

11 August 2022



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Melanie Dillon
Environment and Community Coordinator
Integra Underground
HV Coking Coal Pty Ltd
640 Middle Falbrook Road
SINGLETON NSW 2330

INT5319-11

Dear Melanie

INTEGRA UNDERGROUND: LONGWALL 18 BI-MONTHLY SUBSIDENCE REPORT FOR JUNE AND JULY 2022

HV Coking Coal Pty Ltd (HVCC) are currently mining Longwall 18 in the Middle Liddell (ML) Seam at the Integra Underground (IUG) Mine near Camberwell, 12km northwest of Singleton in the Hunter Valley of NSW. The approved Extraction Plan (EP) for Longwalls 17-20 requires IUG to monitor and report subsidence impacts on a bi-monthly, six-monthly and annual basis. HVCC commissioned SCT Operations Pty Ltd (SCT) to review and analyse the subsidence monitoring conducted and prepare reports suitable for submission to the Department of Planning and Environment (DPE) and the Resources Regulator, if required. This report presents the results of our review and analysis of subsidence monitoring for the mining in Longwall 18 during June and July 2022.

Our review indicates:

- No subsidence impacts have been observed from the mining in Longwall 18, to date.
- No significant subsidence impacts to natural or built features have been observed from the mining in Longwalls 17 and 18.
- No significant subsidence effects or impacts to the Mt Owen Railway Line/Bettys Creek bridges and associated infrastructure have been reported. Ground monitoring, inspections and minor maintenance activities have been overseen by the Technical Committee to maintain this infrastructure in a safe and serviceable condition.

Minor subsidence impacts from the mining of Longwall 17 and previous longwall panels are consistent with or less than expectations presented in SCT Report INT5106 – “Integra Underground Mine: Subsidence Assessment for LW17-20 Extraction Plan” (SCT 2021).

Our review considers the available monitoring data and observations for the June and July 2022 reporting period including:

- Weekly inspections for subsidence impacts from Longwall 18, conducted by IUG personnel during the two-month period in accordance with the IUG Subsidence Monitoring Program for these longwall panels.
- Ongoing Technical Committee communications and a subsidence monitoring report by Mine Subsidence Engineering Consultants Pty Ltd (MSEC) for the monitoring and management of subsidence impacts to the Mt Owen Railway Line, Bettys Creek bridges and associated infrastructure.

On this basis, the observed subsidence effects and impacts are considered compliant with the performance indicators and subsidence performance measures for the EP required under modified IUG Project Approval (PA08_0101). However, it is recognised that assessment of compliance requires input from other specialists.

1. BACKGROUND AND SITE DESCRIPTION

Consent for the recent mining of Longwall 18 in the ML Seam at IUG is provided by Modification 8 (MOD8) to Project Approval (PA) 08_0101 for the Integra Underground Project. The EP for Longwalls 17-20, with supporting subsidence management plans for natural and built features, required by PA08_0101 was approved on 1 March 2021.

Figure 1 shows the longwall mining areas, superimposed onto an aerial image of the surface from January 2021. This figure is a copy of Figure 1 from SCT (2021) amended to show the completed mining in Longwalls 15 and 16 with the mining in Longwalls 17 and 18, during the bi-monthly reporting periods, up to the end of July 2022. The image of the surface features has also been updated since SCT (2021).

Longwall 18 started mining on 16 May 2022 at approximate CH1634m.

During the June and July 2022 reporting period, Longwall 18 mined a distance of 279m from CH1547m to CH1268m.

At the end of July 2022, the total void length for Longwall 18, including the 9m installation roadway width, was approximately 375m. The void for Longwall 18 is nominally 257m wide.

Total overburden depth for the 279m section of Longwall 18 mined during this reporting period ranges from approximately 580m to 530m, below the peak and southwestern slope of the West Dump emplacement area. The thickness of waste rock fill material emplaced on top of the natural ground level ranges from 65m to 25m at the 580m total depth location and 530m total depth location, respectively.

The surface above and in the vicinity of Longwall 18 comprises areas modified by surface mining activities and items of mining related infrastructure for the Mt Owen Glendell Operations (MGO) mines; Mt Owen, Ravensworth East and Glendell. Natural features are limited to small sections of natural ground along the Mt Owen Railway Line corridor.

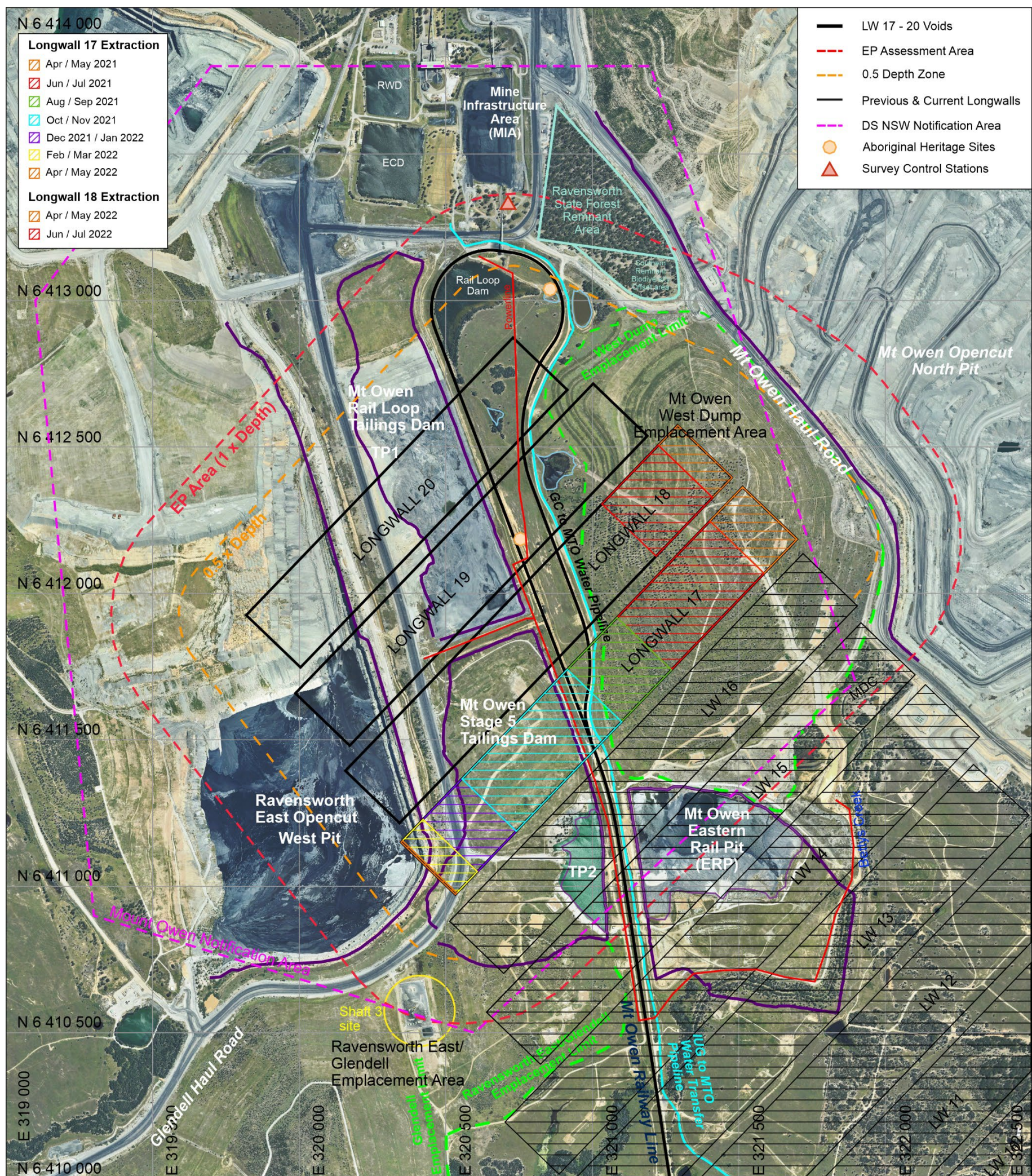


Figure 1: Site plan showing Longwalls 17-20 voids, the EP Area, major surface features and bi-monthly mining areas.

The main surface features above Longwall 18 include sections of the West Dump emplacement area, Mt Owen Railway Line loop, Mt Owen Stage 5 Tailings Dam (also known as Ravensworth East Tailings Pit or TP2), the open void of Mt Owen Rail Loop Tailings Dam (also known as TP1), the Glendell Haul Road and the exposed highwall and open void of Ravensworth East - West Pit.

Mining related infrastructure includes the maintenance road and communications cables associated with the railway line. Water supply and transfer pipelines, an 11kV overhead powerline, gas drainage boreholes and related equipment associated with IUG, and access roads/four-wheel drive tracks are also located above or cross the surface above Longwall 18. A small section of haul road for the Mt Owen – North Pit is adjacent to the start line of Longwall 18 in the northeast.

The Eastern Rail Pit (ERP) and the open void of TP2 are located to the southeast of Longwall 18 above Longwalls 13-16.

Natural and built features above the area mined by Longwall 18 during this reporting period are limited to:

- A section of the southwestern slope of the West Dump with contour drains and drop structure drainage channel.
- Gas drainage installations.
- Access roads/four-wheel drive tracks.

2. MONITORING AND REVIEW

The Subsidence Monitoring Program for the Longwalls 17-20 EP require weekly visual inspections for subsidence impacts to the various surface features above and in the vicinity of these panels. IUG personnel reported no significant subsidence impacts from the mining in Longwall 18 in the weekly inspections during June and July 2022.

No significant subsidence impacts from longwall mining have been reported to:

- West Dump.
- Gas drainage installations with associated equipment.
- Access roads/four-wheel drive tracks.

The condition of the surface terrain on the West Dump and surrounds is being mapped by IUG personnel ahead of the longwall face for baseline reference. Areas of ponding in contour drains and historical erosion over the general area and at recent earthworks for gas drainage sites are recorded.

Management of subsidence impacts to the Mt Owen Railway Line, Bettys Creek bridges and associated infrastructure has continued during this reporting period consistent with the IUG Built Features Management Plan for Longwalls 17 to 20. Inspections, monitoring and meetings of the Technical Committee continued as required by the asset management plan for this infrastructure. No significant additional subsidence effects and impacts have been recorded. Minor maintenance/adjustments were made to the rail as part of the ongoing management of subsidence impacts.

Results from the ground survey for Longwall 18 conducted on 19 July 2022 and reported by MSEC on 28 July 2022 indicate measurements of maximum incremental subsidence movements are in the order of survey tolerance and within expectations for this stage of mining.

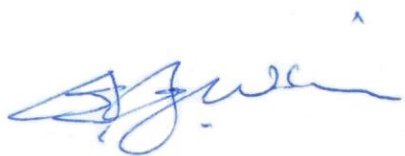
A summary of this MSEC report for monitoring of subsidence effects and impacts to the Mt Owen Railway Line and associated infrastructure from the mining of Longwall 18 is attached in Appendix 1.

To assist with formal reporting requirements, a summary of the monitoring for this reporting period has been prepared. The summary uses a pro-forma checklist for all features assessed for subsidence impacts in the preparation of the EP for Longwalls 17-20 with comparisons to forecasts in SCT (2021). This data is arranged generally in the order of impact assessment in SCT (2021) and not the direction of mining and is recorded as a reference for reporting or auditing purposes. The checklist is provided in Table 1.

Observations of subsidence effects or impacts and management measures in Table 1 cover the area above the active panel, as well as the previous panel. Where features are currently outside the subsidence zone of the active panel longwall face position (within half overburden depth, for Longwall 18 this is 200-300m) they are marked 'n/a' (not applicable).

If you have any queries, or require further clarification of any of these issues, please don't hesitate to contact me directly.

Yours sincerely



Stephen Wilson
Mine Planner

3. REFERENCES

SCT 2017 'Integra Underground Mine: Subsidence Assessment for Modification to PA08_0101' SCT Report INT4648 – 22 November 2017.

SCT 2021 'Integra Underground Mine: Subsidence Assessment for LW17-20 Extraction Plan' SCT Report INT5106 – 2 February 2021.

Table 1: Surface Features and Subsidence Impact Monitoring

June – July 2022			
Longwall 18 Bi-Monthly Subsidence Monitoring			
Surface feature, subsidence effect or management measure	New effect or impact observed Yes/No	Exceedance of predictions Yes/No	Exceedance within performance measure and/or performance indicator Yes/No
Natural Vegetation	NO	no	n/a
Aboriginal Heritage	n/a	n/a	n/a
MOC-Mine Infrastructure Area	n/a	n/a	n/a
Mt Owen Railway Line	YES	NO	n/a
Bettys Creek Bridges	YES	NO	n/a
Communication Cables	NO	no	n/a
Maintenance Road	NO	no	n/a
Cuttings and Embankments	NO	no	n/a
Surface Drainage	NO	no	n/a
Water Supply Pipeline	NO	no	n/a
Water Transfer Pipeline	NO	no	n/a
Powerlines	NO	no	n/a
Mt Owen – North Pit	NO	no	n/a
Ravensworth East - West Pit	NO	no	n/a
Glendell haul road	NO	no	n/a
TP1	NO	no	n/a
TP2	NO	no	n/a
ERP	n/a	n/a	n/a
Emplacement area (West Dump)	NO	no	n/a
Sediment Control Dams	n/a	n/a	n/a
Gas Drainage Equipment	NO	no	n/a
Shaft 3 and Infrastructure	n/a	n/a	n/a
Access Roads	NO	no	n/a
General:			
Fences/Gates	NO	no	n/a
Access Roads	NO	no	n/a
Farm dams	n/a	n/a	n/a
Forest Road	n/a	n/a	n/a

June – July 2022			
Longwall 18 Bi-Monthly Subsidence Monitoring			
Surface feature, subsidence effect or management measure	New effect or impact observed Yes/No	Exceedance of predictions Yes/No	Exceedance within performance measure and/or performance indicator Yes/No
Subsidence Impacts:			
Surface cracks or steps	NO	no	n/a
Surface humps	NO	no	n/a
Slope instability	NO	no	n/a
Surface water (ponding)	NO	no	n/a
Management measures:			
Warning signage			
(Glendell Haul Road)			
Remediation measures:	n/a	n/a	n/a

APPENDIX 1

Glencore: Mt. Owen Complex

Subsidence monitoring review report for the Mt. Owen Railway
due to the extraction of Integra Longwall 18

Monitoring report no.	MSEC1259-R01
Latest survey date	19 July 2022
Longwall chainage	1283 m on 25 July 2022
Extracted length since previous report	N/A (first summary report)
Closest distance of extraction face from the railway	240 m from the railway above the longwall maingate 365 m from the railway above the longwall tailgate

Measured ground movements for the railway

PH-Line	Current measured value	Predicted final value	Comments
Maximum incremental subsidence (mm)	19	800	Low level subsidence in the order of survey tolerance for absolute height
Additional subsidence since last survey (mm)	19	-	First survey since the base survey
Maximum incremental tensile strain (mm/m)	0.1	1.0*	Very low level strains in the order of survey tolerance
Maximum incremental comp. strain (mm/m)	1.1	2.0*	
Maximum opening over 100 m long bays (mm)	2	60	Low level changes in the 100 m long bays in the order of survey tolerance
Maximum shortening over 100 m long bays (mm)	3	100	

Note: * denotes maximum predicted conventional strains. The measured strains could exceed these values due to localised irregular ground movements or due to disturbed survey marks. Refer to the main report for further discussions.

