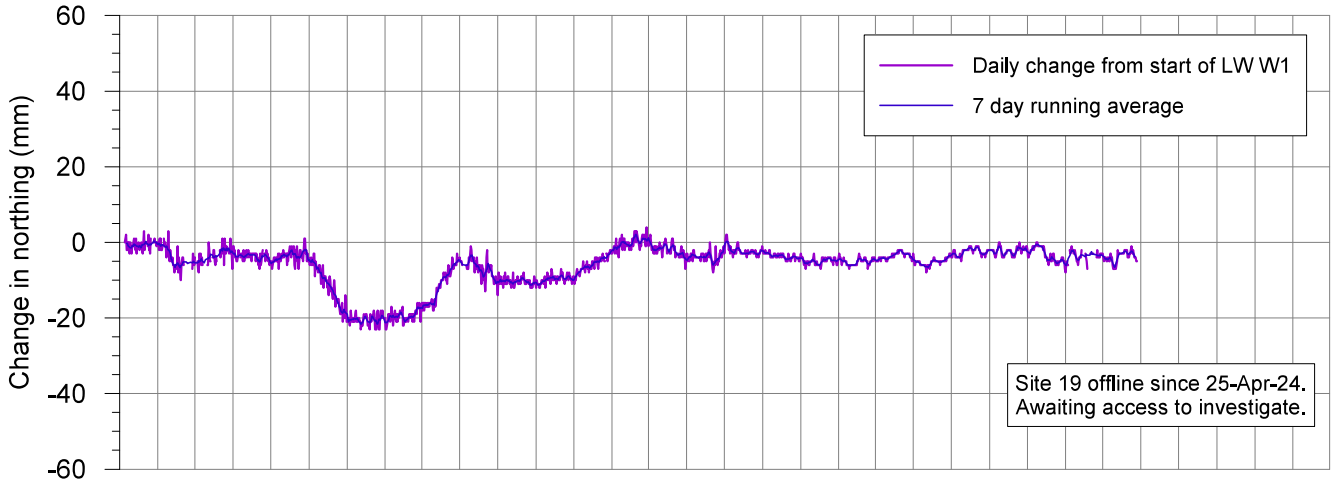
I:\Projects\Tahmoor\MSEC1422 - Residual Subsidence Monitoring LW W1-W4\Subsdata\Fig. 12 - Site 19.grf

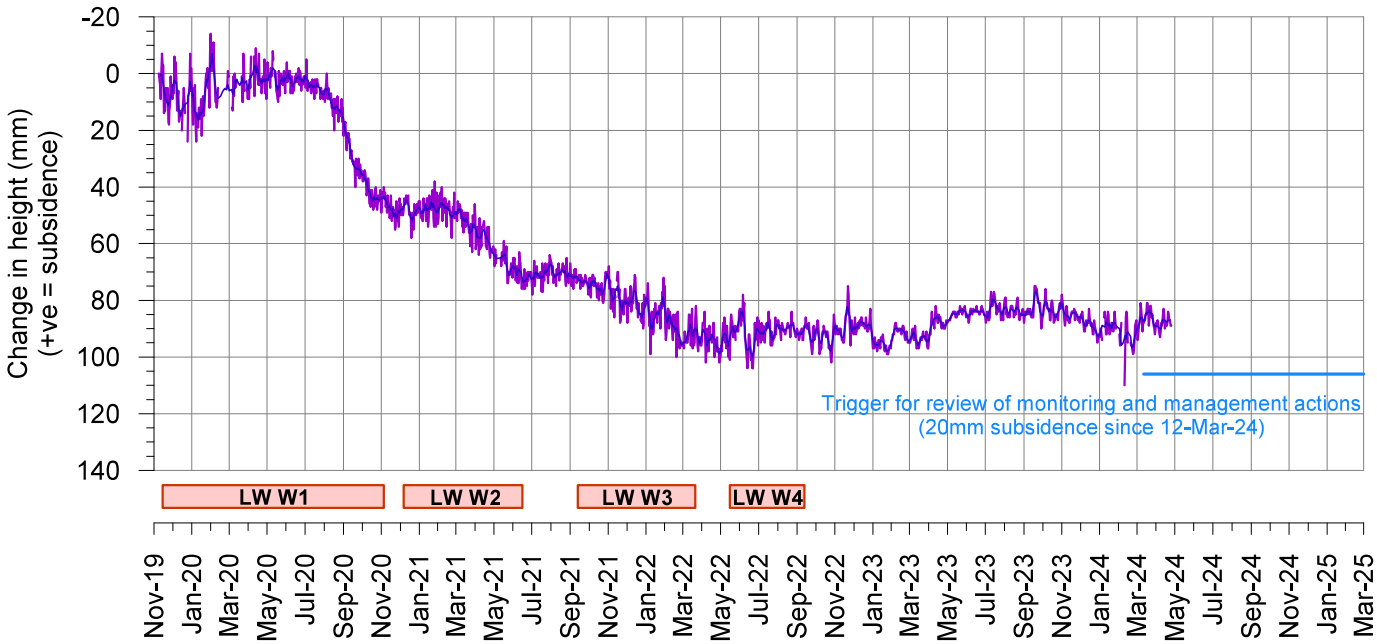


During LW W1
During LW W2
During LW W3
During LW W4







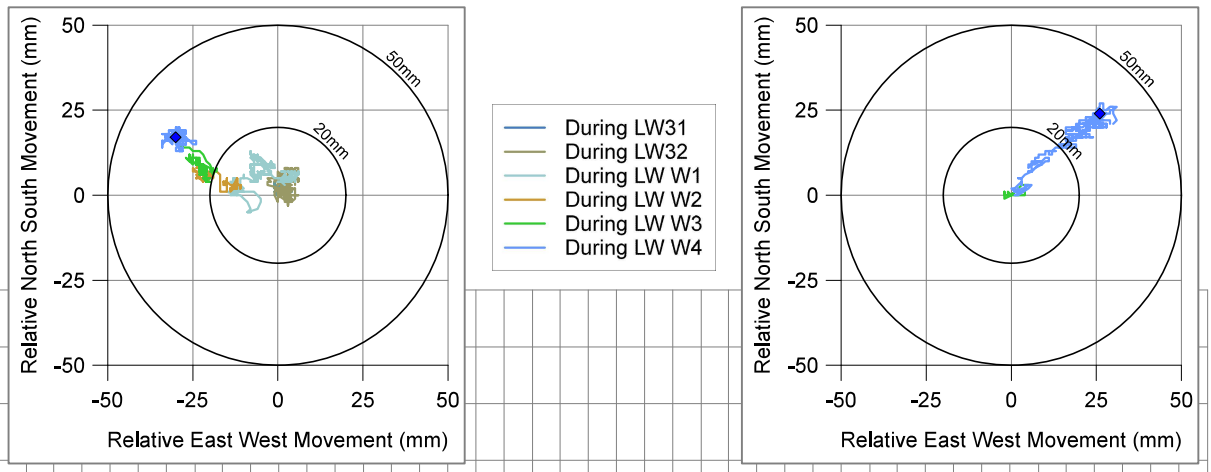


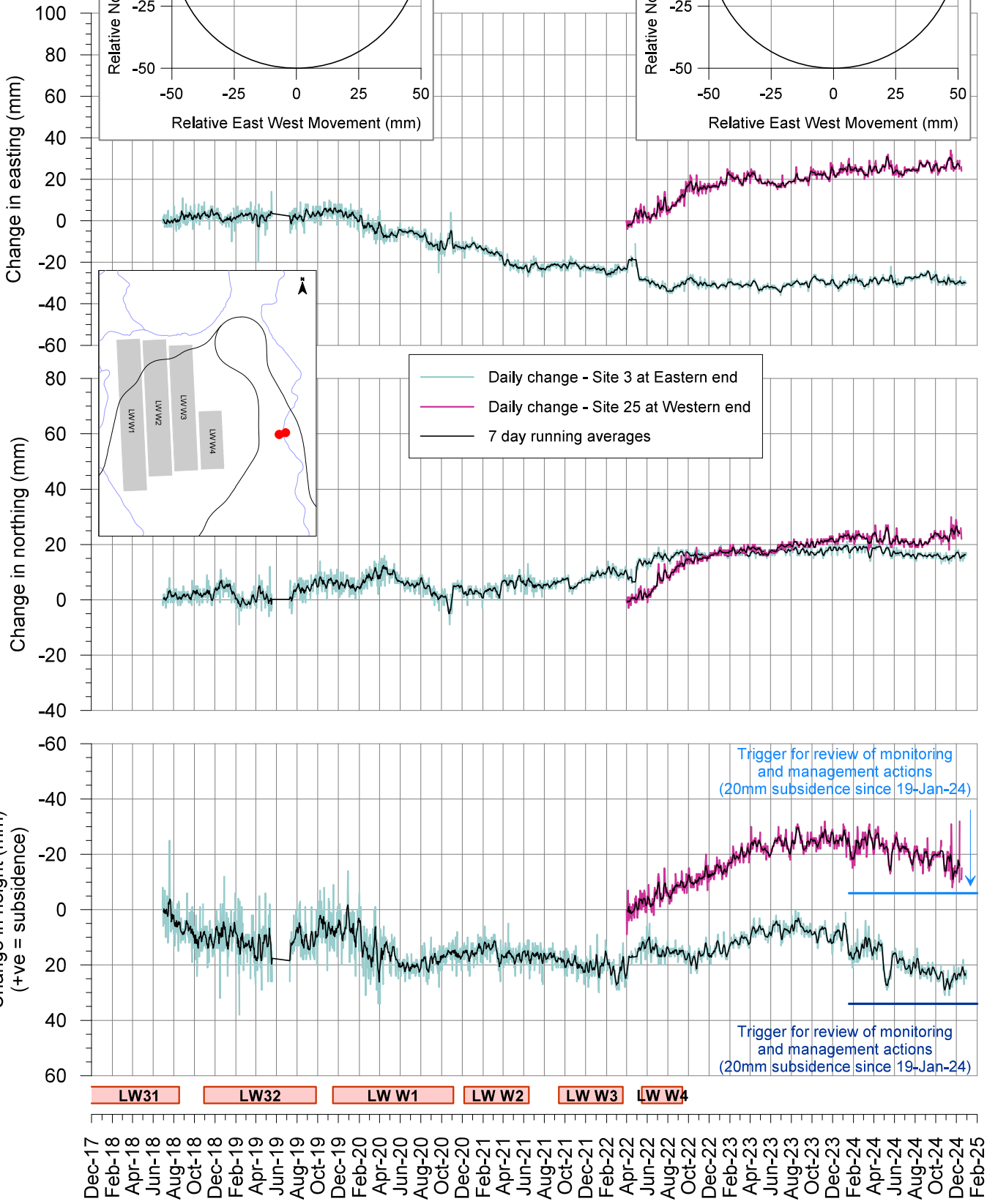
msec

Fig. 12-R04

Tahmoor Western Domain - Main Southern Railway
GNSS Monitoring at Victoria Bridge (Sites 03 and 25)

I:\Projects\Tahmoor\MSEC1422 - Residual Subsidence Monitoring LW W1-W4\Subsdata\Fig. 13 - Sites 3 and 25.grf