Inspections, geometry and status for the railway and bridges

Parameter	Status	Comments
Visual inspection and track geometry	N/A	No new visual defects observed
Rail stress monitoring		Rail stresses within the green zone
Rail switch monitoring		Rail switches are within the green zone
Signal line		Minor changes only, total strain less than trigger

Triggers, forecasts and actions

Parameter	Comments
Alarms or real-time monitoring system faults	No alarms during the reporting period
Ground monitoring	Low level movements in the order of survey tolerance
Visual inspection and track geometry	Weekly visual inspections are being carried out
Rail stress	No recommended track adjustments

This subsidence monitoring review summarises the latest ground survey, rail stress, track geometry and visual monitoring associated with the Mt. Owen Railway and the Bettys Creek Bridges during the extraction of Integra Underground (IUG) LW17. This report is based on information provided by Lynton Surveys (ground monitoring and rail stress data), PCE (review of the rail stress and track geometry data) and Daracon (visual monitoring and rail operations).

This subsidence monitoring review report covers the period between 1 July and 28 July 2022 inclusive.

The locations of the longwalls, railway, bridges, ground monitoring line and the face positions at the times of the surveys are shown in Drawing No. MSEC1259-01. The longwall chainage up to the 25 July 2022 is illustrated with the black line in Figure 1. At that date, the longwall face was 240 m from the departure road on the maingate side (i.e. first rail contact) and 365 m from the railway on the tailgate side (i.e. last rail contact). LW18 has now fully mined beneath both the departure and arrival roads of the railway.

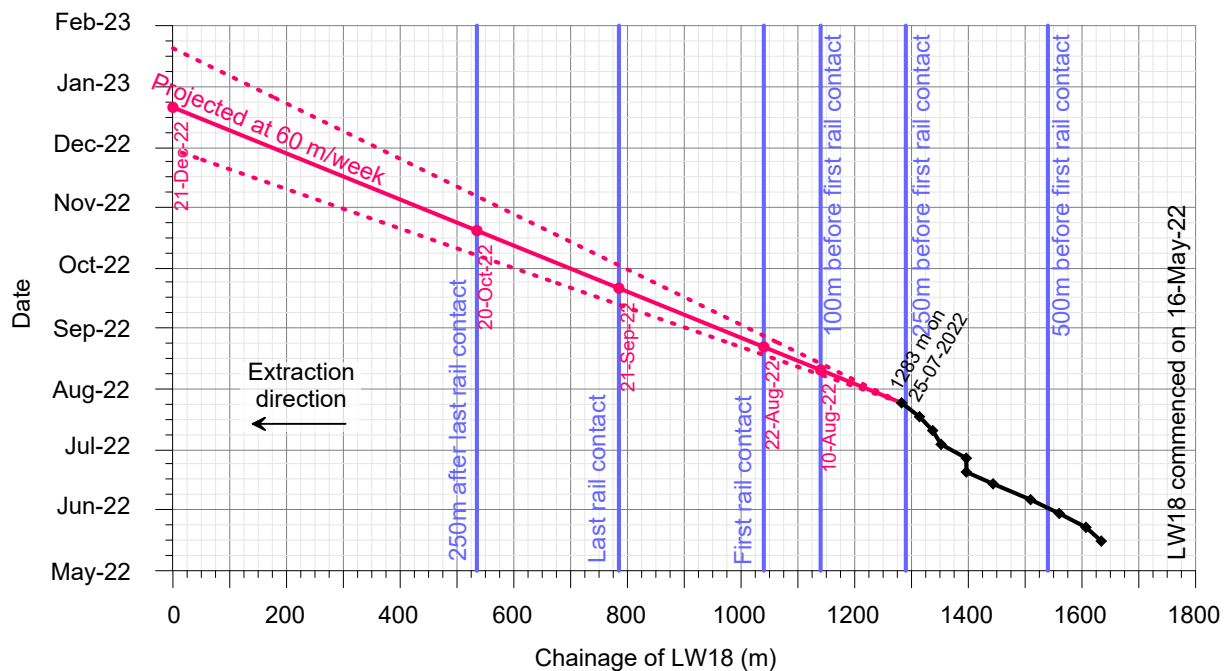


Figure 1 Longwall chainage and milestones

The longwall extracted 114 m between 27 June and 25 July 2022. The average rate of retreat over the past month is approximately 29 m/week.

The estimated dates for the milestones in the LW18 Action Plan based on an average extraction rate of 60 m/week are:

- 100 m before first rail contact: 10 August 2022
- first rail contact: 22 August 2022
- last rail contact: 21 September 2022
- 250 m after last rail contact: 20 October 2022
- completion of longwall (last shear): 21 December 2022

Mt. Owen Railway

The monitoring of the Mt. Owen Railway comprises the: PH-Line, rail stress, track geometry and visual inspections.

PH-Line

The PH-Line is located adjacent to the Mt. Owen Railway. The latest survey of the monitoring line was carried out on the 19 July 2022.

The profiles incremental vertical subsidence, vertical mid-ordinate deviation, horizontal mid-ordinate deviation, strain and changes in 100 m long bays are illustrated in Figs. A.01 and A.02. The measured parameters shown in these figures are the additional movements due to the extraction of LW18 only. The base survey was carried out on the 21 June 2022.

In the latest survey, the maximum measured incremental vertical subsidence due to LW18 is **19 mm**. Only very-low level subsidence has been measured similar to the order of survey tolerance for absolute height. There is no measurable subsidence along the monitoring line at this stage due to the distance of the active longwall face from the railway.

The development of the maximum measured and maximum predicted incremental vertical subsidence along the PH-Line due to LW18 is illustrated in Figure 2. Subsidence is expected to develop after the longwall face has mined beneath the railway on the maingate side. The longwall is anticipated to reach longwall chainage 1000 m in late-August 2022 based on an average rate of retreat of 60 m/week.

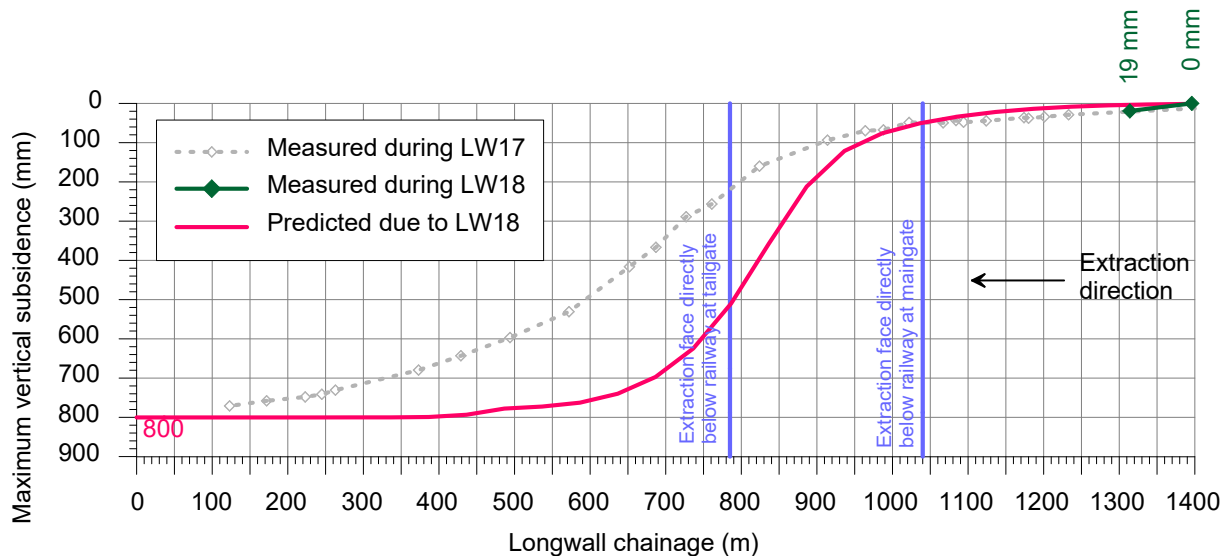


Figure 2 Development of maximum vertical subsidence along the PH-Line due to LW18

There is very low-level scatter in the measured vertical and horizontal mid-ordinate deviations (refer to Fig. A.01). These movements are in the order of survey tolerance and, therefore, the changes are not measurable. There are no irregular or localised movements identified at this stage.

The maximum measured incremental strains along the PH-Line are **0.1 mm/m** tensile and **0.1 mm/m** compressive. Tensile strains are in the order of survey tolerance and, therefore, they are not measurable.

The measured total strains are less than the trigger levels for the signal line (refer to Fig. A03).

The maximum measured incremental changes in 100 m long bays due to LW17 (refer to Fig. A.02) are **+2 mm** extension and **-3 mm** contraction. These movements are in the order of survey tolerance and, therefore, the changes are not measurable.

The development of the maximum measured and maximum predicted changes in 100 m long bays along the PH Line due to LW18 is illustrated in Figure 4. Changes in long bays are expected to develop when the longwall face is directly beneath the railway. The longwall is anticipated to reach longwall chainage 900 m in early-September 2022 based on an average rate of retreat of 60 m/week.

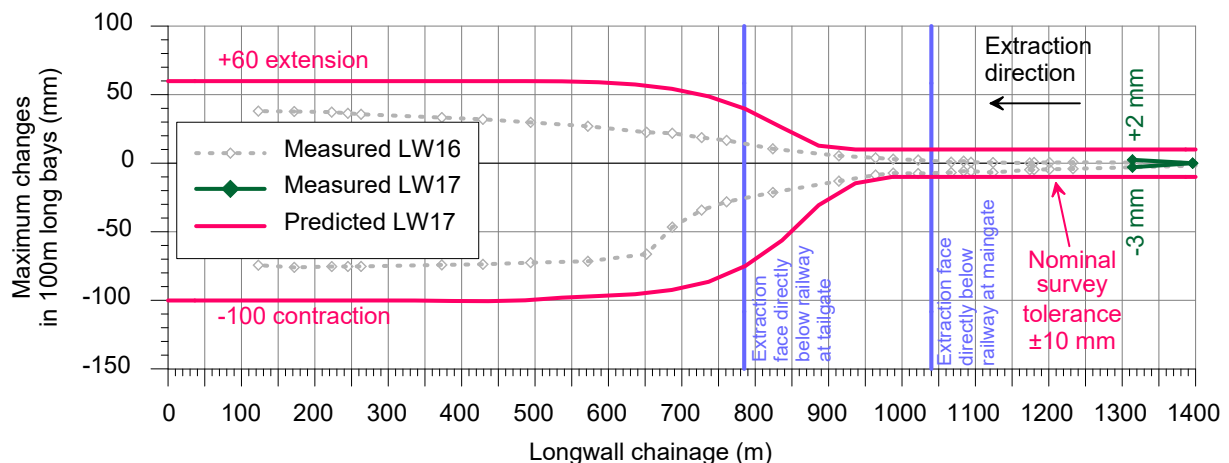


Figure 3 Development of maximum changes in 100 m long bays along the PH-Line due to LW18

Rail stress and track geometry

Refer to the attached report by PCE for discussions on rail stress:

- all rail stresses are within the green zone;
- all switch rails are within the green zone;
- maximum subsidence is 19 mm on the arrival road and 19 mm on the departure road;
- minimal changes this week;
- forecast range of rail temperatures between 1°C and 31°C (week ending 2 August 2022);
- rainfall forecast over the week up to 50 % chance of 0 mm to 1 mm rain per day; and
- track adjustment completed successfully;
- no recommended track adjustments.

Real-time monitoring and triggers

Refer to the attached report by Lynton Surveys for a summary of the monitoring system:

- there were no alarms during the reporting period apart from an false alarm on 19 July 2022 triggered by a train axle over a sensor;
- all stress alarms are turned on except for:
 - DR_S_258.50, DR_S_261.18 and UR_S_261.88 – awaiting maintenance;
 - UR_S_259.85 and UR_S_261.58 – awaiting repair;
- system faults requiring repair – refer abovementioned sensors; and
- test alarm carried out on 19 July 2022 – RRG and ACCC attended the teleconference.

Visual inspection and track geometry

Weekly visual inspections are being carried out by Daracon, refer to separate inspection report.