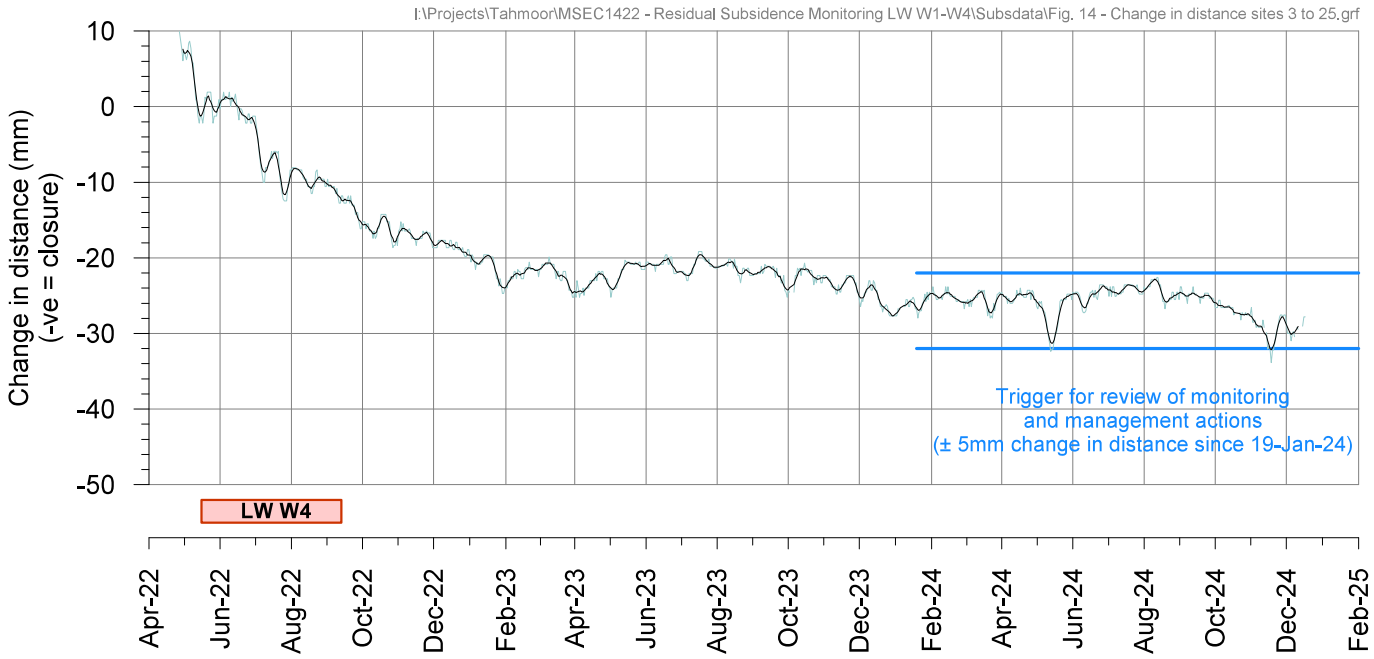


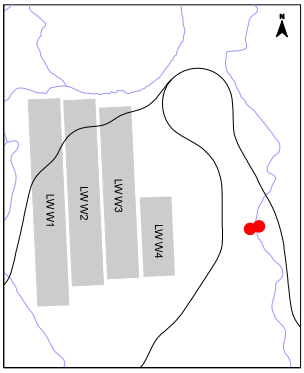


msec

Fig. 13-R04

Tahmoor Western Domain - Main Southern Railway
GNSS Monitoring at Victoria Bridge (Sites 03 and 25)





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APPENDIX 14

simecgfg.com

Technical Memorandum

To:	Nick Le Baut	**From:**	Raymond Minnaar
Company:	Tahmoor Coal Pty Ltd	**SLR Consulting Australia Pty Ltd**	
cc:	Natalie Brumby	**Date:**	29 September 2025
		Project No.	610.033041.00002

RE: Tahmoor Western Domain Groundwater Monitoring Review

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This document is confidential and may contain legally privileged information. If you are not a named or authorised recipient, you must not read, copy, distribute or act in reliance on it. If you have received this document in error, please notify us immediately and return the document by mail.

1.0 Introduction

Tahmoor Coal has requested a focused review of groundwater level behaviour in the Western Domain (LW W1 – W4) to determine whether residual subsidence-related groundwater monitoring can be rationalised or ceased in accordance with the Western Domain Water Management Plan (WMP). This memorandum outlines the objectives, scope, decision framework and analytical approach applied to recent bore hydrographs and associated datasets, and provides recommendations regarding the future monitoring regime for the Western Domain.

1.1 Background and Context

Mining at Western Domain commenced on 15 November 2019, and concluded on 13 September 2022. The Western Domain mining area lies within Mining Lease (ML) 1376 and ML 1539. Western Domain comprises 4 longwalls; Longwall (LW) West 1 (W1), LW West 2 (LW W2), LW West 3 (LW W3) and LW West 4 (LW W4).

The governing document, pertinent here for understand monitoring requirements, is the Longwall W3-W4 Water Management Plan (Tahmoor Coal, 2021).

Post-mining groundwater monitoring was undertaken for approximately fifteen months and the Western Domain post-mining monitoring program was recorded as complete in December 2023 (SLR, 2024). This memorandum consolidates the most recent groundwater observations and provides a structured assessment of post-mining trends and stability to support decisions on residual monitoring in the Western Domain.

1.2 Regulatory Framework and Decision Criteria (Western Domain)

Groundwater monitoring and post-mining residual assessment for the Western Domain are governed by LW W3 – W4 Water Management Plan (TAH-HSEC-326). The WMP defines groundwater Trigger Action Response Plans (TARPs) for levels, pressures and quality; identifies the monitoring network and the role of each asset (impact or control); and specifies post-mining monitoring for at least twelve months following completion of LW W4, extendable at the Environmental Response Group's discretion.

The decision context adopted here is therefore straightforward: where hydrographs exhibit material ongoing change, residual monitoring remains warranted; where water levels are demonstrably stable or recovered, rationalisation or cessation is justified under the WMP.

1.3 Objectives

The assessment objectives are to:

- quantify the magnitude of historical mining-related depressurisation in the Western Domain and characterise post-mining behaviour,
- determine whether groundwater levels are stable or continuing to change using formal statistical and variability tests,
- normalise groundwater responses for climate effects to separate mining recovery from climatic variability,
- review current groundwater levels against TARP trigger levels, and
- provide clear recommendations regarding ongoing monitoring requirements.

1.4 Scope and Study Area

This memorandum focuses on the available Western Domain bores and instruments, including operational open standpipe piezometers (OSPs) and vibrating-wire piezometers (VWPs), together with the concurrent climate record. The primary evaluation window is 1 January 2024 to 31 December 2024. Earlier records are used, where relevant, to confirm pre-mining baselines, quantify mining-period drawdown, and trace post-mining behaviour. Decommissioned or inaccessible sites are acknowledged for context but are excluded from quantitative assessment. A brief statement on the current Tahmoor South monitoring status is provided for context only. No South Domain datasets are analysed or interpreted.

1.4.1 Data Sources

This assessment draws on datasets supplied by Tahmoor Coal for the available Western Domain bores and instruments, together with the concurrent climate record. The data received comprised:

- Continuous logger water-level series for P14A, P14B, P14C, P14D and P16A, P16B, P16C.
- Vibrating-wire piezometer pressure series for TNC036 with operational intakes at approximately 65 m, 97 m, 169 m, 214 m and 412.5 m below ground level. Historical records note removal of the ~298.5 m intake and a deepest intake at ~463.5 m in the Bulli Coal seam.
- Vibrating-wire piezometer pressure series for TNC040 with operational shallow intakes at approximately 27 m (Wianamatta Group) and 65 m (Hawkesbury Sandstone).
- Vibrating-wire piezometer pressure series for WD02 (post-mining height-of-fracturing (HoF) installation) with eight functional sensors and continuous records since construction.

1.5 Assessment Methodology

The assessment examines groundwater levels and pressures at each monitoring location to determine whether post-mining conditions are stable or still adjusting. Hydrographs are interpreted alongside a cumulative rainfall residual departure derived from the site gauge so that climate-driven fluctuations are distinguished from mining-related behaviour. Established hydrogeological time-series techniques are applied, including non-parametric trend testing, slope estimation and rolling variability statistics, together with recovery indicators that relate

present heads to pre-extraction baselines and mining-period drawdown. Results are synthesised across monitoring locations to classify behaviour as recovered or stable, recovering, continuing change or uncertain. The same approach is applied consistently across bores and vibrating-wire piezometer sensors, with the underlying datasets and full methodology documented in **Section 3.0**.

1.6 Stability Assessment Criteria

Classification is based on hydrograph behaviour at each monitoring location, interpreted using consistent diagnostics. The interpretation considers the recent trend result from the seasonal Mann–Kendall test, the magnitude of the fitted Sen's slope, variability relative to the pre mining baseline, residual drawdown, and the rainfall-normalised context. The aim is to determine whether heads have achieved a stable post mining condition or are still adjusting.

The four classifications include recovered or stable, recovering, continuing change or uncertain, with each detailed below.

A monitoring location is classified as *recovered or stable* when the recent window shows no statistically significant monotonic trend and the fitted slope is near zero. In this state, the hydrograph shows variability reconverging toward the pre mining envelope, residual drawdown that is small and not increasing, and hydraulic heads oscillating within a narrow range around an equilibrium consistent with post mining conditions in the relevant stratigraphic unit.

A monitoring location is classified as *recovering* when the recent window shows a statistically significant upward trend and the slope magnitude is smaller than in earlier post mining periods. In this condition, variability contracts toward the baseline range and residual drawdown decreases through time, indicating attenuation of mining influence. The hydrograph therefore shows heads migrating toward the pre mining baseline or trending toward a new equilibrium consistent with the hydrogeological setting.

A monitoring location is classified as *continuing change* when a statistically significant trend persists away from baseline conditions, or when variability remains elevated without reconvergence after climatic forcing is accounted for. In this condition, residual drawdown does not reduce or new departures from baseline emerge, and the pressure response is not consistent with stabilisation.

Where records are incomplete or diagnostics are inconsistent, the status is recorded as *uncertain*. In such cases, monitoring continues under a precautionary approach until subsequent observations allow classification against the criteria above.

2.0 Western Domain Setting and Monitoring Context

The Western Domain comprises four longwall panels located west of the Tahmoor South extraction area together with a dedicated groundwater monitoring network. Monitoring includes open standpipe piezometers at P14 and P16 and vibrating-wire piezometers at TNC036, TNC040 and WD02.

The initial monitoring network utilised during mining activities, included seven monitoring bores sites, P12, P13, P14, P15, P16 and P17, five private landholder bores, was reduced post-mining in accordance with landholder agreements and ongoing access. WD01 was decommissioned at the outset of the post-mining period. Nearby private bores are referenced for context where records are available. The network samples the principal stratigraphic units and provides both vertical and lateral coverage across the domain.

2.1 Western Domain Mining Sequence

Longwall extraction in the Western Domain proceeded sequentially across four panels between 15 November 2019 and 13 September 2022. Longwall W1 operated from 15 November 2019 to 6 November 2020, a period of 357 days (about 11.7 months). Longwall W2 operated from 7 December 2020 to 17 June 2021, a period of 192 days (about 6.3 months). Longwall W3 operated from 13 September 2021 to 21 March 2022, a period of 189 days (about 6.2 months). Longwall W4 operated from 16 May 2022 to 13 September 2022, a period of 120 days (about 3.9 months).

Taken together, active extraction across W1 to W4 amounts to 858 days (about 28.2 months, or 2.35 years) of mining time. Across the full calendar span from the start of W1 to the end of W4 there were 1033 days (about 33.9 months, or 2.82 years), which includes planned non-mining intervals totalling 175 days between panels. Those intervals comprised approximately 31 days between W1 and W2, 88 days between W2 and W3, and 56 days between W3 and W4. For groundwater assessment purposes, the post-mining period commences on 13 September 2022, the date on which extraction of W4 concluded. The Western Domain mining sequence is summarised in **Table 1**.