Teleconference

The details of the previous teleconference are provided below:

Date: 30 June 2022

Time: 15:30 to 16:00

Teleconference: Microsoft Teams

Present: Shane Holmes (SH) – Mt. Owen Glendell Operations (MGO)
Lee Wicks (LW) – Mt. Owen Glendell Operations (MGO)
Nick Roberts (NR) – Mt. Owen Glendell Operations (MGO)
Evert Smit (ES) – Integra Underground Mine (IUG)
Josh Pay – Daracon (JP)
Greg Taylor – Daracon (GT)
Craig Banks (CB) – Lynton Surveys (LS)
Allan Pidgeon (AP) – PCE
James Barbato (JB) – MSEC

Apologies: Josh Kowalczyk (JK) – Mt. Owen Glendell Operations (MGO)
Sebastien Moreno (SM) – Integra Underground Mine (IUG)
Ben Woodbridge – Daracon (BW)
Nikolas Hoskin (NH) – Lynton Surveys (LS)
Antonio Nunes (AN) – Lynton Surveys (LS)

Meeting minutes

Item	Description	Action by	By when
<i>Longwall operations</i>			
1	LW18 chainage was 1396 m on 27 June 2022. Forecast retreat of 50 m this week and 60 m next week	Note	-
2	Longwall anticipated to reach "250 m before first rail contact" around 9 July 2022 and "100 m before first rail contact" around 26 July 2022	Note	-
<i>Ground and bridge monitoring</i>			
3	Base survey for LW18 completed	Note	-
4	First weekly survey scheduled on 18 July 2022	CB	18 Jul 22
<i>Track stress and switch monitoring</i>			
5	Alarms will be turned back on 9 July 2022	CB	9 Jul 22
6	Test alarm scheduled for 14 July 2022	All	14 Jul 22
7	Very small changes in rail SFT during the last month	Note	-
8	LS will repair six gauges when next on-site	CB	14 Jul 22
9	Gauges located south to 258.380 km can now be decommissioned (not required for LW18)	CB	14 Jul 22
10	Two new camaras have been installed in rail loop	Note	-
<i>Visual and track geometry monitoring</i>			
11	Minor visual changes to rail top requiring tamping	Note	-
<i>Track mitigation works</i>			
12	Track adjustment recommended to lower SFT in the next few of weeks. MGO, Daracon and PCE to liaise to confirm date, tentatively between 11 and 14 July 2022	LW/JP/AP	14 Jul 22
<i>Meetings and teleconferences</i>			
13	Lee Wicks and Nick Roberts to be added to alarms contact list	CB	9 Jul 22
14	This was Shane Holmes last teleconference, he will be moving on from MGO in mid-July 2022	Note	-
15	Weekly reporting will commence week starting 25 July 2022. PCE and Daracon to provide their first weekly reports to MSEC by 27 July and MSEC to issue summary report by the morning of 28 July 2022	All	27 Jul 22
16	The next teleconference is on Thursday 28 July at 3:30 pm	All	28 Jul 22

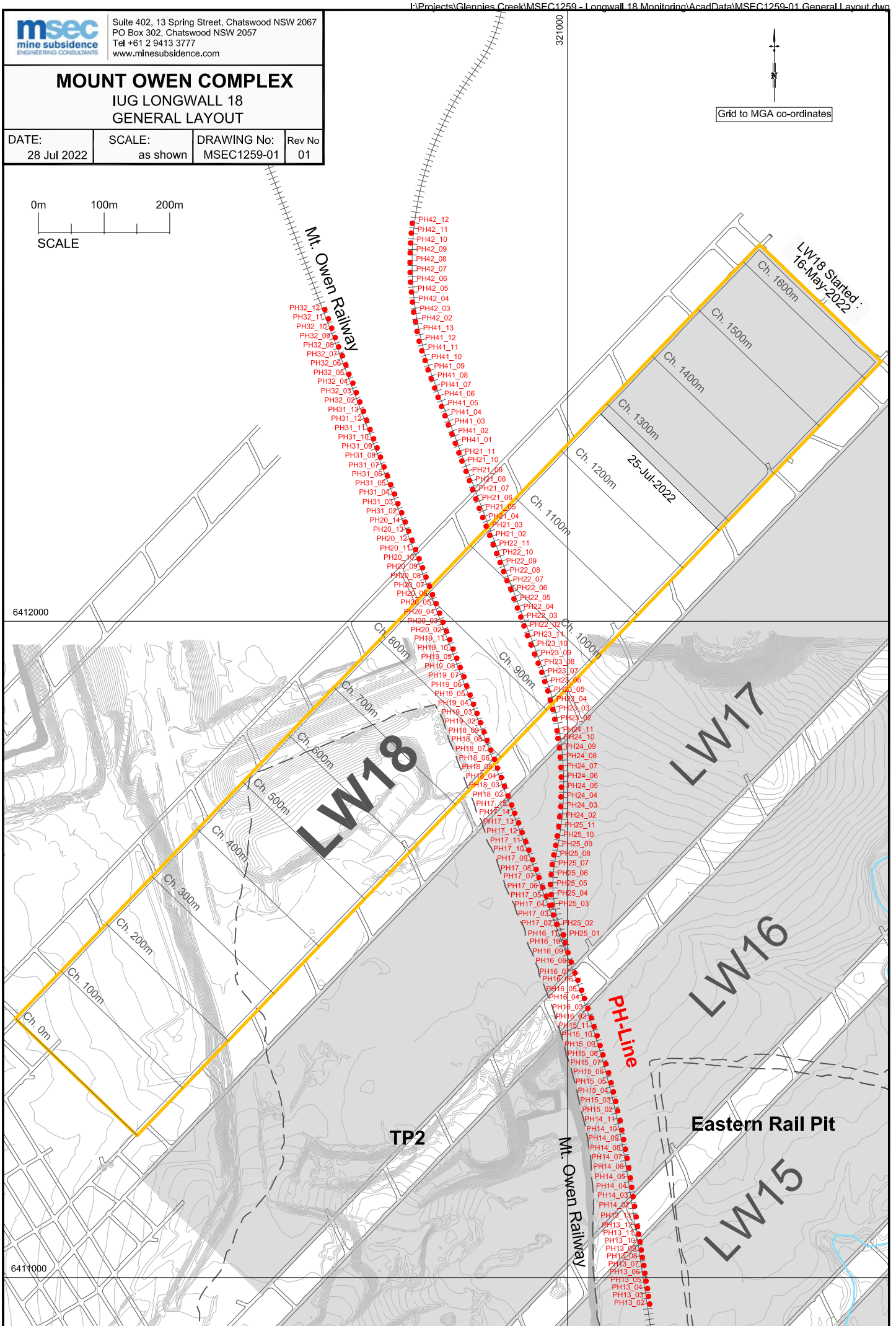
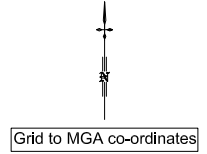


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MOUNT OWEN COMPLEX **IUG LONGWALL 18** **GENERAL LAYOUT**

DATE: 28 Jul 2022	SCALE: as shown	DRAWING No: MSEC1259-01	Rev No 01
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0m 100m 200m
SCALE



LW18 Track Report 04

Report Date – 27 July 2022

1. Survey - Subsidence

Base survey was on 21/06/2022.

Last Survey was on 19/07/2022.

Max Subsidence in the Arrival Road is 19 mm;

Max Subsidence in the Departure Road is 19 mm

2. Survey – Changes in Bay Lengths

Base survey was on 21/06/2022.

Last Survey was on 19/07/2022.

Arrival Road: minimal changes;

Departure Road minimal changes

3. Rail Temperatures

Refer to Figure 7 for historical rail and ambient temperatures.

For week ending 26 July 2022:

	Mt Owen Rail	Ambient, Singleton	Date
Maximum Temperatures	32.3	19.9	Rail 22/07/22; Ambient 23/07/22
Minimum Temperatures	2.5	4.6	Rail 20/07/22; Ambient 19/07/22
Maximum Daily Range	27.4	12.7	Rail 22/07/22; Ambient 25/07/22

Forecast for Week Ending 02/08/2022:

	Rail, approx.	Ambient, Singleton	Date
Maximum Temperatures	31	19	01, 02/08/22
Minimum Temperatures	1	3	31/07/22

Singleton [Bureau of Meteorology website]

Forecast for Singleton Issued on [Wednesday 27 July 2022](#)

Rainfall Forecasts are for 24 hours to 10 PM on the relevant day.

	Wed Jul 27	Thu Jul 28	Fri Jul 29	Sat Jul 30	Sun Jul 31	Mon Aug 01	Tue Aug 02
Summary							
Max (°C)	17	18	17	16	17	19	19
Min (°C)	–	5	7	3	3	7	8
Chance of rain (%)	–	5	30	5	5	50	30
Rainfall range (mm)	–	0	0 to 0.2	0	0	0 to 1	0 to 0.2

4. Rail Stress Levels and Stress Free Temperature

Exceedences of Trigger Values for period ending [27 June 2022](#) due to subsidence effects:

Rail Stress

Trigger Level	Date	Details
BLUE	Nil	
YELLOW	Nil	
RED	Nil	

Expansion Switch Positions

Trigger Level	Date	Details
BLUE	Nil	
YELLOW	Nil	
RED	Nil	

Summary – All Switch Rails are currently in the GREEN zone

5. Track Geometry

Refer to the Daracon Track Report.

6. Recommended Maintenance

Nil:

7. Comments on recent Maintenance

Arrival Road:

Nil.

Departure Road:

Planned SFT Adjusted completed successfully.

Allan Pidgeon

Pidgeon Civil Engineering Pty Ltd



Subsidence – Last Survey on 19/07/2022

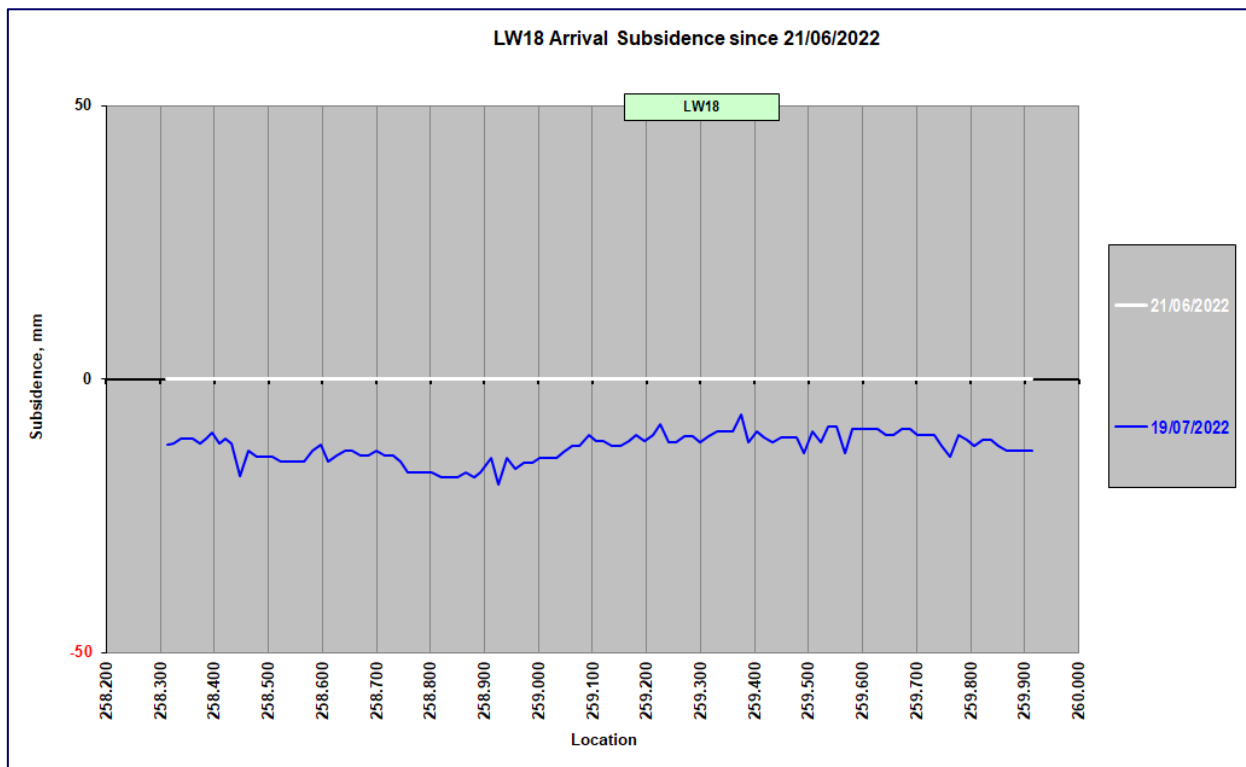


Figure 1 - Changes in Subsidence - Arrival Road

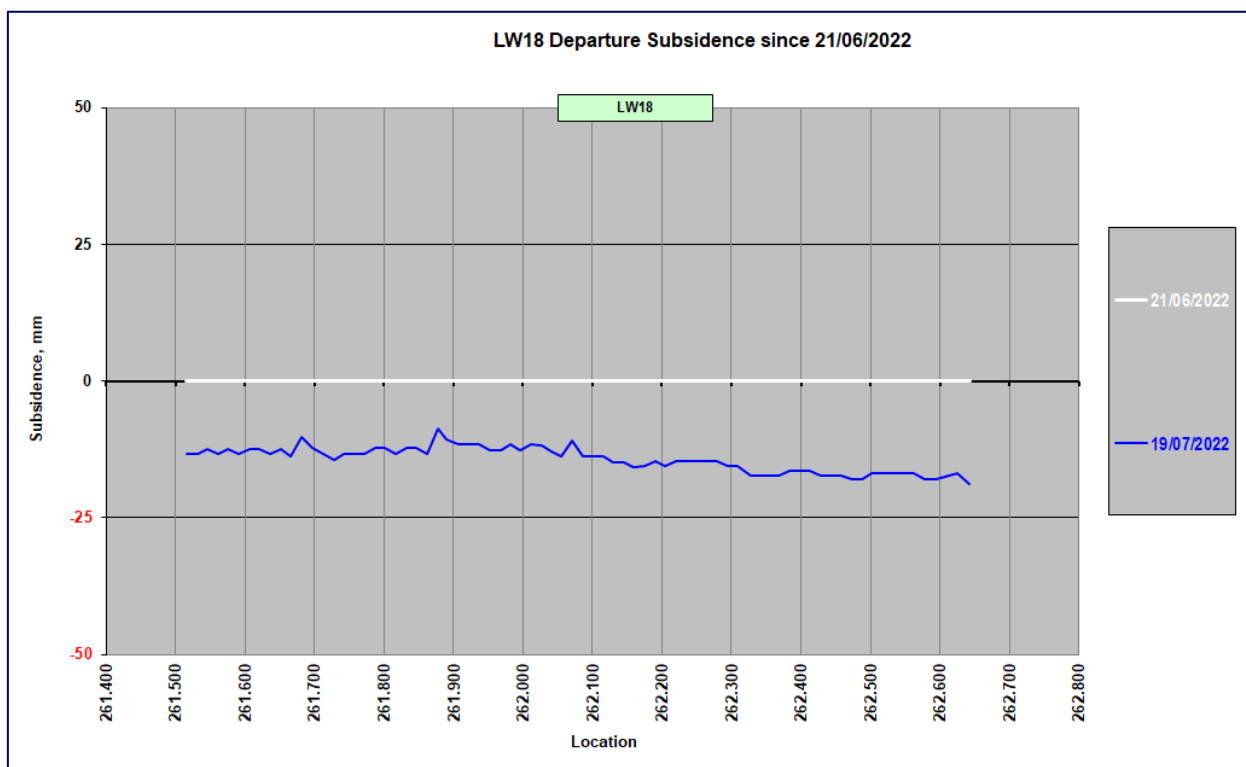


Figure 2 - Changes in Subsidence - Departure Road

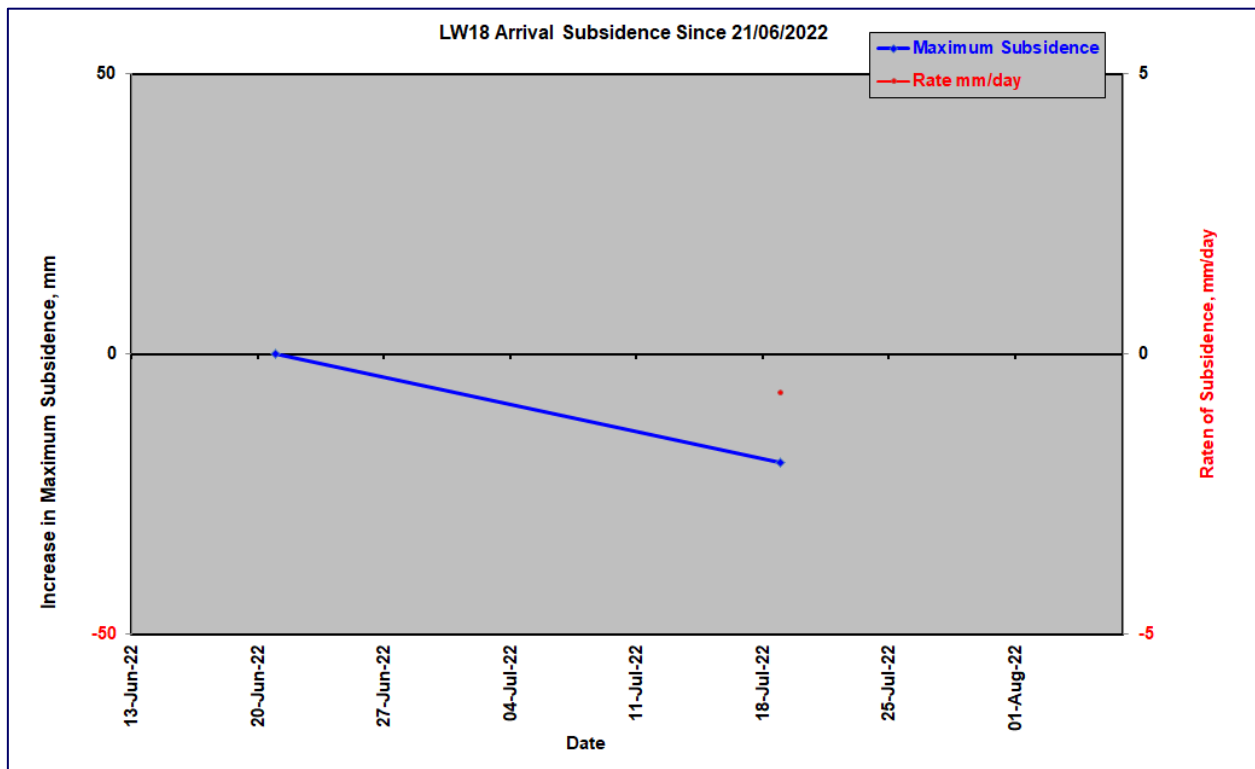


Figure 3 - Rates of Change of Subsidence, Arrival Road

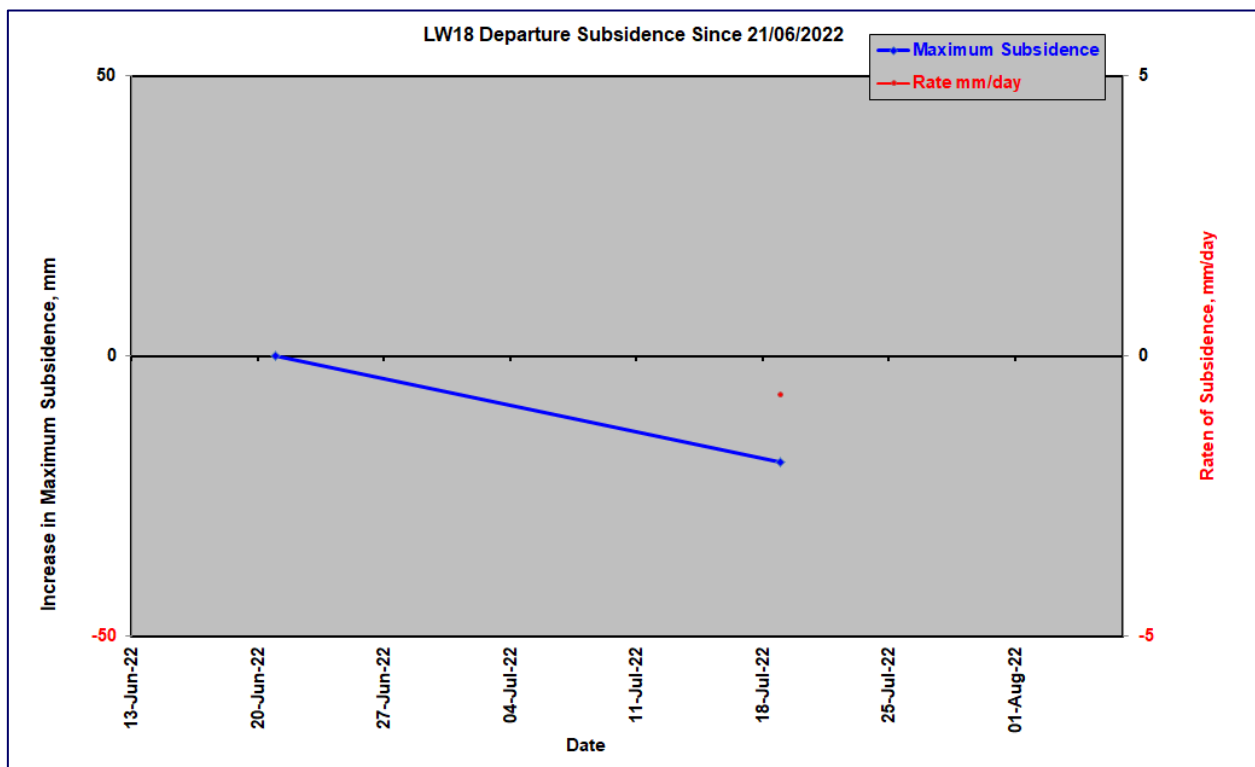


Figure 4 - Rates of Change of Subsidence Departure Road

Changes in Bay Lengths – Last Survey on 21/07/2022

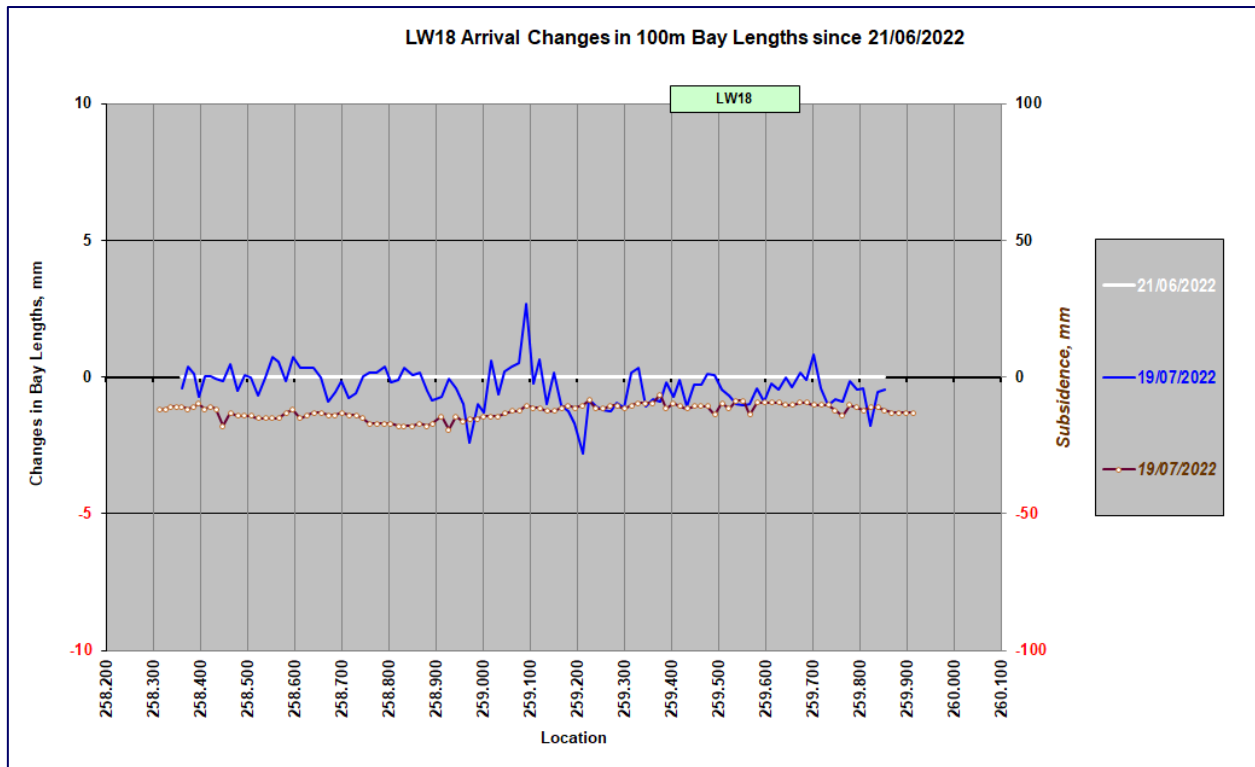