Table 1 Western Domain Mining Operations

Longwall	Start Date	End Date
LW W1	15 November 2019	6 November 2020
LW W2	7 December 2020	17 June 2021
LW W3	13 September 2021	21 March 2022
LW W4	16 May 2022	13 September 2022

2.2 Hydrogeological Setting

The Western Domain overlies a typical Sydney Basin sequence. Near-surface soils and weathered materials are underlain by the Wianamatta Group, which generally exhibits lower hydraulic conductivity and can support perched or semi-confined conditions. The Hawkesbury Sandstone forms a more transmissive fractured-rock aquifer and hosts many of the standpipe installations at P14 and P16. Beneath the Hawkesbury Sandstone the Narrabeen Group includes the Bulgo Sandstone, which presents moderate transmissivity and is monitored via selected vibrating-wire intakes. The Bulli Coal seam is the mined horizon at depth. Bedding, joint sets and local structures influence fracture connectivity, and subsidence associated with extraction can modify vertical and lateral permeability within the overburden. This stratigraphic framework explains the differing sensitivities of shallow piezometers and deeper pressure sensors and provides the structural context for the assessment.

2.3 Climatic Setting

Rainfall at Tahmoor follows a temperate regime with year-round precipitation and seasonal variability that influences shallow groundwater responses. Climatic context for this memorandum is derived from the site rainfall gauge daily record and long-term monthly averages from the SILO gridded dataset centred near Tahmoor. For 2024, the site gauge recorded approximately 878.7 mm, which is about six per cent above the long-term annual average (828.8 mm). Departures from monthly averages are presented with the rainfall analysis in Section 4.1. Rainfall recorded over the reporting period (January 2024 to December 2024), compared to the long-term average (i.e., from January 1970 to the present), is summarised in **Table 2** and presented on **Figure 2**.

Table 2 Monthly Rainfall vs Long-Term Average Rainfall

SILO (-34.25, 150.60)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Long-term average rainfall (mm)	84.9	112.3	97.5	71.6	55.8	63.4	40.8	46.8	43.4	63.0	81.7	67.6
January - December 2024 monthly rainfall (mm)	69.7	69.0	34.8	190.8	105.7	135.9	31.8	21.9	30.5	30.0	107.5	51.1

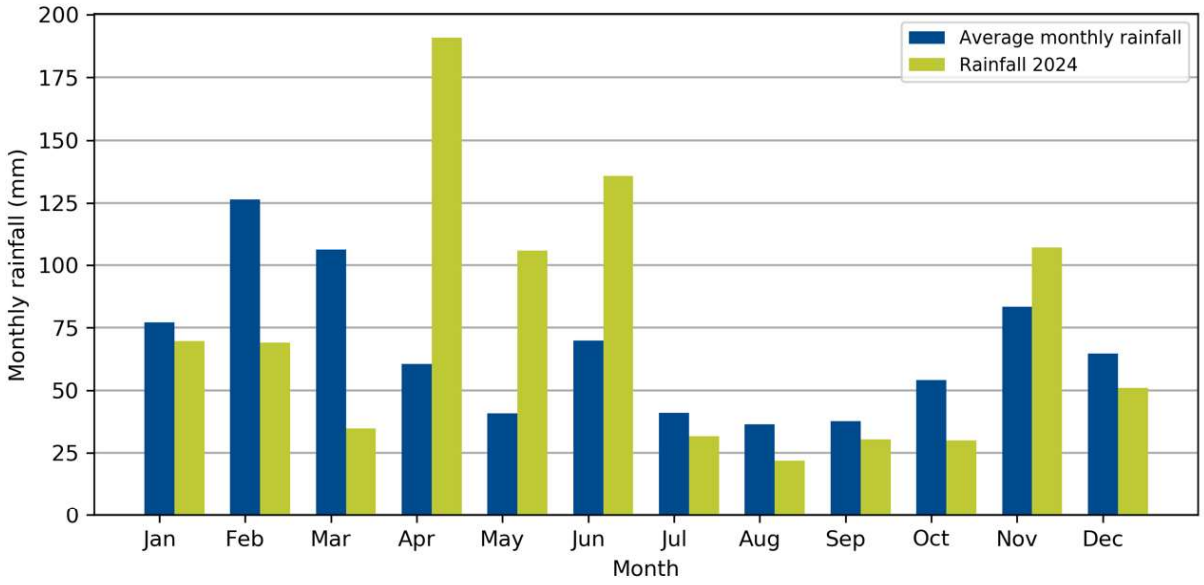


Figure 1 Monthly rainfall and long term average monthly rainfall (2000 – 2024)

2.4 Monitoring Network Overview and Status

The Western Domain monitoring network provides coverage across the principal hydrostratigraphic units and along positions that surround longwalls W1 to W4. OSPs at P14 and P16 chiefly monitor the Hawkesbury Sandstone. The nested construction at each site allows depth-discrete observations and sensitivity to vertical gradients.

The VWP installations extend coverage through the overburden into the coal measures. At TNC036, intakes are installed within the Hawkesbury Sandstone and the Bulgo Sandstone, and the deepest intake is located in the Bulli Coal seam. At TNC040, shallow intakes monitor the Wianamatta Group and the Hawkesbury Sandstone, while deeper intakes were sheared during mining the operation period and consequently not active during the evaluation period. WD02 is a post-mining multi-level installation commissioned in 2023. Its eight sensors step from the Hawkesbury Sandstone into the Narrabeen Group and down to the seam interval, providing a vertical profile of pressure response through the overburden to the coal measures.

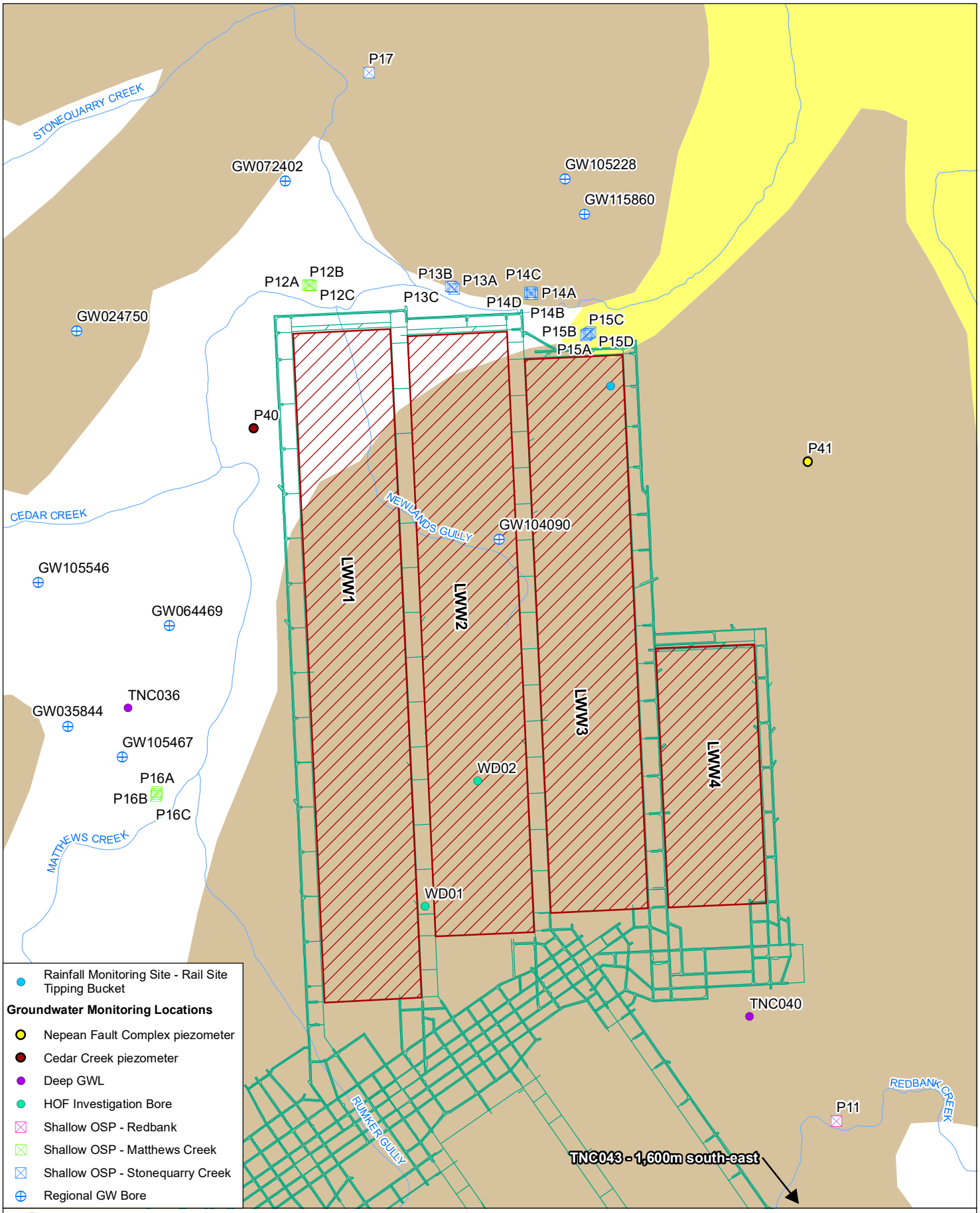
Not all monitoring locations remain accessible or instrumented. The assessment draws on the available Western Domain bores and VWP sensors that have sufficient recent record and acceptable data quality for the evaluation window. No new data were available for surrounding private groundwater bores. No data were received from the client and a check of the Bureau of Meteorology Groundwater Explorer and the NSW Water Insights real-time databases did not identify additional records for the reporting period.

The current configuration is summarised in **Table 3**, which lists each monitoring location and intake, the screened interval and stratigraphic assignment, the mode of measurement (continuous logging or manual), operational status, and data coverage during 2024. The monitoring bores and Western Domain longwalls are illustrated in **Figure 2**.

Table 3 Western Domain Groundwater Monitoring Network and Current Status Summary

Site ID	Type	VWP Sensor ID	Ground RL (mAHD)	Total Depth / Sensor Depth (mBGL))	Piezometer Ground Elevation (mAHD)	Target Formation	Operational Status	Groundwater Level Monitoring Data	
								Minimum available date	Maximum available date
P14A	SP	NA	173.03	6.0	167.03	Alluvium/colluvium	Functional	19-06-2019	18-06-2025
P14B	SP	NA	173.20	16.6	156.60	Hawkesbury Sandstone	Functional	19-06-2019	18-06-2025
P14C	SP	NA	173.81	31.6	142.21	Hawkesbury Sandstone	Functional	19-06-2019	18-06-2025
P14D	SP	NA	173.88	61.6	112.28	Hawkesbury Sandstone	Functional	19-06-2019	18-06-2025
P16A	SP	NA	227.94	27.5	200.44	Hawkesbury Sandstone	Functional	14-05-2019	18-06-2025
P16B	SP	NA	228.41	45.5	182.91	Hawkesbury Sandstone	Functional	14-05-2019	18-06-2025
P16C	SP	NA	228.96	75.5	153.46	Hawkesbury Sandstone	Functional	14-05-2019	19-06-2025
TNC36	VWP	Sensor 1	231.25	65.0	166.25	Hawkesbury Sandstone	Functional	20-01-2016	29-07-2025
	VWP	Sensor 2		97.0	134.25	Hawkesbury Sandstone	Functional	20-01-2016	29-07-2025
	VWP	Sensor 3		169.0	62.25	Bulgo Sandstone	Functional	20-01-2016	29-07-2025
	VWP	Sensor 4		214.0	17.25	Bulgo Sandstone	Functional	20-01-2016	29-07-2025
	VWP	Sensor 5		298.5	-67.25	Bulgo Sandstone	Removed from monitoring network in 2020 (GES, 2020)	20-01-2016	29-10-2020
	VWP	Sensor 6		412.5	-181.25	Bulgo Sandstone	Functional	20-01-2016	29-07-2025
	VWP	Sensor 7		463.5	-232.25	Bulli Coal Seam	Functional	20-01-2016	29-07-2025
TNC40	VWP	Sensor 1	229.03	27.0	202.03	Wianamatta Formation	Functional	18-12-2009	29-07-2025
	VWP	Sensor 2		65.0	164.03	Hawkesbury Sandstone	Functional	18-12-2009	29-07-2025
	VWP	Sensor 3		111.0	118.03	Hawkesbury Sandstone	Not active/failed since 2019 (GES, 2019)	18-12-2009	01-02-2019
	VWP	Sensor 4		225.0	4.03	Hawkesbury Sandstone	Not active/failed since 2019 (GES, 2019)	18-12-2009	21-03-2019
	VWP	Sensor 5		252.0	-22.97	Bald Hill Claystone	Not active/failed since 2019 (GES, 2019)	18-12-2009	20-06-2019
	VWP	Sensor 6		352.0	-122.97	Bulgo Sandstone	Not active/failed since 2019 (GES, 2019)	18-12-2009	21-03-2019
	VWP	Sensor 7		482.0	-252.97	Scarborough Sandstone	Not active/failed since 2019 (GES, 2019)	18-12-2009	11-01-2019
	VWP	Sensor 8		501.9	-272.86	Bulli Coal Seam	Not active/failed since 2018 (GES, 2019)	18-12-2009	26-08-2018
WD02	VWP	Sensor 1	270.72	130.0	140.72	Hawkesbury Sandstone	Functional	27-03-2023	14-07-2025
	VWP	Sensor 2		200.0	70.72	Hawkesbury Sandstone	Functional	27-03-2023	14-07-2025
	VWP	Sensor 3		240.0	30.72	Newport Formation	Functional	27-03-2023	14-07-2025
	VWP	Sensor 4		280.0	-9.28	Bulgo Sandstone	Functional	27-03-2023	14-07-2025
	VWP	Sensor 5		305.0	-34.28	Bulgo Sandstone	Functional	27-03-2023	14-07-2025
	VWP	Sensor 6		330.0	-59.28	Bulgo Sandstone	Functional	27-03-2023	14-07-2025
	VWP	Sensor 7		355.0	-84.28	Bulgo Sandstone	Functional	27-03-2023	14-07-2025
	VWP	Sensor 8		410.0	-139.28	Bulgo Sandstone	Functional	27-03-2023	14-07-2025

SP: Standpipe Piezometer
VWP: Vibrating Wire Piezometer
mAHD: meters Australian Height Datum
mBGL: meters below ground level
NA: not applicable



TAHMOOR COAL WESTERN DOMAIN MONITORING REVIEW

Groundwater Monitoring Network

SLR

FIGURE 1

H:\Projects-SLR\640-MEL\640.030985.00001 Tahmoor WD Quaterly July-Sept\06 SLR Data\01 CAD\GIS\GIS\640.030985 Fig1 Tahmoor Coal Groundwater Monthly Review (Oct 2022).mxd

3.0 Groundwater Monitoring Results

This section presents the monitoring outcomes for the Western Domain. Rainfall context is first summarised from the site gauge using a cumulative rainfall residual departure to frame subsequent groundwater responses. Hydrographs then show heads for the P14–P16 standpipes, followed by depth-discrete pressure results from VWP intakes at TNC036, TNC040 and WD02. Reported values include recent and post-mining trend estimates, variability relative to pre-extraction baselines, residual drawdown and percentage recovery. Interpretation of causes and implications for the monitoring program is also provided.

3.1 Cumulative Rainfall Departure

Monthly rainfall totals were compiled from the site gauge daily record and aggregated to calendar months. Climatic variability for groundwater interpretation is expressed using a cumulative rainfall residual departure (CRD) constructed against long-term monthly means from the SILO grid centred near Tahmoor. Positive CRD slope indicates months wetter than average; negative slope indicates months drier than average. The accompanying figure presents the monthly totals and CRD on a common time axis.

Total site rainfall in 2024 was approximately 878.7 mm, which is about six per cent above the long-term annual average (~828.8 mm). Within the year, January – March were below their long-term monthly means, April – June were above average (approximately 119 mm, 50 mm and 73 mm, respectively), August was below average (approximately 25 mm), and November exceeded its monthly mean; the remaining months were close to average. Consistent with these departures, the CRD exhibits a pronounced rise through autumn 2024, a flattening to slight decline in late winter, and a smaller rise in November (**Figure 3**).

Placed in the broader context since 2019, the CRD indicates a wetter-than-average phase through much of 2020 to early 2023, a drier interval during mid to late 2023, and conditions that were broadly near average through 2024 apart from the autumn wet pulse noted above.

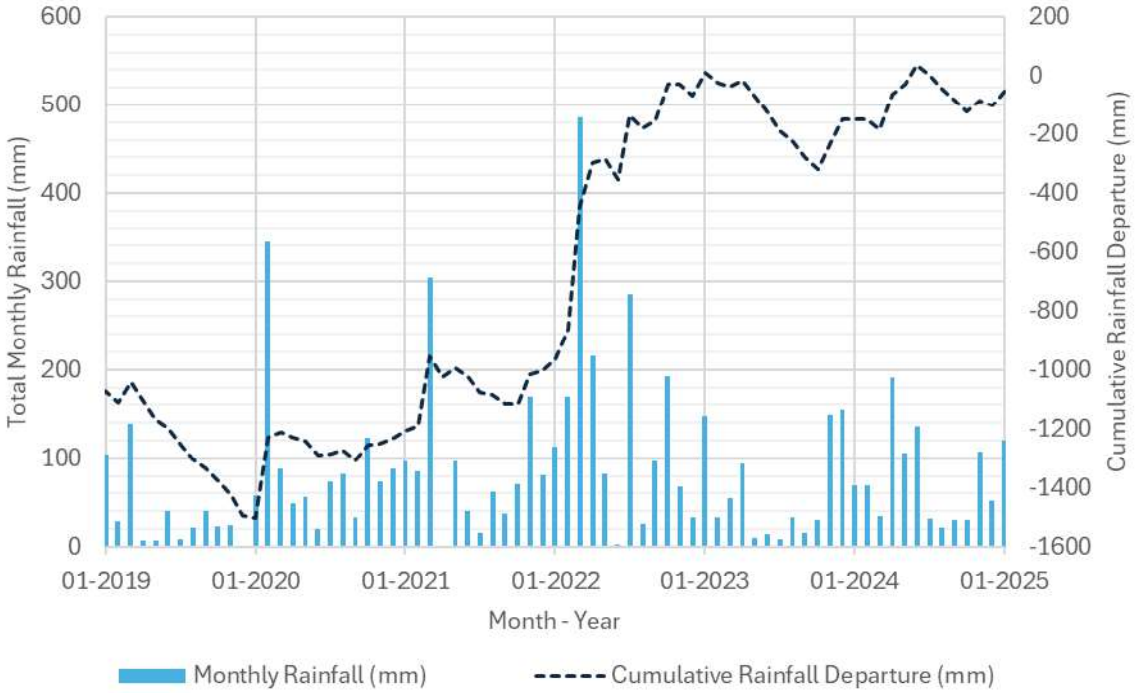


Figure 3 Tahmoor Monthly Rainfall and Cumulative Rainfall Departure

3.2 Groundwater Level Monitoring Data

Groundwater levels and pressures were converted to head (mAHD) using surveyed collar levels; routine QA reconciled logger and manual measurements and removed obvious artefacts.

The groundwater level trend analyses use cleaned logger records with hydraulic head expressed in metres AHD for OSPs and VWPs. The pre-extraction baseline for each standpipe is the median head prior to 15 November 2019. Maximum mining-period drawdown is measured between 15 November 2019 and 13 September 2022. Residual drawdown at the end of the assessment window is the difference between the baseline and the mean head over the final ninety days. Percentage recovery is the proportion of the mining-period drawdown that has been regained.

Two trend measures are reported. The post-mining slope is fitted from 13 September 2022 to the latest measurement and describes the overall rate of change since extraction ceased. The recent-window slope is fitted to the most recent twelve months and reflects current behaviour. Sen's slope is a robust estimate of the rate of change in hydraulic head, calculated as the median of all pairwise slopes so it copes with irregular sampling and outliers. The seasonal Mann–Kendall test is a non-parametric test that checks for a consistent upward or downward trend after allowing for repeating monthly patterns. The reported p value is its significance level. Values below 0.05 indicate a statistically detectable trend. The rainfall cumulative residual departure is plotted for context and is not used in the slope calculations.

3.2.1 OSP Statistical Analysis

3.2.1.1 P14 (A-D)

Across the P14 cluster, heads presently sit above their pre-extraction medians and recent slopes are not statistically different from zero. At P14A, the recent-window slope is −0.307 metres per year with p = 0.50, while the post-mining slope is +0.077 metres per year with p = 0.59. The standpipe did not experience material mining-period drawdown, with a maximum of 0.18 metres, and the twelve-month mean head to June 2025 is 1.35 metres above baseline.

At P14B, the recent-window slope is −0.102 metres per year with p = 0.67, and the post-mining slope is +0.018 metres per year with p = 0.72. The maximum drawdown during extraction was 1.64 metres, and current heads are 1.26 metres above baseline.

At P14C, the recent-window slope is +0.161 metres per year with p = 0.25, and the post-mining slope is +0.013 metres per year with p = 0.84. The maximum drawdown was 1.96 metres, and current heads are 1.49 metres above baseline.

At P14D, the recent-window slope is −0.013 metres per year with p = 0.95, and the post-mining slope is +0.043 metres per year with p = 0.46. The maximum drawdown was 2.37 metres, and current heads are 2.35 metres above baseline.

The hydrograph for P14A–D is shown in **Figure 4**.

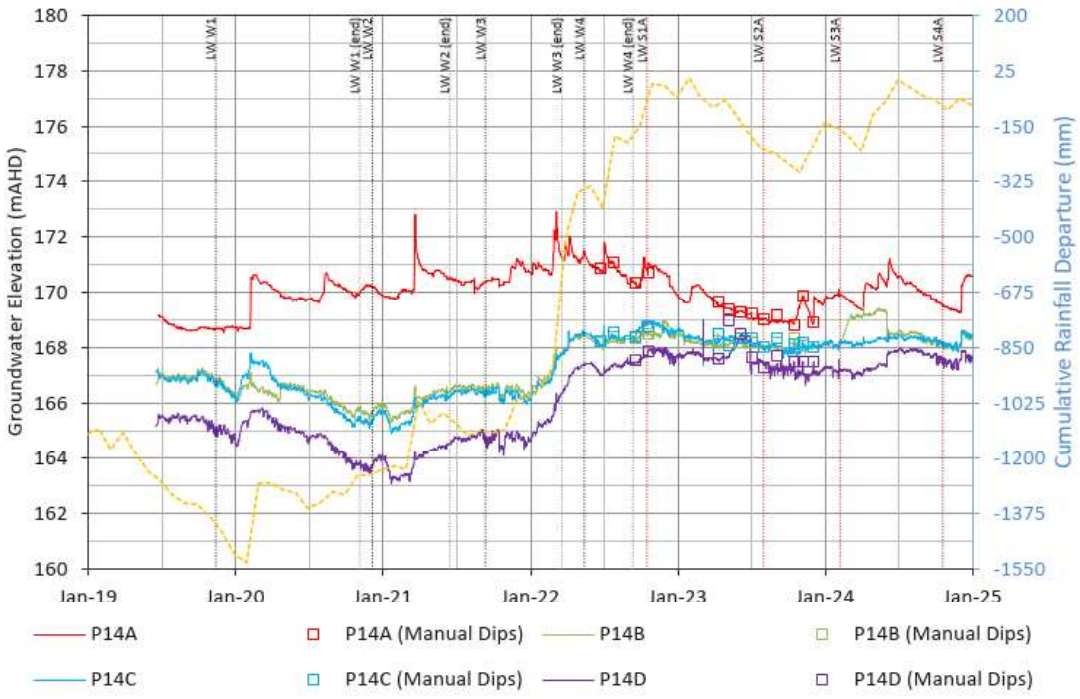


Figure 4 P14A–D groundwater elevations and CRD

3.2.1.2 P16 (A-C)

The P16 cluster shows post-mining rises, with differing degrees of residual drawdown. At P16A, the recent-window slope is −0.053 metres per year with p = 0.50, whereas the post-mining slope is +0.188 metres per year with p = 2.5×10^{-4}, indicating a statistically detectable rise since September 2022. The maximum mining-period drawdown was 1.41 metres, and

the current residual drawdown is 0.58 metres, which represents approximately 59 per cent recovery toward the baseline.