Figure 5 - Changes in 100 m Bay Lengths - Arrival Road

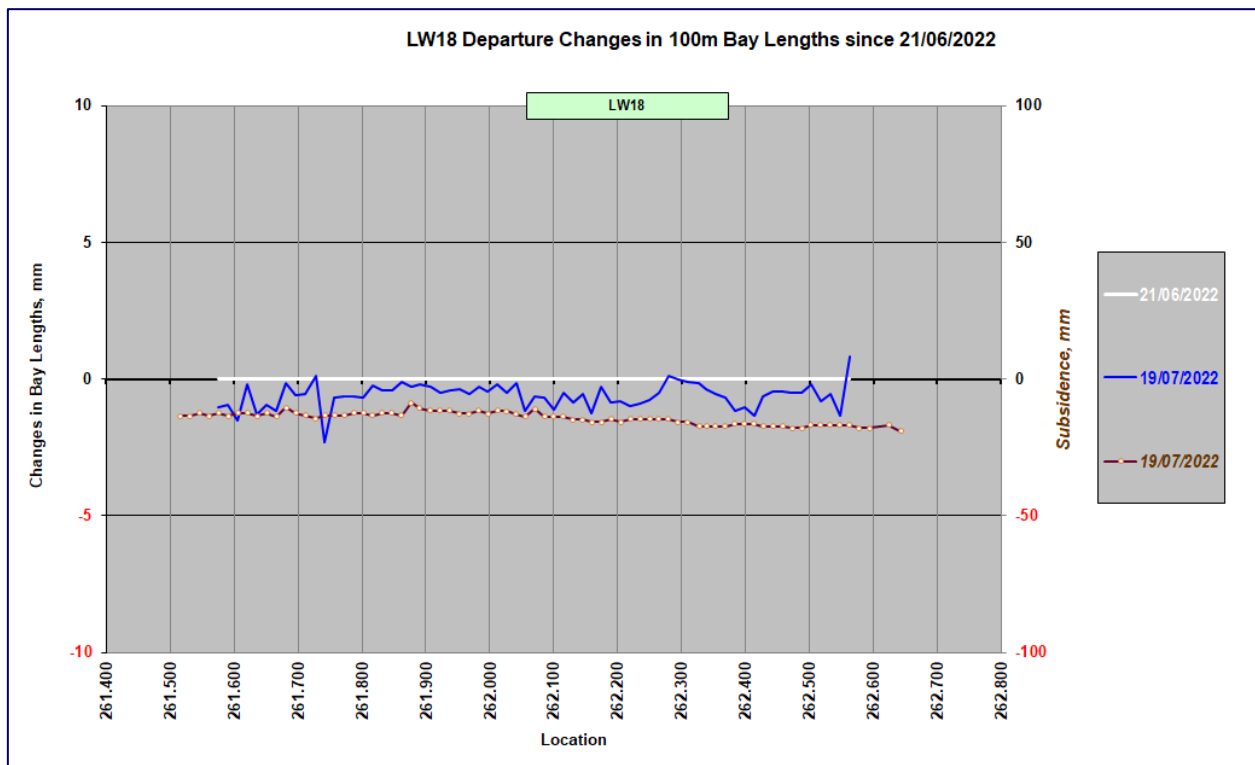


Figure 6 - Changes in 100 m Bay Lengths - Departure Road

Temperatures

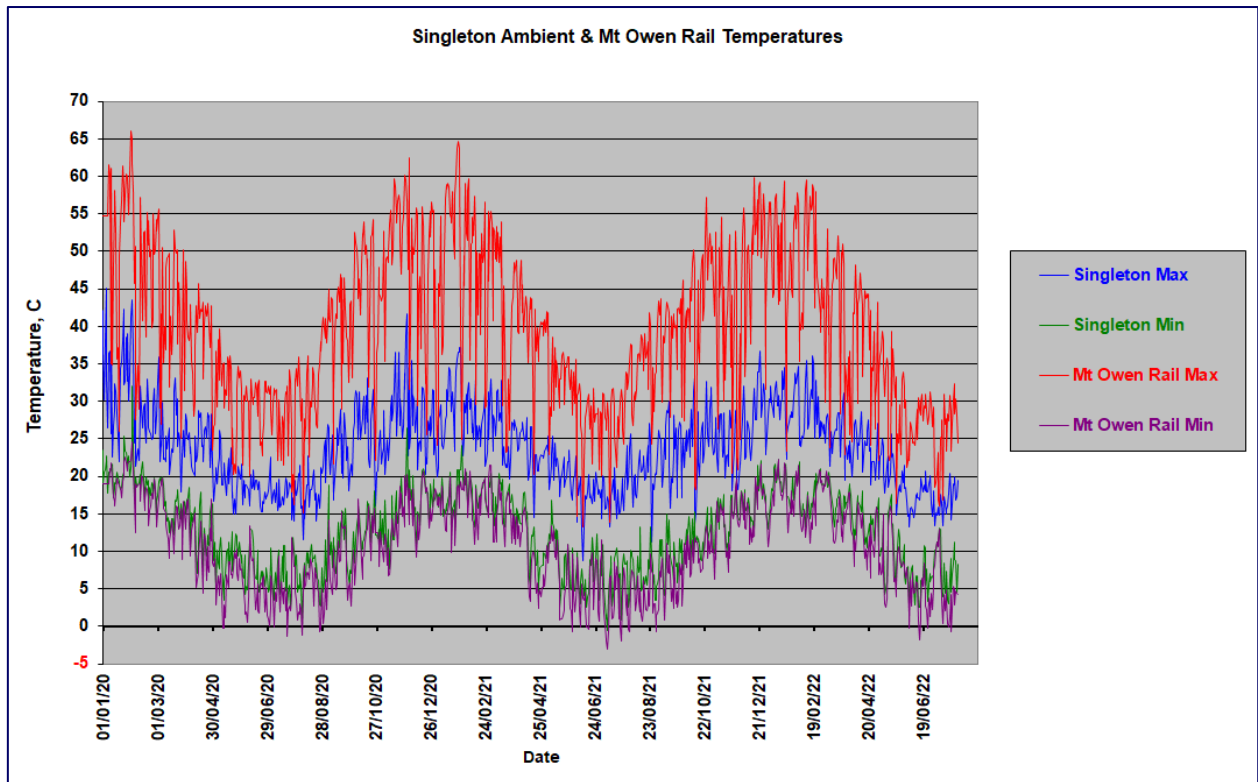


Figure 7 - Singleton Max and Min Ambient Temperatures, Max and Min Rail Temperatures

Rail Stresses along the **Main Line / Arrival Road** on **26/07/2022** with Rail Stresses at 2-Hr Intervals, and Stress Range over period since **20/07/2022**

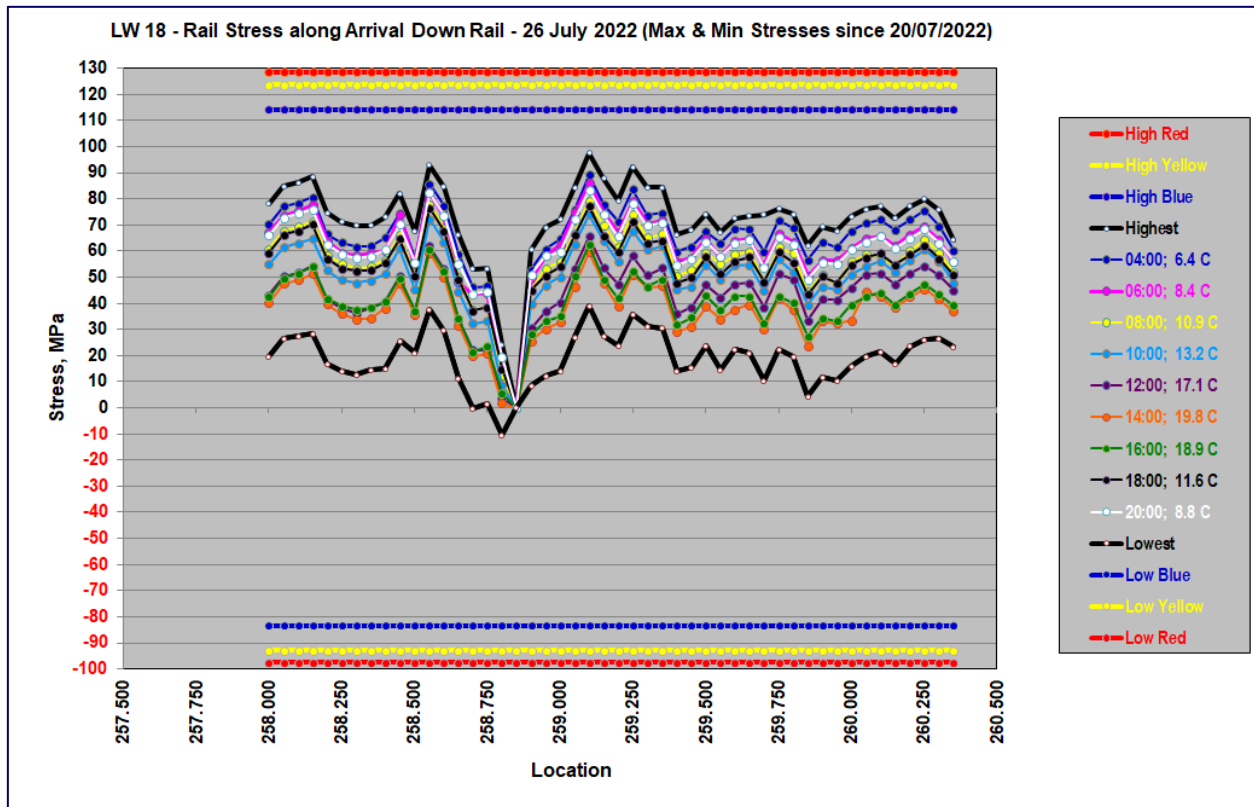


Figure 8 - Rail Stress along Down Rail.

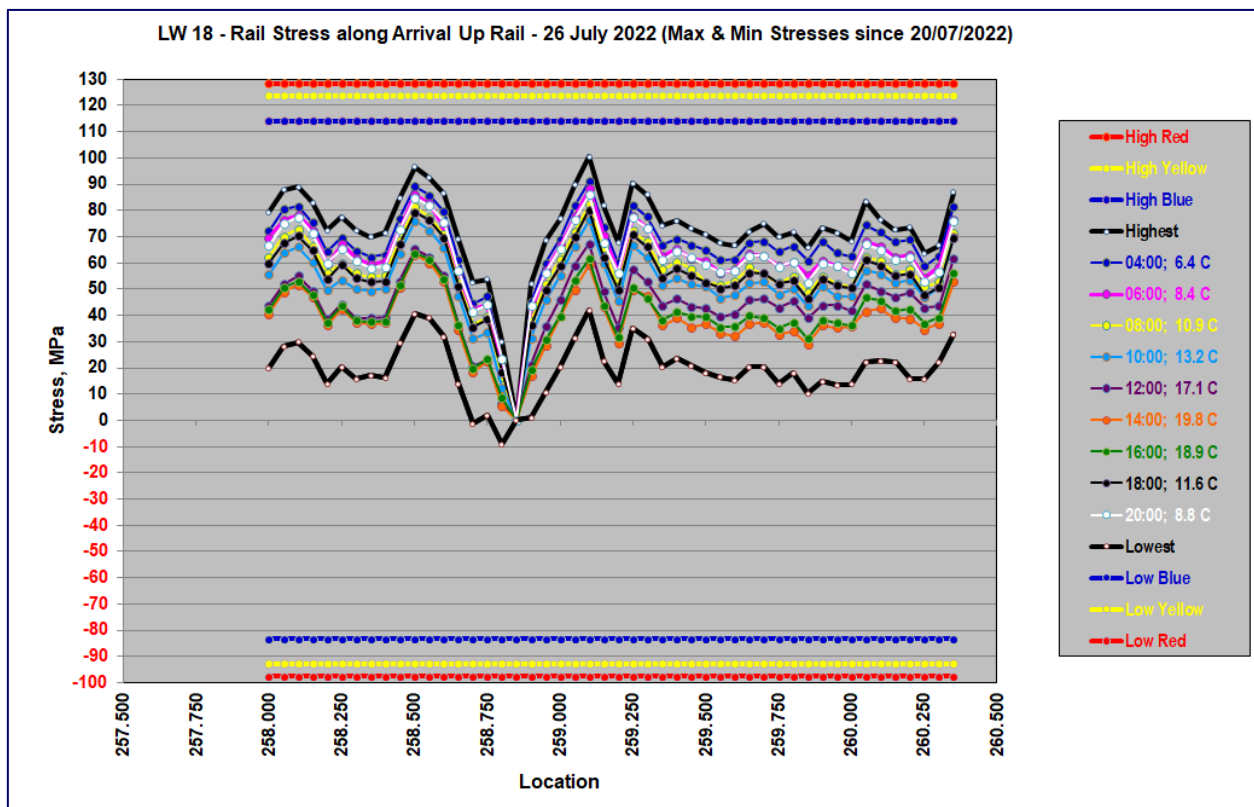


Figure 9 - Rail Stresses along Up Rail.