At P16B, both the recent and post-mining slopes are positive and statistically detectable. The recent-window slope is +0.317 metres per year with p = 3.2 x10^{-4}, and the post-mining slope is +0.409 metres per year with p = 7.6 x10^{-12}. The maximum drawdown during extraction was 6.70 metres, and the present residual drawdown is 0.23 metres, corresponding to approximately 96.5 per cent recovery.

At P16C, the recent-window slope is +0.416 metres per year with p = 0.60 (nine months of recent data), and the post-mining slope is +1.861 metres per year with p = 9.0 x10^{-10}. The maximum drawdown was 15.62 metres, and heads are now 0.10 metres above the pre-extraction baseline, indicating effective completion of recovery.

The hydrograph for P16A–C is shown in **Figure 5**.

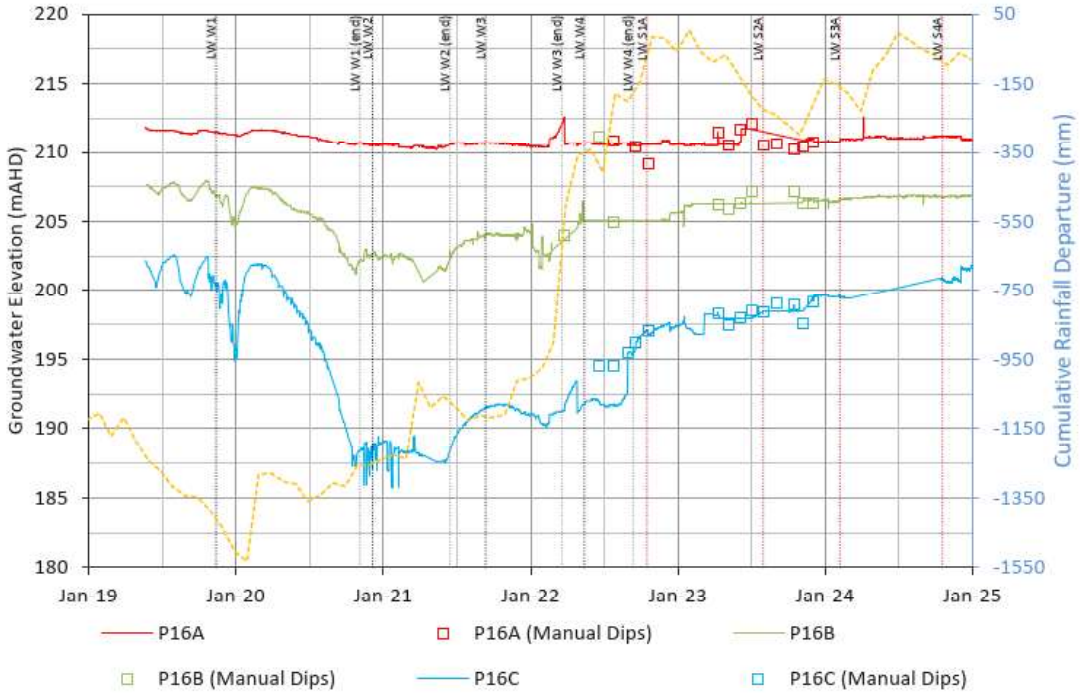


Figure 5 P16A–C groundwater elevations and CRD

3.2.2 VWP Statistical Analysis

3.2.2.1 TNC036

HBSS-65 m (Hawkesbury Sandstone). The post-mining slope is +0.395 metres per year (p = 0.011) and the recent-window slope is +0.814 metres per year (p = 0.044). The maximum drawdown during extraction was 4.59 metres. Heads at the end of the period are 4.24 metres above the pre-extraction baseline, indicating full recovery and subsequent rise relative to baseline conditions.

HBSS-97 m (Hawkesbury Sandstone). The post-mining slope is +1.610 metres per year (p < 0.001) and the recent-window slope is +0.329 metres per year (p = 0.059). The maximum drawdown was 28.74 metres. Residual drawdown is 5.75 metres, which corresponds to approximately eighty per cent recovery toward baseline.

BGSS-169 m (Bulgo Sandstone). The post-mining slope is +3.906 metres per year ($p < 0.001$) and the recent-window slope is +0.308 metres per year ($p = 0.200$). The maximum drawdown was 49.26 metres. Residual drawdown is 4.59 metres, indicating approximately ninety-one per cent recovery.

BGSS-214 m (Bulgo Sandstone). The post-mining slope is +14.256 metres per year ($p < 0.001$) and the recent-window slope is +1.299 metres per year ($p = 0.044$). The maximum drawdown was 103.37 metres. Residual drawdown is 41.50 metres, indicating approximately sixty per cent recovery with a relatively large residual.

BGSS-412.5 m (deep Bulgo Sandstone). The post-mining slope is −8.316 metres per year ($p < 0.001$) and the recent-window slope is −1.536 metres per year ($p = 0.127$). The maximum drawdown within the extraction window was 107.50 metres. The current residual drawdown is 134.76 metres, which exceeds the mining-period drawdown, indicating continued depressurisation after mining ceased and that the minimum head occurred in the post-mining period.

BUSM-463.5 m (Bulli Coal seam). The post-mining slope is −5.490 metres per year ($p < 0.001$) and the recent-window slope is −3.068 metres per year ($p = 0.044$). The maximum drawdown during the extraction window was 13.73 metres. The present residual drawdown is 29.69 metres, also greater than the mining-period drawdown, which is consistent with ongoing depressurisation within the coal measures, likely associated with ongoing extractive operations in Tahmoor South.

The hydrograph for TNC036 is shown in **Figure 6**.

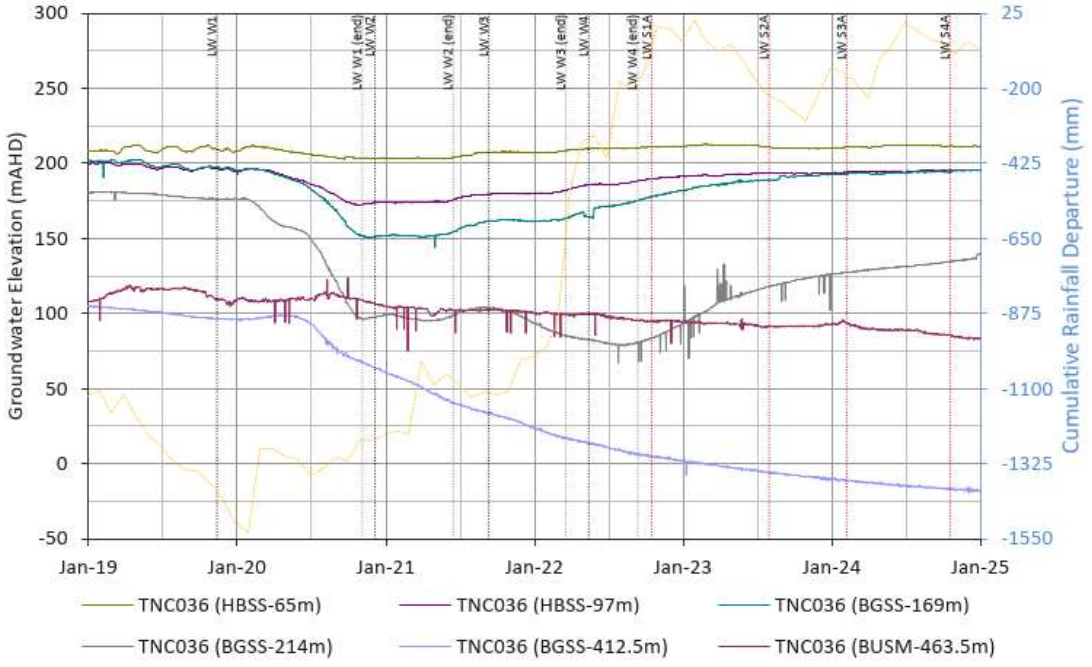


Figure 6 TNC036 groundwater elevations and CRD

3.2.2.2 TNC040

HBSS-65 m (Hawkesbury Sandstone). The post-mining slope is −0.141 metres per year ($p = 0.159$) and the recent-window slope is −0.231 metres per year ($p = 0.0059$). The maximum drawdown during extraction was 2.38 metres. The current residual drawdown is 1.25 metres, which equates to approximately forty-seven per cent recovery. This intake shows a statistically detectable recent decline with a moderate residual relative to baseline.

WMFM-27 m (Wianamatta Formation). The post-mining slope is −0.482 metres per year (p = 0.0286), indicating a detectable decline over the post-mining interval. The recent-window slope is −0.600 metres per year (p = 0.0769), which is not statistically distinguishable from zero at the 0.05 level. The maximum drawdown during extraction was 0.484 metres. The current residual drawdown is 0.034 metres, which corresponds to approximately ninety-three per cent recovery.

The hydrograph for TNC040 is shown in **Figure 7**.

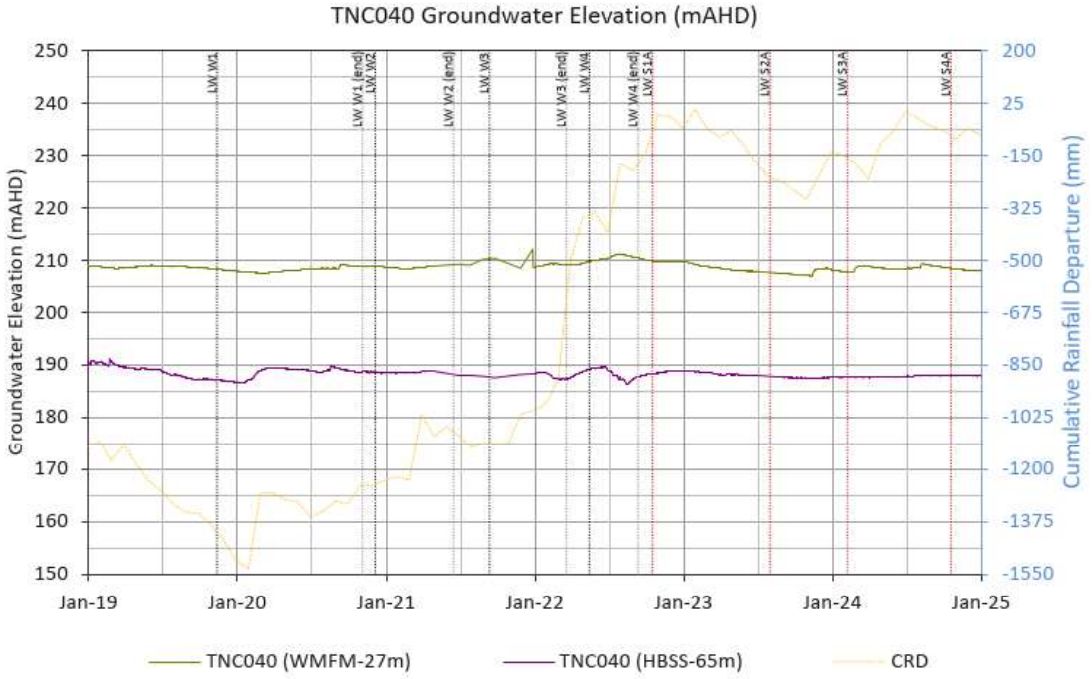


Figure 7 TNC040 groundwater elevations and CRD

3.2.2.3 WD02

For WD02, the logger records begin after 15 November 2019 and therefore do not establish a pre-extraction baseline within this dataset. Maximum mining-period drawdown, residual drawdown and percentage recovery cannot be evaluated on this basis. Trends are nonetheless informative and are reported below.