The following charts show SFT along the Arrival Road

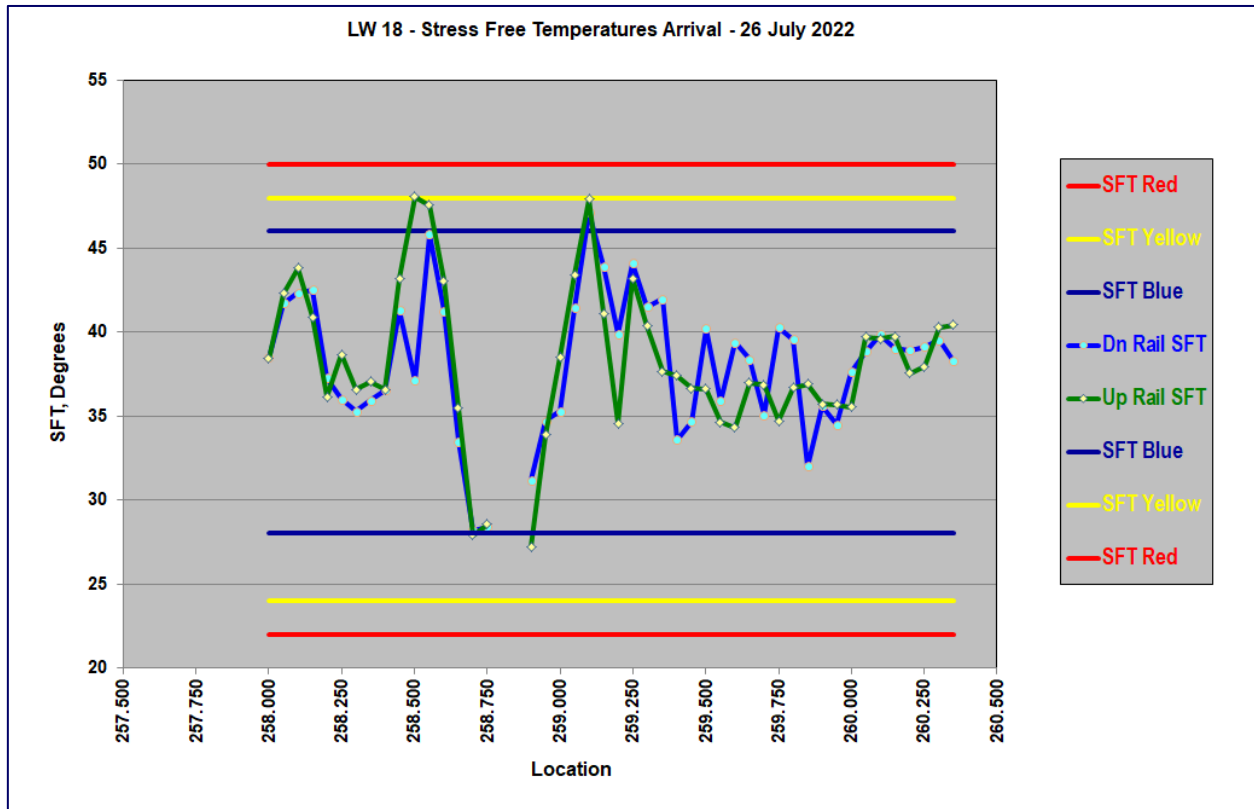


Figure 10 - SFT Both Rails

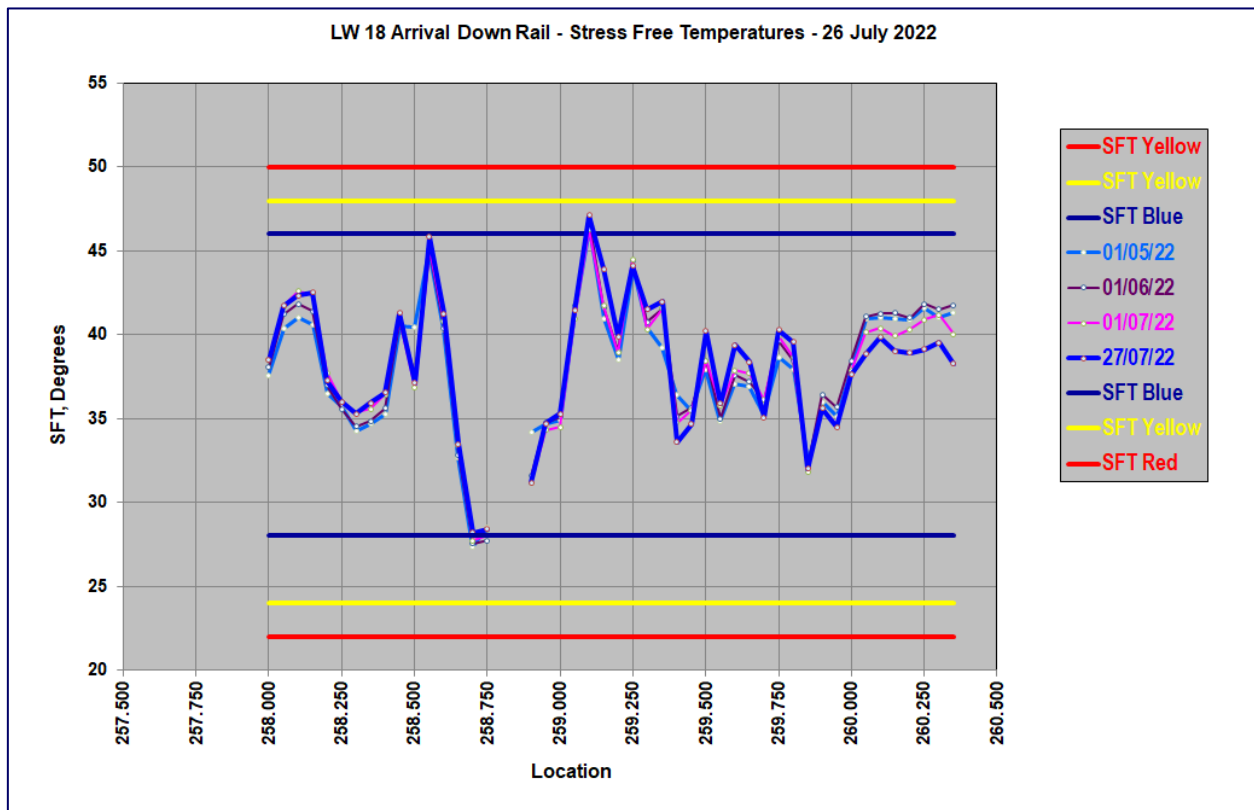


Figure 11 - SFT Down Rail

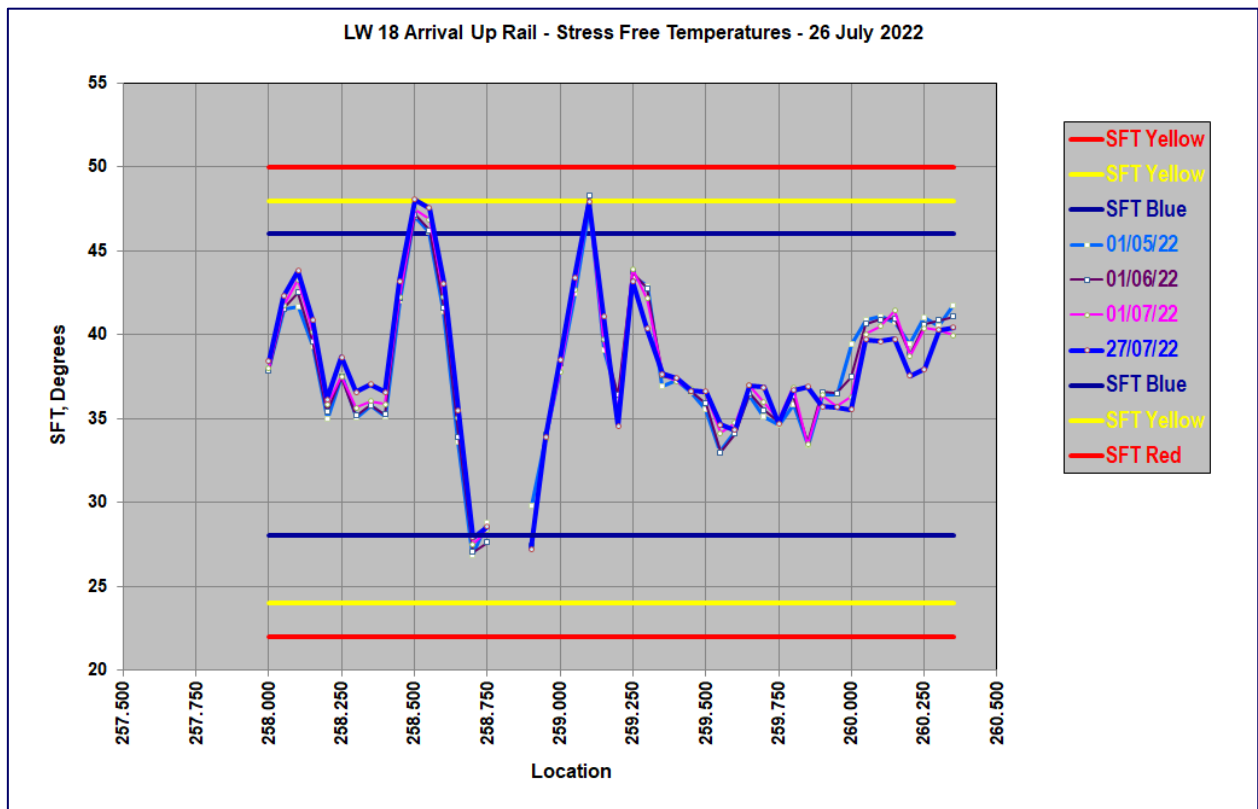


Figure 12 - SFT Up Rail

Rai Stresses are Predicted to exceed Rail Stress Triggers at the Following Temperatures

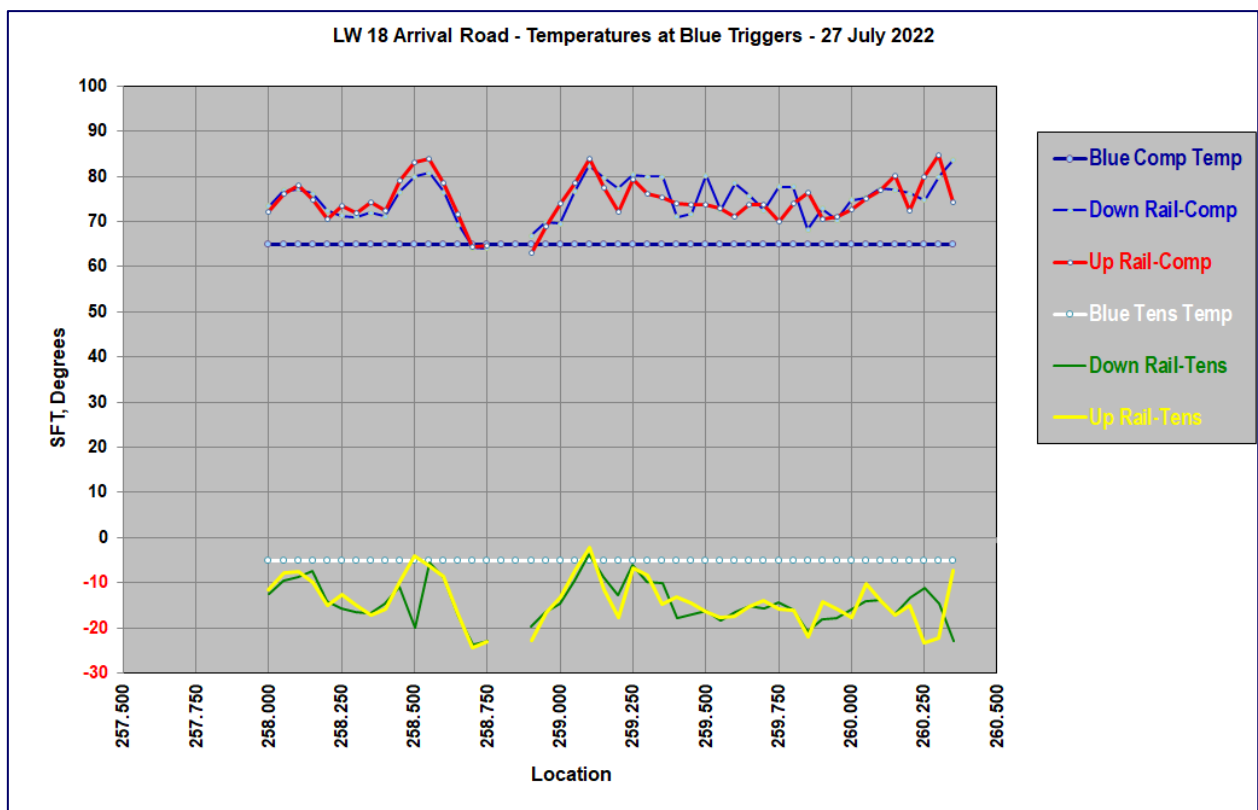


Figure 13 - Main Line and Arrival Road

Stress Gauge Performance

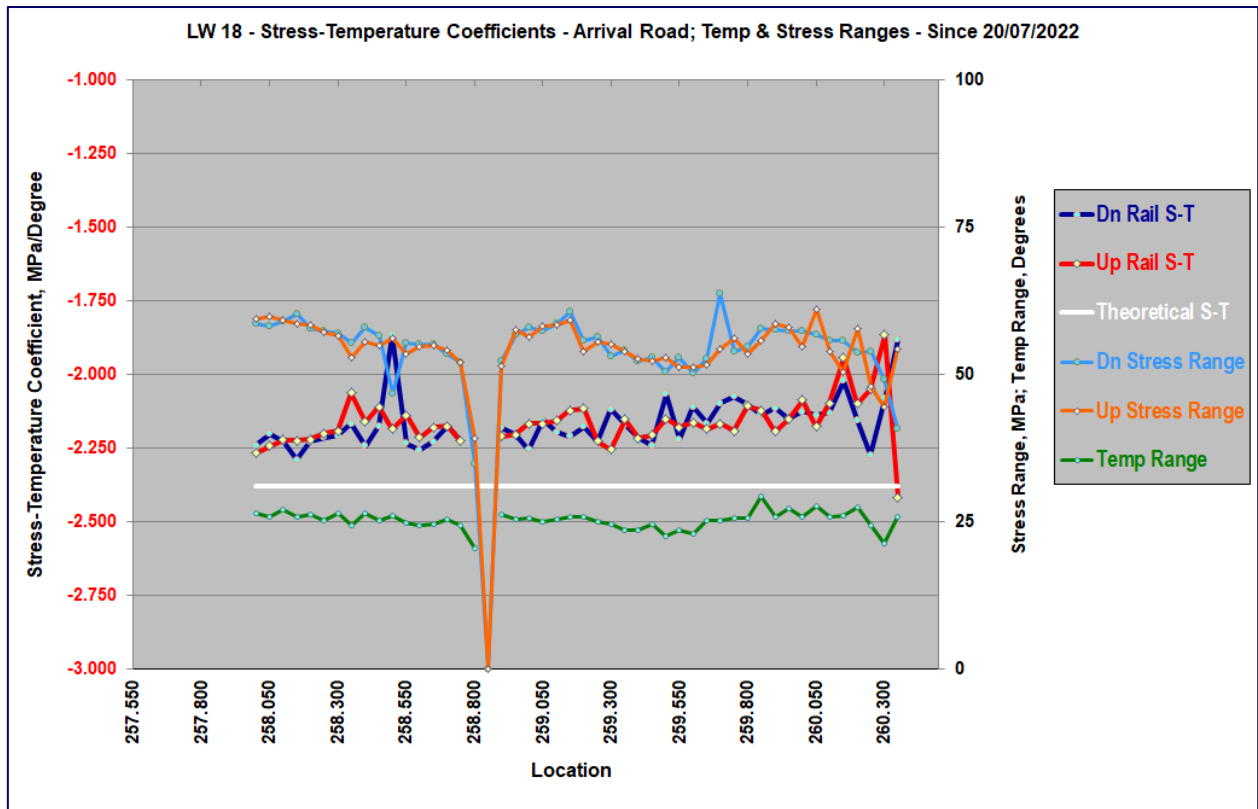


Figure 14 - Stress Ranges; Stress-Temperature Coefficients, Temperature Ranges

Rail Stresses along the **Departure Road** on 26/07/2022 with Rail Stresses at 2-Hr Intervals, and Stress Range over period since 20/07/2022

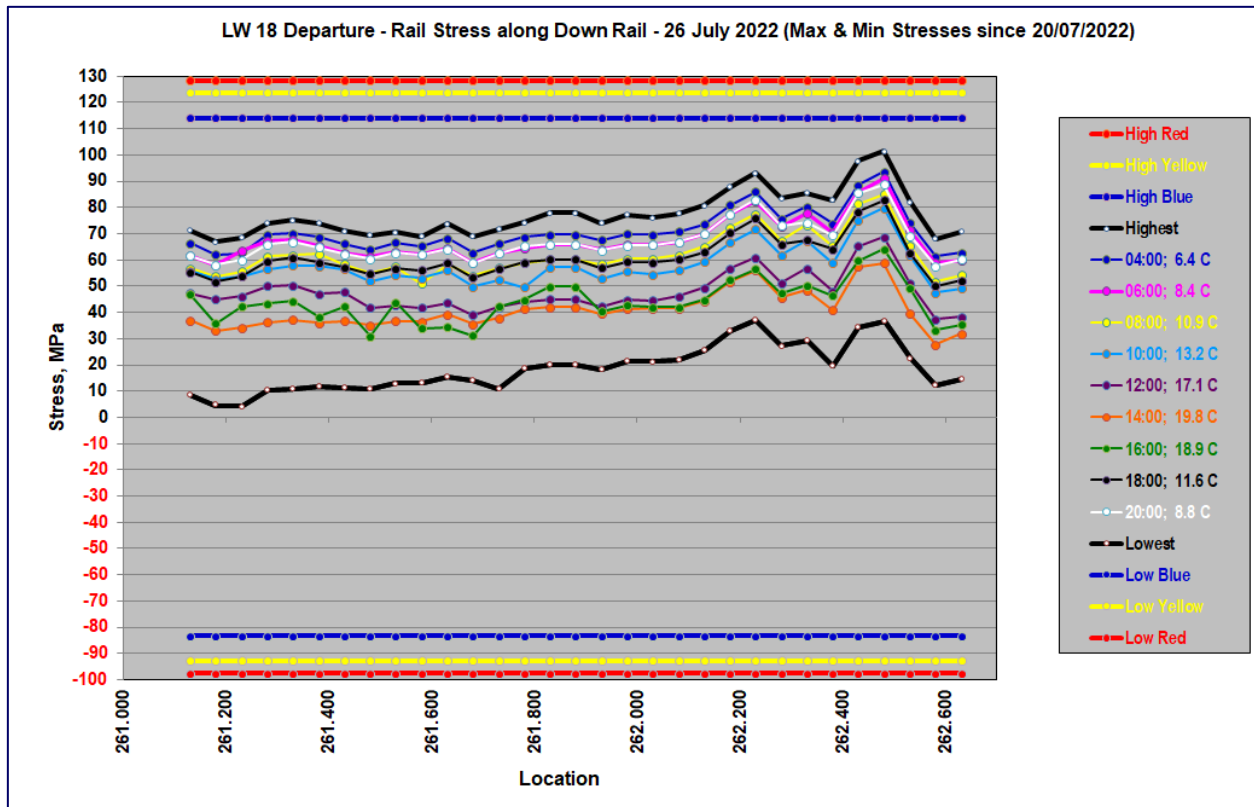


Figure 15 - Rail Stress along Down Rail.