HBSS-130 m (Hawkesbury Sandstone). The post-mining slope is −0.113 metres per year (p = 0.200). The recent-window slope is +0.144 metres per year (p = 0.428). Heads are essentially stable at this intake.

HBSS-200 m (Hawkesbury Sandstone). The post-mining slope is +2.482 metres per year (p < 0.001) and the recent-window slope is +0.429 metres per year (p = 0.017), indicating a statistically detectable rise with continued, but slower, recent increase.

NPFM-240 m (Newport Formation). The post-mining slope is +9.574 metres per year (p < 0.001) and the recent-window slope is +0.341 metres per year (p = 0.0586), indicating a strong post-mining rise with a recent rate that is smaller and not statistically distinguishable from zero at the 0.05 level.

BGSS-280 m (Bulgo Sandstone). The post-mining slope is +7.379 metres per year (p < 0.001) and the recent-window slope is +1.989 metres per year (p = 0.006), consistent with a continuing rise.

BGSS-305 m (Bulgo Sandstone). The post-mining slope is +0.494 metres per year (p = 0.347) and the recent-window slope is +4.637 metres per year (p = 0.044), indicating a recent acceleration upward.

BGSS-330 m (Bulgo Sandstone). The post-mining slope is −12.463 metres per year (p < 0.001) and the recent-window slope is −5.000 metres per year (p = 0.006), indicating a pronounced and continuing decline.

BGSS-355 m (Bulgo Sandstone). The post-mining slope is −1.631 metres per year (p < 0.001). The recent-window slope is −0.167 metres per year (p = 0.077), showing a small, not statistically detectable, recent decline.

BGSS-410 m (Bulgo Sandstone). The post-mining slope is −1.757 metres per year (p < 0.001) and the recent-window slope is −0.273 metres per year (p = 0.044), indicating continued decline with a modest, statistically detectable, recent rate.

The hydrograph for WD02 is shown in **Figure 8**.

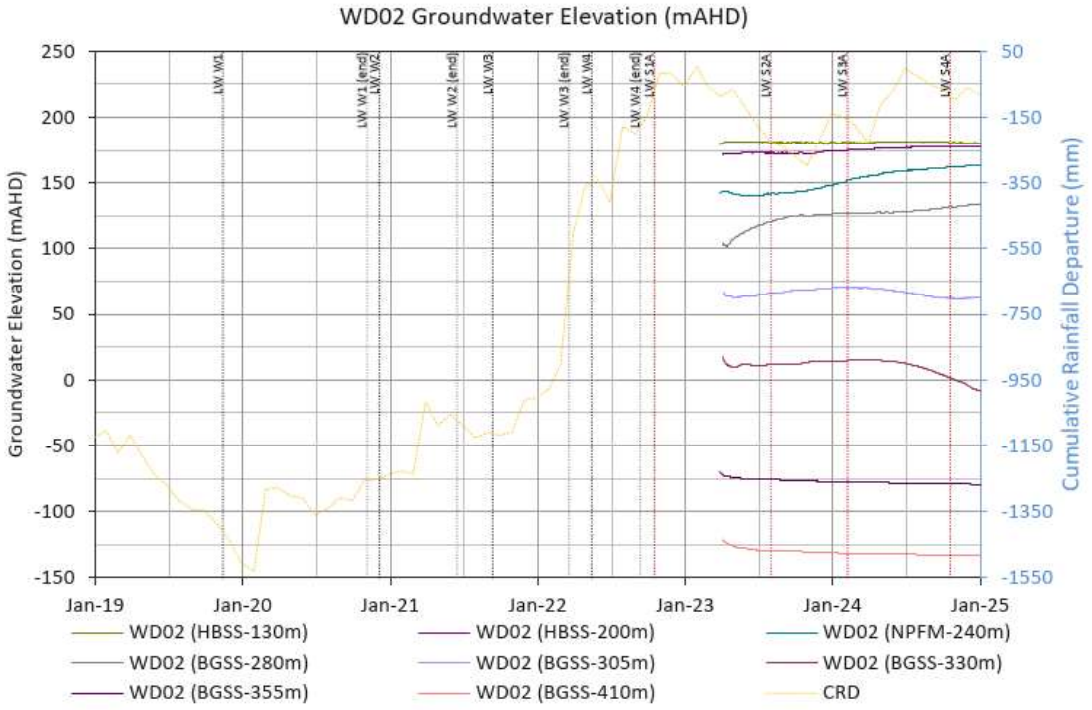


Figure 8 WD02 groundwater elevations and CRD

3.2.3 OSP TARP Trigger Analysis

TARP Level 1 is considered representative of baseline conditions, whilst a breach of TARP Level 2 indicated potential impact requiring action. The TARP Level 2 trigger values have been plotted with the groundwater elevations and are presented in the following sub-sections.

3.2.3.1 P14 (A – D)

Figure 9 presents the groundwater elevation time-series with the TARP Trigger Level 2 elevation for each OSP (colour matched). All the P14 bores are above the level 2 trigger, indicating no active exceedances and groundwater can be considered within to be representative of baseline conditions.

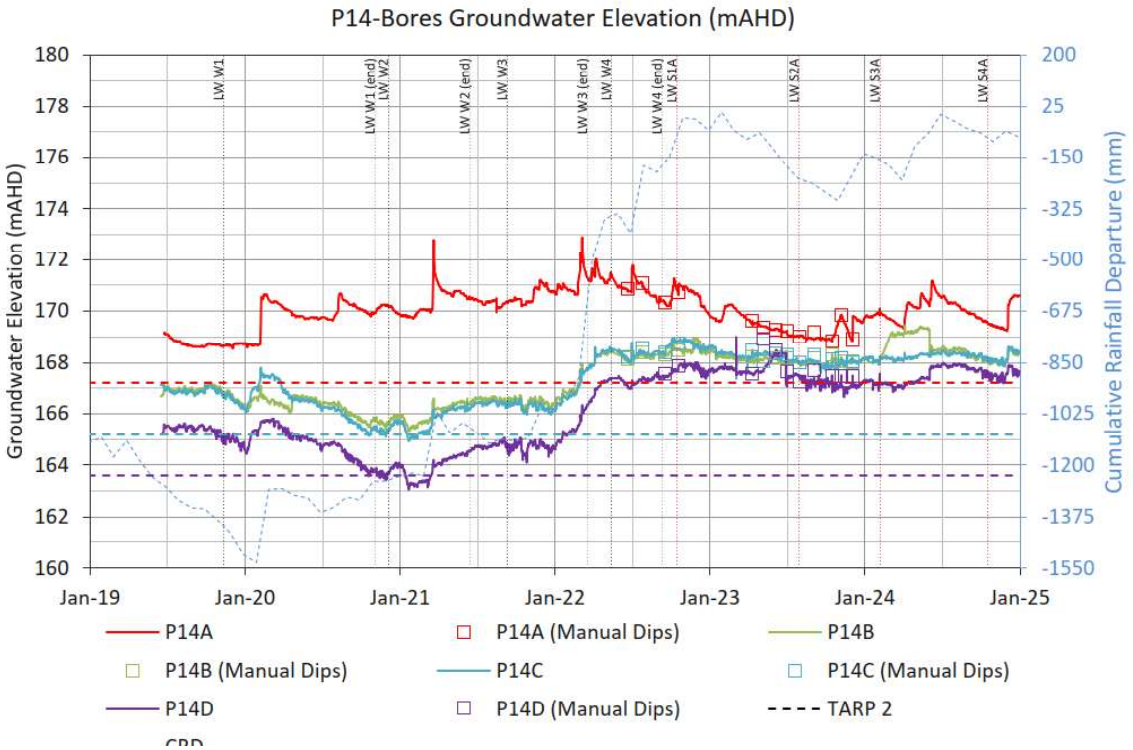


Figure 9 P14 groundwater elevations with TARP Level 2 trigger

3.2.3.2 P16 (A – C)

Figure 10 presents the groundwater elevation time-series with the TARP Trigger Level 2 elevation for each OSP (colour matched). All the P16 bores are above the level 2 trigger, indicating no active exceedances and groundwater can be considered within to be representative of baseline conditions.

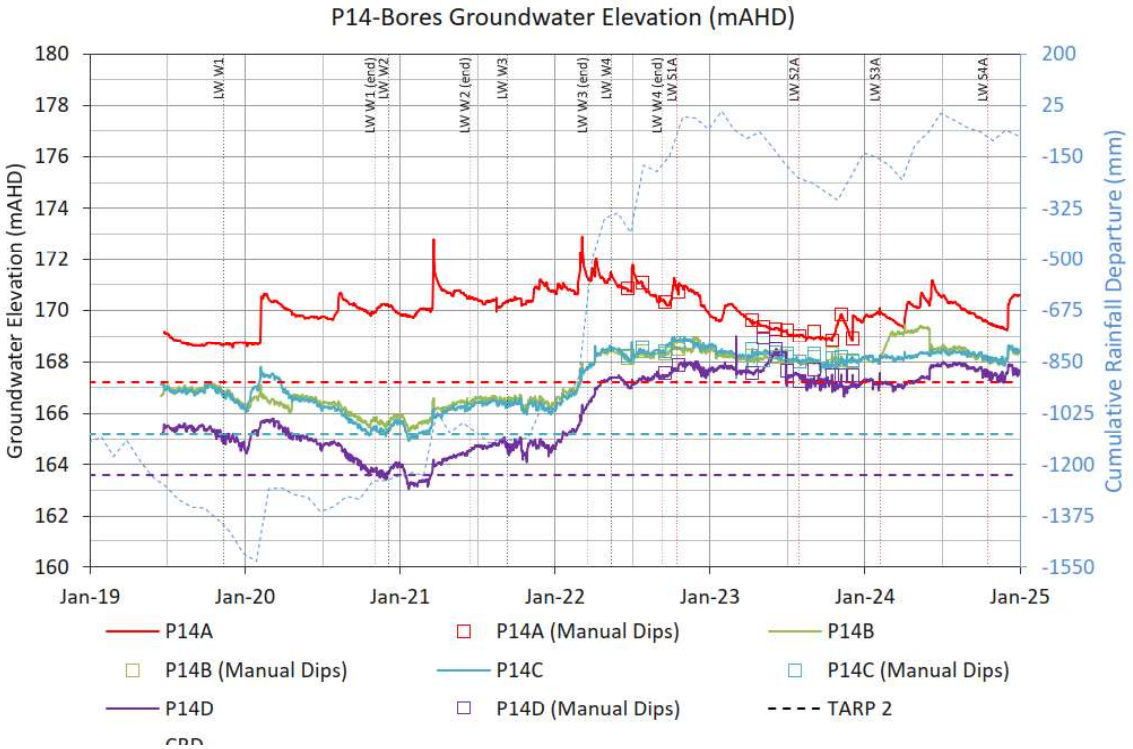


Figure 10 P14 groundwater elevations with TARP Level 2 trigger

3.2.4 VWP TARP Trigger Analysis

The shallow VWPs have approved trigger levels as per the shallow OSPs. These are presented below.