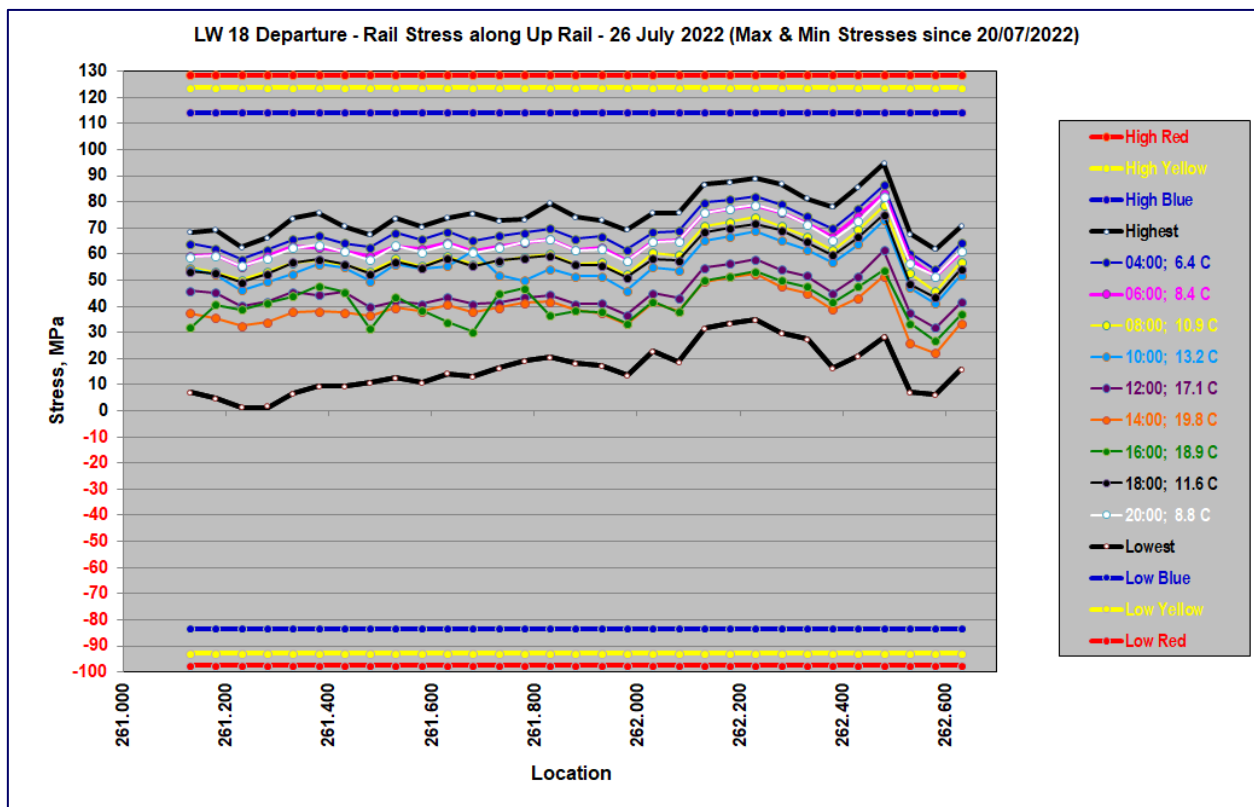


Figure 16 - Rail Stresses along Up Rail.

The following charts show SFT along the Departure Road

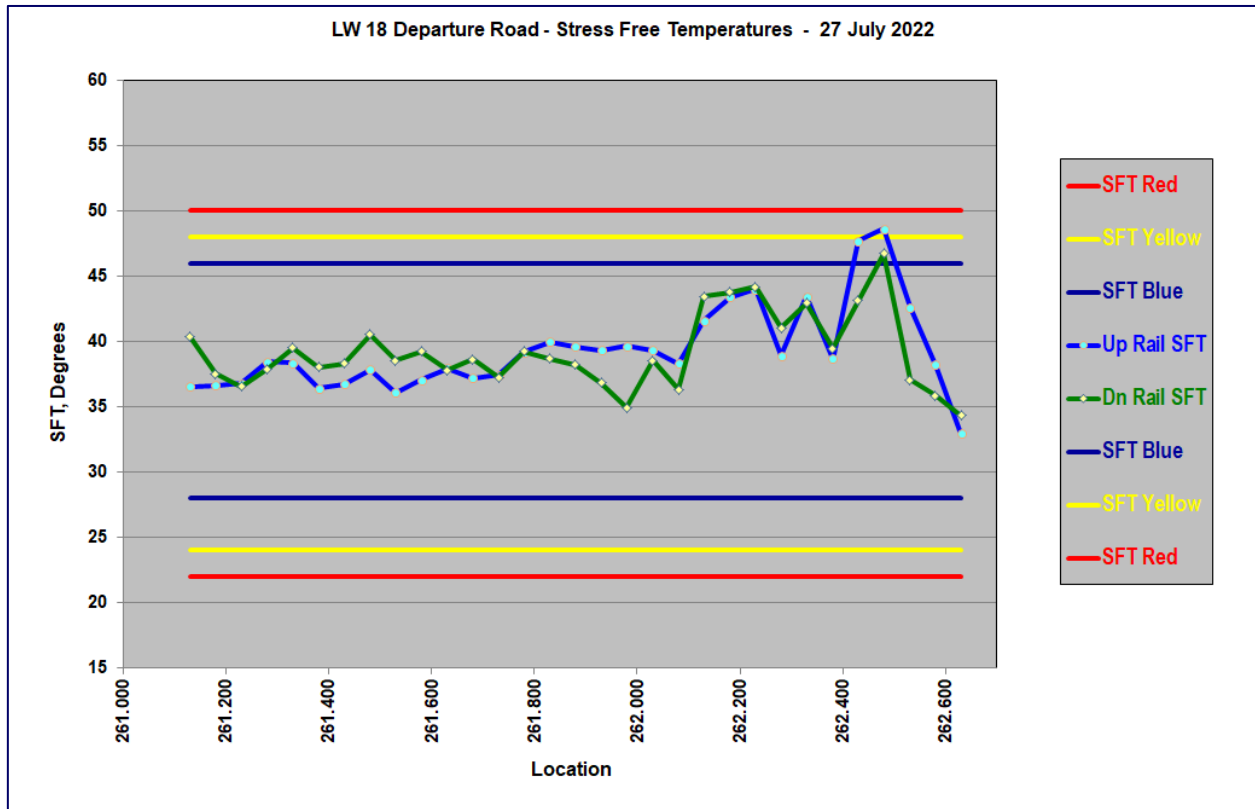


Figure 17 - SFT Both Rails

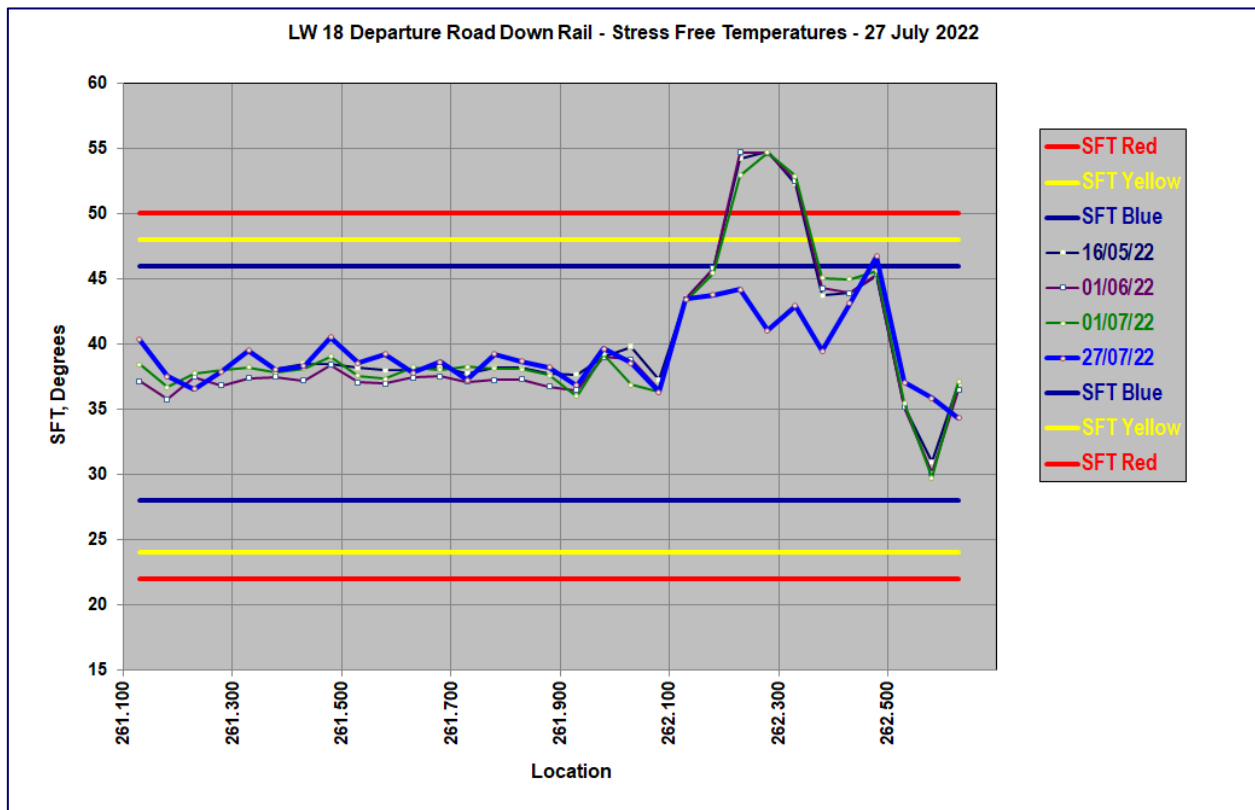


Figure 18 - SFT Down Rail

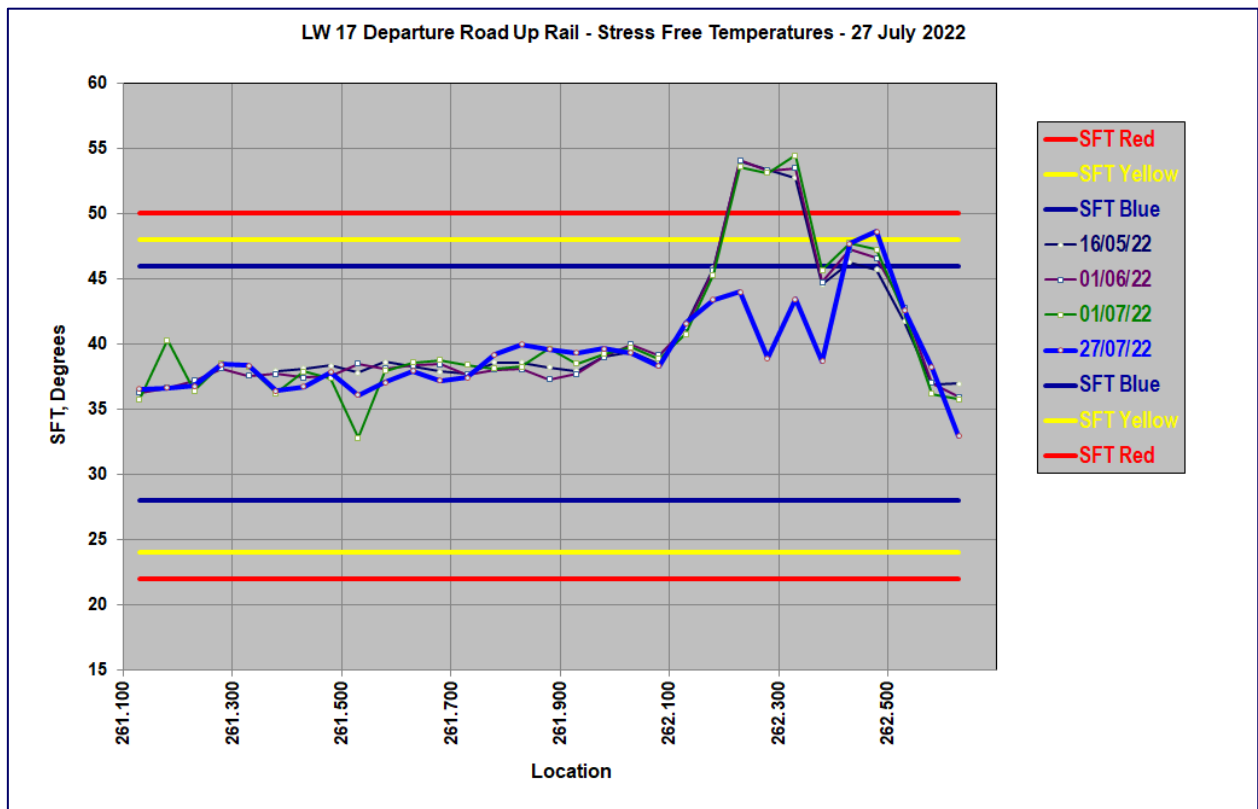


Figure 19 - SFT Up Rail

Rail Stresses are Predicted to exceed Rail Stress Triggers at the Following Temperatures