3.2.4.1 TNC036 (shallow sensors)

The shallow VWP sensors and they're associates TARP Level 2 triggers are presented in **Figure 11**. All sensors indicate no exceedance of the Level 2 trigger, indicating baseline conditions exist.

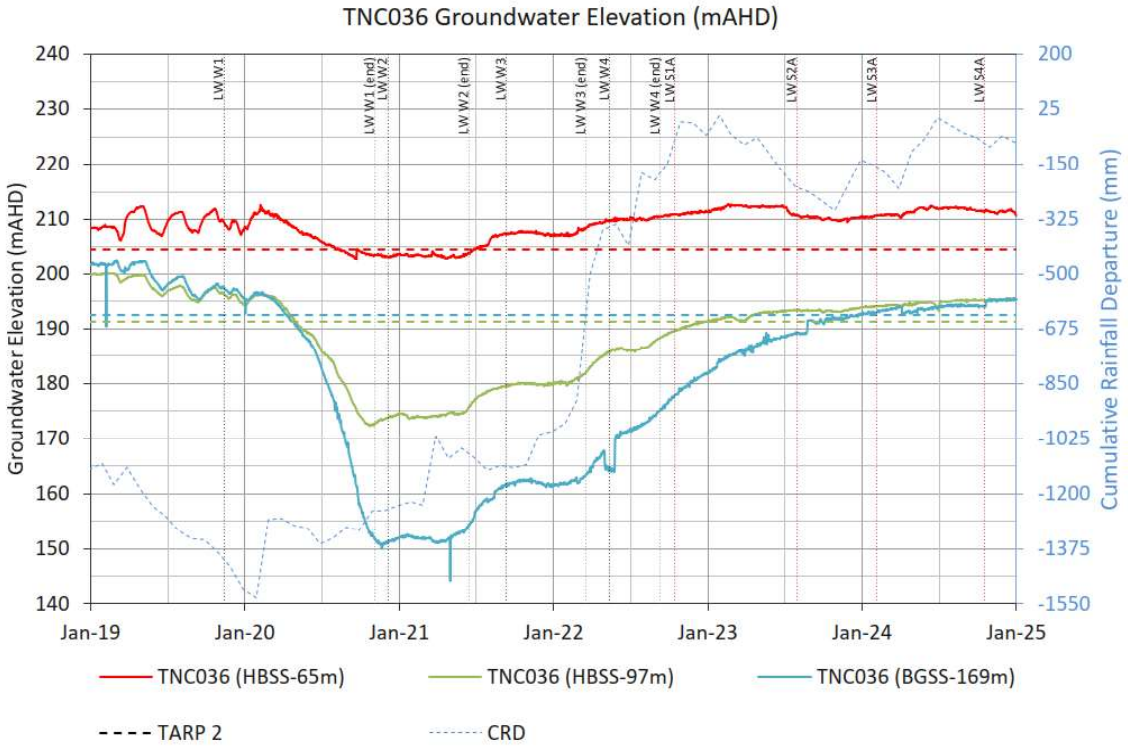


Figure 11 TNC036 shallow sensors (<200m) groundwater elevations with TARP Level 2 trigger

3.2.4.2 TNC036 (deep sensors)

The deep (>200 metres) sensors have approved drawdown criteria upon which the TARP levels are based. A level 1 (or no exceedance) is active if the observed drawdown does not exceed the predicted drawdown. **Figure 12** through **Figure 14** show the observed and modelled drawdown for the three deep sensors at TNC036. None of the deep sensors exceed predicted drawdown.

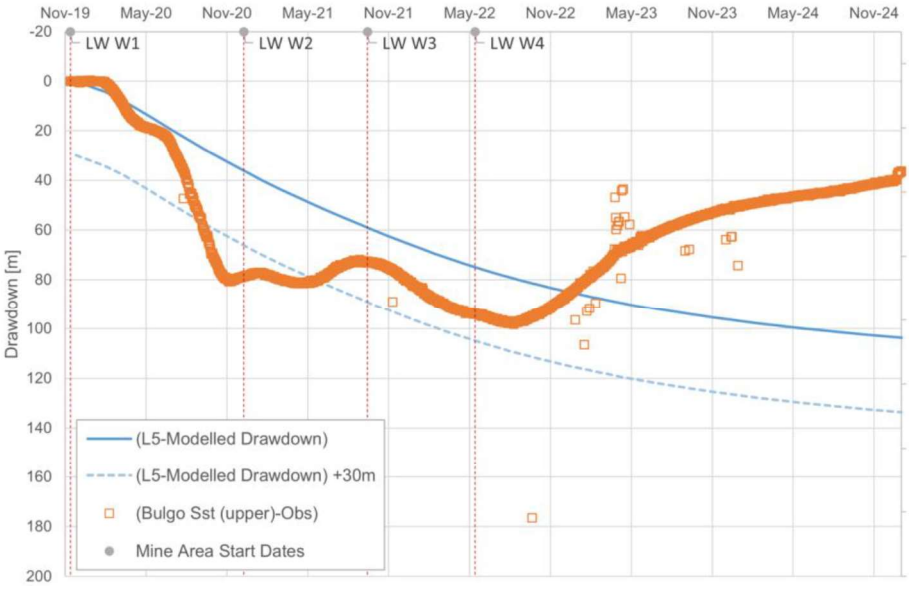


Figure 12 TNC036 (214m) observed and modelled drawdown

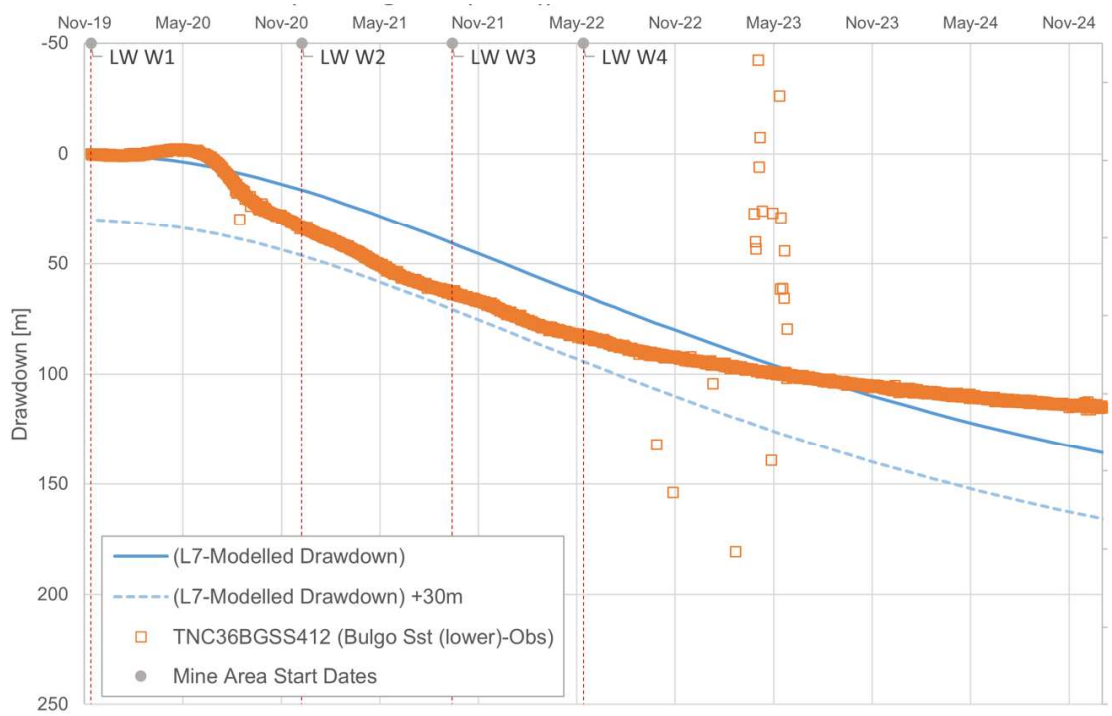


Figure 13 TNC036 (412m) observed and modelled drawdown

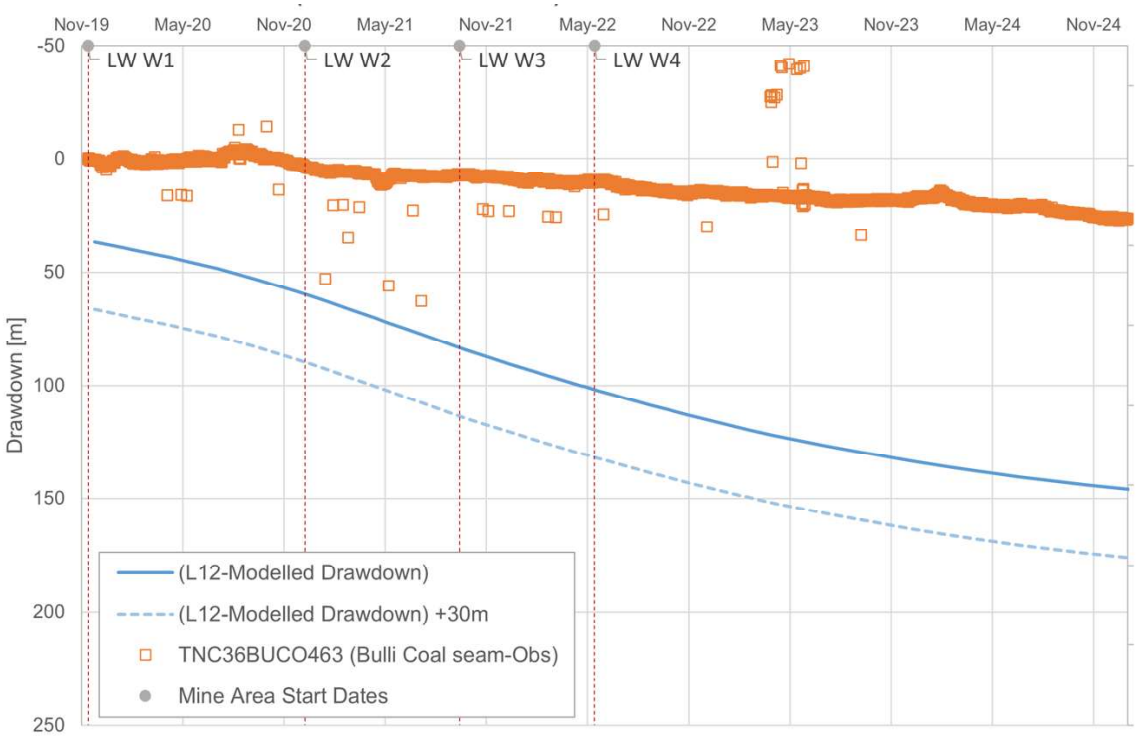


Figure 14 TNC036 (463m) observed and modelled drawdown

3.2.4.3 TNC040

Both sensors of VWP TNC040 are above the Level 2 TARP Trigger, indicating they are representative of baseline conditions (**Figure 15**).

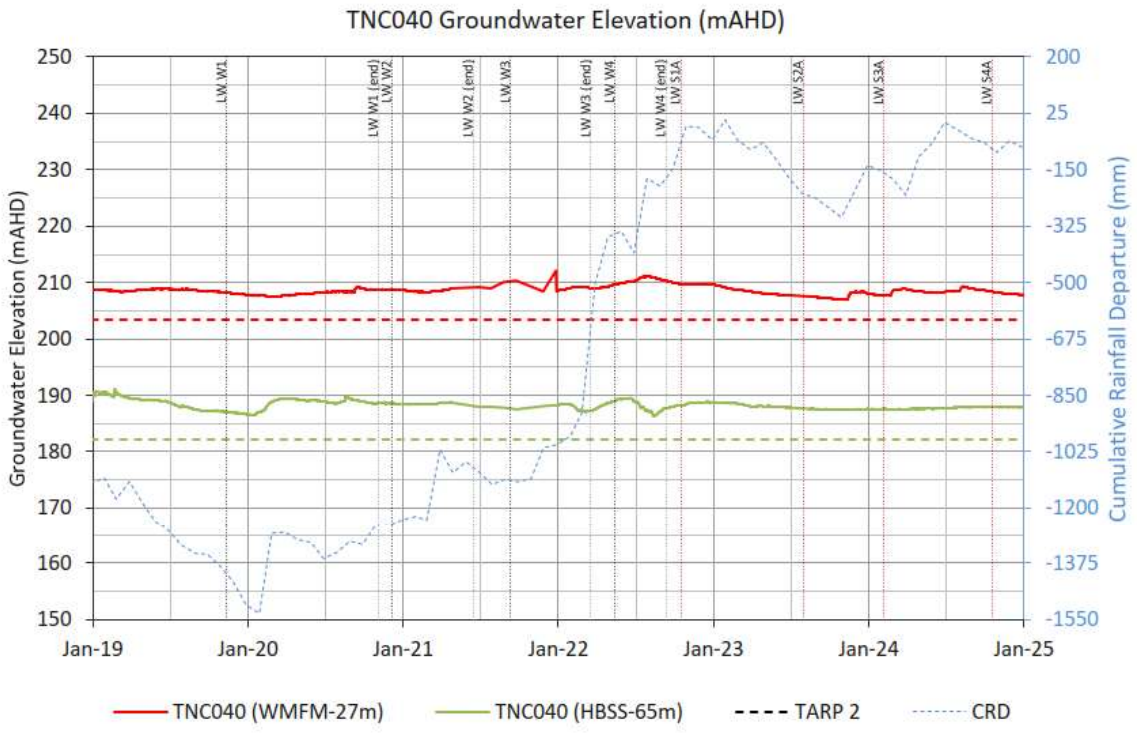


Figure 15 TNC040 shallow sensors (<200m) groundwater elevations with TARP Level 2 trigger

3.2.4.4 WD02

Nothing the installation of WD02 post-mining, there are no trigger levels established for this VWP.

3.2.5 Summary

Table 4 provides a summary of the trend and TARP analysis for each monitoring point.

Table 4 Summary of statistical and TARP trigger analysis

Site ID	Total Depth / Sensor Depth (mBGL))	Target Formation	Groundwater Level Monitoring Data		Recent Window Slope	Post Mining Slope	Stability Assessment Criteria	TARP Trigger Level
			Minimum available date	Maximum available date	m/year	m/year		
P14A	6	Alluvium/colluvium	19-06-2019	18-06-2025	-0.307	0.077	Stable (recovered)	Level 1
P14B	16.6	Hawkesbury Sandstone	19-06-2019	18-06-2025	-0.102	0.018	Stable (recovered)	Level 1
P14C	31.6	Hawkesbury Sandstone	19-06-2019	18-06-2025	0.161	0.013	Stable (recovered)	Level 1
P14D	61.6	Hawkesbury Sandstone	19-06-2019	18-06-2025	-0.013	0.043	Stable (recovered)	Level 1
P16A	27.5	Hawkesbury Sandstone	14-05-2019	18-06-2025	-0.053	0.188	Recovering	Level 1
P16B	45.5	Hawkesbury Sandstone	14-05-2019	18-06-2025	0.317	0.409	Stable (recovered)	Level 1
P16C	75.5	Hawkesbury Sandstone	14-05-2019	19-06-2025	0.406	1.861	Stable (recovered)	Level 1
TNC36	65	Hawkesbury Sandstone	20-01-2016	29-07-2025	0.814	0.395	Stable (recovered)	Level 1
	97	Hawkesbury Sandstone	20-01-2016	29-07-2025	0.329	1.61	Recovering	Level 1
	169	Bulgo Sandstone	20-01-2016	29-07-2025	0.308	3.906	Stable (recovered)	Level 1
	214	Bulgo Sandstone	20-01-2016	29-07-2025	1.299	14.256	Continuing change	Level 1
	412.5	Bulgo Sandstone	20-01-2016	29-07-2025	-1.536	-8.316	Continuing change	Level 1
	463.5	Bulli Coal Seam	20-01-2016	29-07-2025	-3.068	-5.49	Continuing change	Level 1
TNC40	27	Wianamatta Formation	18-12-2009	29-07-2025	-0.231	-0.141	Recovering	Level 1
	65	Hawkesbury Sandstone	18-12-2009	29-07-2025	-0.6	-0.482	Stable (recovered)	Level 1
WD02	130	Hawkesbury Sandstone	27-03-2023	14-07-2025	0.144	-0.113	n/a*	n/a
	200	Hawkesbury Sandstone	27-03-2023	14-07-2025	0.429	2.482	n/a*	n/a
	240	Newport Formation	27-03-2023	14-07-2025	0.341	9.574	n/a*	n/a

Site ID	Total Depth / Sensor Depth (mBGL))	Target Formation	Groundwater Level Monitoring Data		Recent Window Slope	Post Mining Slope	Stability Assessment Criteria	TARP Trigger Level
			Minimum available date	Maximum available date	m/year	m/year		
	280	Bulgo Sandstone	27-03-2023	14-07-2025	1.989	7.379	n/a*	n/a
	305	Bulgo Sandstone	27-03-2023	14-07-2025	4.637	0.494	n/a*	n/a
	330	Bulgo Sandstone	27-03-2023	14-07-2025	-5	-12.463	n/a*	n/a
	355	Bulgo Sandstone	27-03-2023	14-07-2025	-0.167	-1.631	n/a*	n/a
	410	Bulgo Sandstone	27-03-2023	14-07-2025	-0.273	-1.757	n/a*	n/a

* insufficient historical data to establish maximum mining-period drawdown, residual drawdown and percentage recovery

3.3 Integrated Groundwater Interpretation and Site-Wide Residual Status

This section synthesises responses from the standpipes (P14, P16) and the VWPs (TNC036, TNC040, WD02) to assess whether post-mining depressurisation at depth is affecting the principal aquifer units and informs recommendations regarding monitoring in the Western Domain.

3.3.1 Depth-Resolved Behaviour by Bore Cluster

3.3.1.1 West of W1 (P16 and TNC036)

P16 and TNC036 is west of W1 and the shallow Hawkesbury Sandstone standpipes show stable to rising heads consistent with recovery (P16A, P16B and P16C), as do the upper VWP intakes at TNC036 (HBSS-65 m and HBSS-97 m). At depth the Bulgo Sandstone intakes at TNC036 indicate continuing post-mining recovery (BGSS-169 m and BGSS-214 m), with the very deep Bulgo and Bulli measures still depressurising (BGSS-412.5 m and BUSM-463.5 m). There is no indication that these deeper trends are propagating upward into the Hawkesbury Sandstone at this locality.

3.3.1.2 W2 and W3 (P14 and WD02)

P14 is north of W3 and WD02 is located directly above W2. The Hawkesbury Sandstone standpipes at P14 indicate stable to rising heads (P14A, P14B, P14C and P14D) and the upper Hawkesbury intakes at WD02 are likewise stable to rising (HBSS-130 m and HBSS-200 m). Mid-depth behaviour above W2 shows post-mining recovery that is moderating toward stability in the Newport Formation (NPFM-240 m). Within the deeper Bulgo interval at WD02, heads at BGSS-280 m and BGSS-305 m are increasing post-mining. By contrast, BGSS-330 m, BGSS-355 m and BGSS-410 m continue to decline (depressurisation). The overlying Hawkesbury Sandstone intakes (HBSS-130 m and HBSS-200 m) remain stable to rising. This pattern is consistent with vertical decoupling between the principal aquifer and deeper measures.

3.3.1.3 South of W4 (TNC040)

TNC040 is located south of W4. The Wianamatta and Hawkesbury intakes are stable or rising with small residuals relative to pre-extraction levels where a baseline exists (WMFM-27 m and HBSS-65 m). No upward transmission from deeper measures is evident at this location.

3.3.2 Spatial Coherence Relative to the Western Domain Longwall Sequence

Across the domain, behaviour varies systematically with position relative to the longwall sequence from west (W1) to east (W4). Locations up-panel and lateral to W1 (P16 and TNC036) show recovery in shallow units with continuing adjustment confined to deeper Bulgo and the coal seam. Above and adjacent to W2 and W3 (WD02, P14) the shallow units are stable, while selected deep Bulgo sensors continue to adjust. South of W4 (TNC040) the shallow system is recovered or stable. There is no clear indication of domain-wide upward propagation of depressurisation into the Hawkesbury Sandstone or shallow aquifer units.

3.3.3 Climate Influence

Hydrographs with monthly CRD overlays in **Section 3.2** show that shallow Hawkesbury and Wianamatta heads display modest seasonal or climatic change but have broadly stabilised



or risen since September 2022. In contrast, deeper Bulgo and Bulli responses are largely decoupled from CRD and reflect post-mining pressure redistribution. This distinction supports the interpretation that remaining declines at depth are mining-related adjustments that are not materially influencing the principal aquifer.

4.0 Conclusions and Recommendations

4.1 Summary of Findings

Analysis of active OSPs (P14, P16) and VWPs (TNC036, TNC040, WD02) shows that groundwater heads in the Hawkesbury Sandstone and Wianamatta Formation are stable or rising across assessed locations and, where a pre-extraction baseline is available, have largely reconverged toward the pre-mining envelope. Deeper intakes within the Bulgo Sandstone and the Bulli Coal seam display localised post-mining adjustment, including continued depressurisation at some depths. These deeper responses are not synchronous with rainfall residuals and are interpreted as confined to the coal measures and immediately underlying sandstones, without indications of upward transmission into the principal aquifer.

There are no active TARP exceedances at any sites.

4.2 Western Domain Post-Mining Monitoring

On technical grounds, and consistent with the SLR (2024) interpretation, the stand-alone Western Domain post-mining monitoring program can be concluded. The current dataset provides sufficient evidence that the principal aquifer units in the Western Domain are not exhibiting ongoing mining-related decline.

In accordance with recommendations via approved *Development Consent SSD 8445 MOD2* (determination date 13 June 2023), a selection of current monitoring points associated with the historical working, namely the Western Domain, will be incorporated into the Tahmoor South ongoing monitoring regime. The VWPs selected for ongoing monitoring include WD02, TNC036 and TNC040.As per the additional VWPs incorporated from the historical workings monitoring network, P14 and P16 open standpipes are included in the Tahmoor South monitoring network.

Accordingly, the Western Domain program should conclude as a discrete post-mining requirement, with ongoing monitoring of WD02, TNC036, TNC040, P14 and P16 undertaken within the Tahmoor South GWMP and considered part of Tahmoor South reporting.

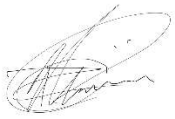
4.3 Annual Review under the Tahmoor South GWMP

The Western Domain locations included in the Tahmoor South network will be subject to an annual review. The review will collate any new logger data, update the hydrographs, and summarise post-mining and recent-window trends using established non-parametric statistics used in this study. The emphasis will be on confirming that shallow units (Hawkesbury and Wianamatta) remain stable or rising and that any deeper adjustments remain confined to the Bulgo and Bulli intervals. Where material changes in trend are identified, recommendations on monitoring or additional work will be made within the Tahmoor South annual review.



Regards,

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Associate Hydrogeologist

Sharon Hulbert
Principal Hydrogeologist

5.0 References

SLR Consulting Pty Ltd Australia (SLR), 2024. Tahmoor Coal Pty Ltd Six - Monthly Groundwater Reporting: July – December 2023. Project number 640.031086.00001. 13 March 2024.

Tahmoor Coal Pty Ltd, 2021. Tahmoor North - Western Domain, LW W3-W4 Water Management Plan. TAH-HSEC-326 (September 2021, Ver4)