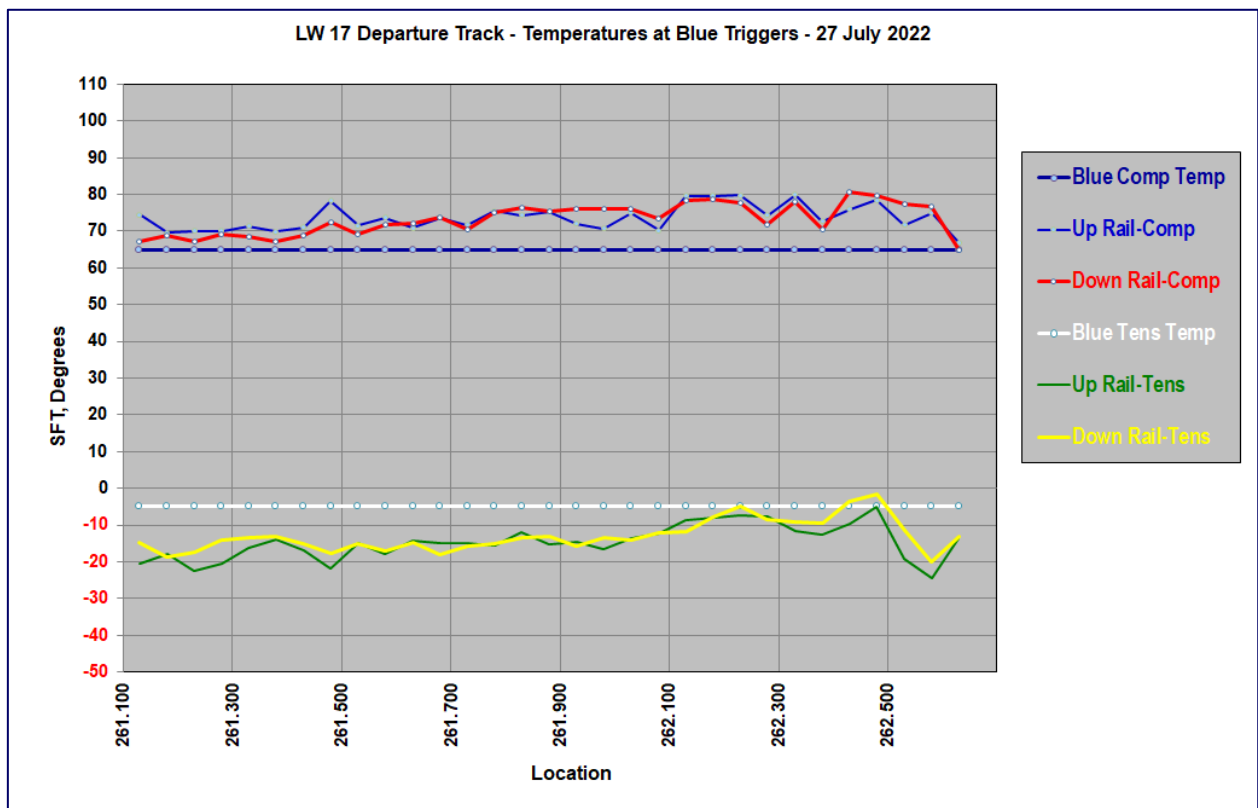


Figure 20 - Departure Road

Stress Gauge Performance

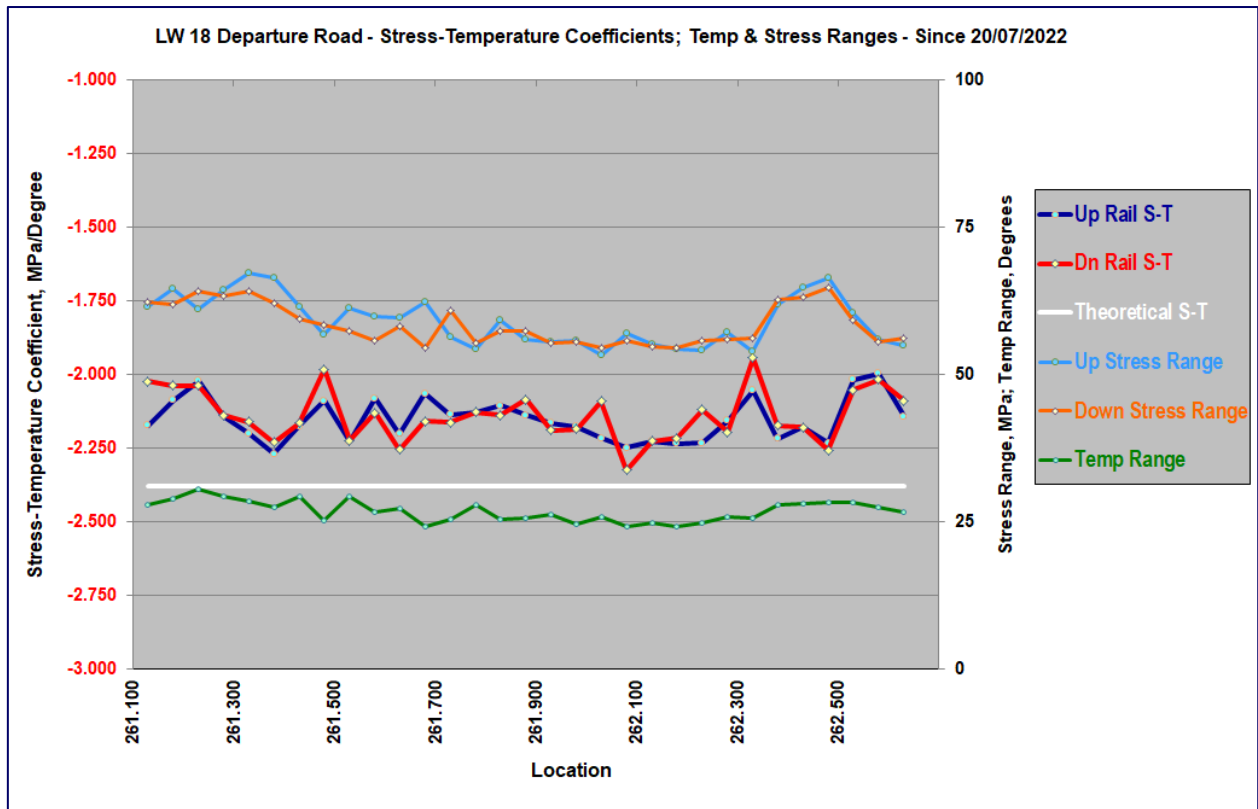


Figure 21 - Stress Ranges; Stress-Temperature Coefficients, Temperature Ranges

Expansion Switch Performance

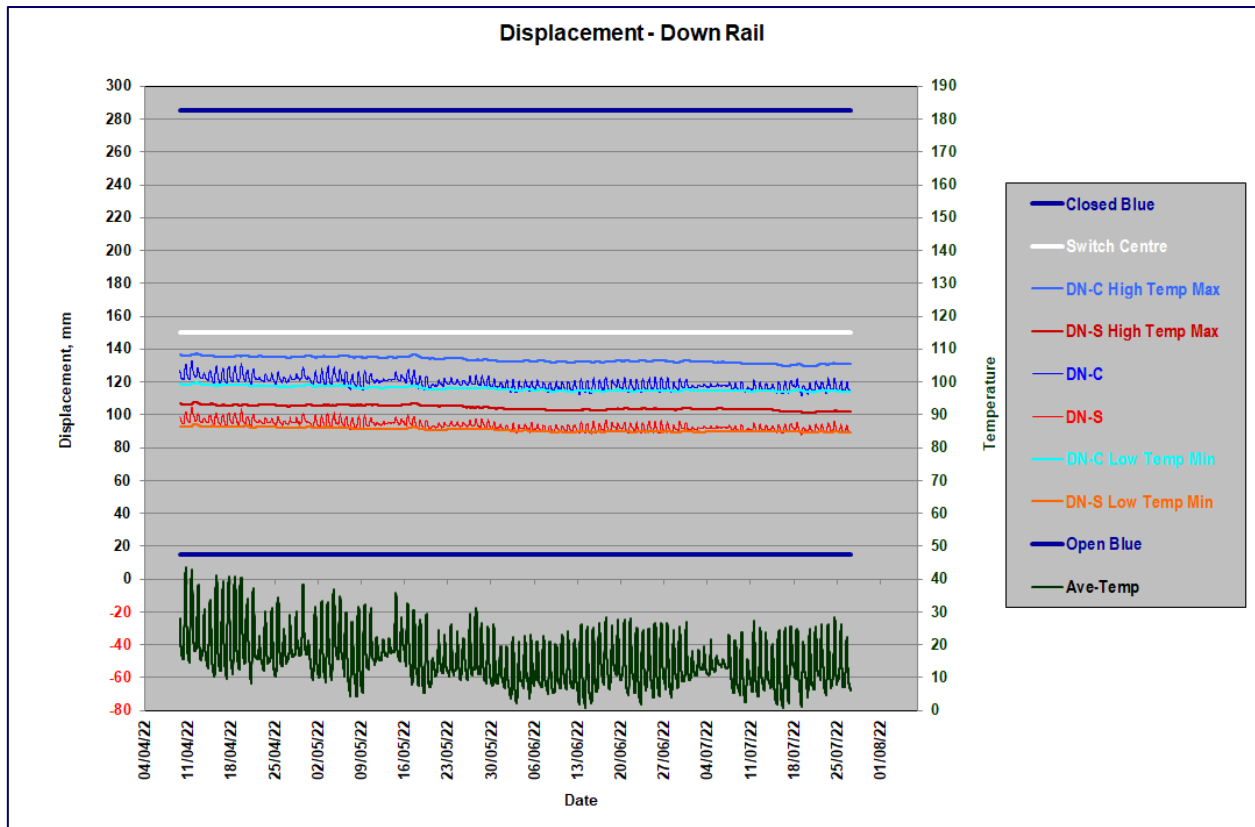


Figure 22 - Switch Rail Positions – Down Rail

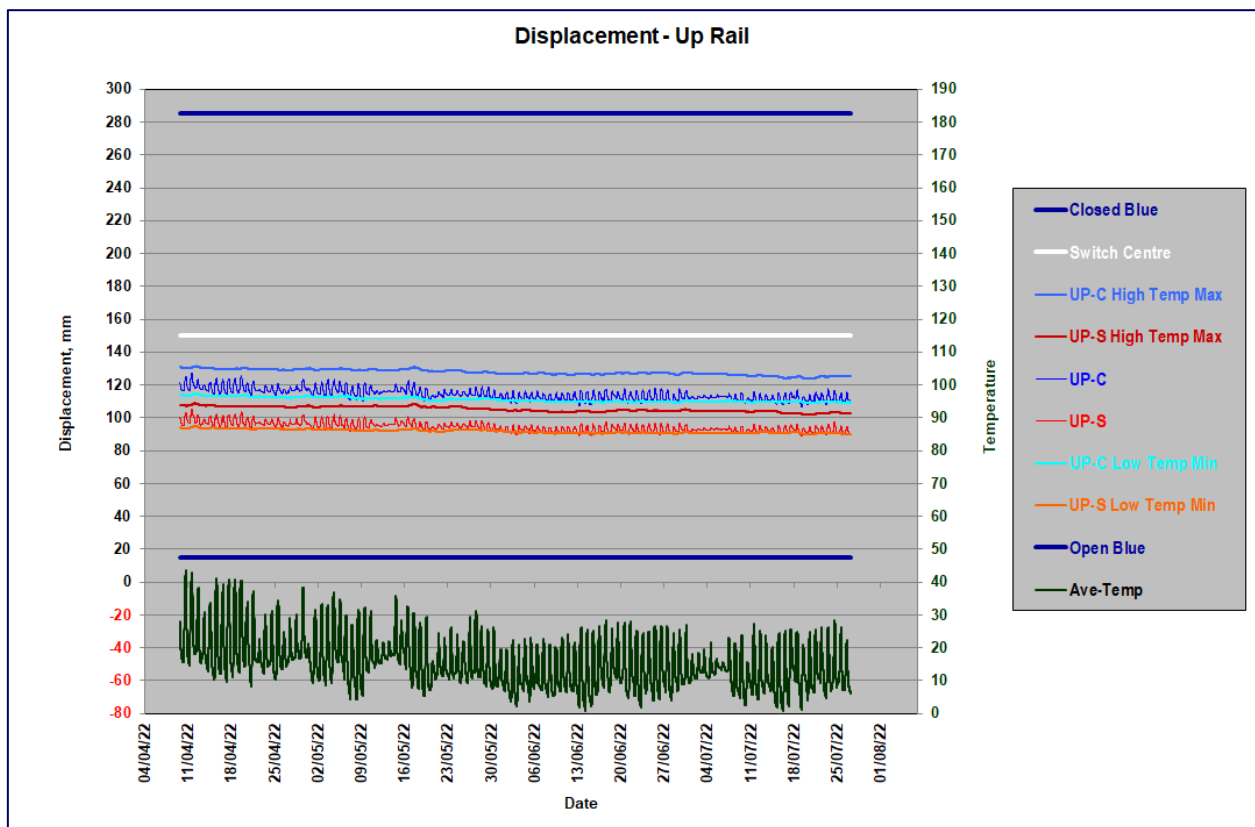


Figure 23 - Switch Rail Positions - Up Rail

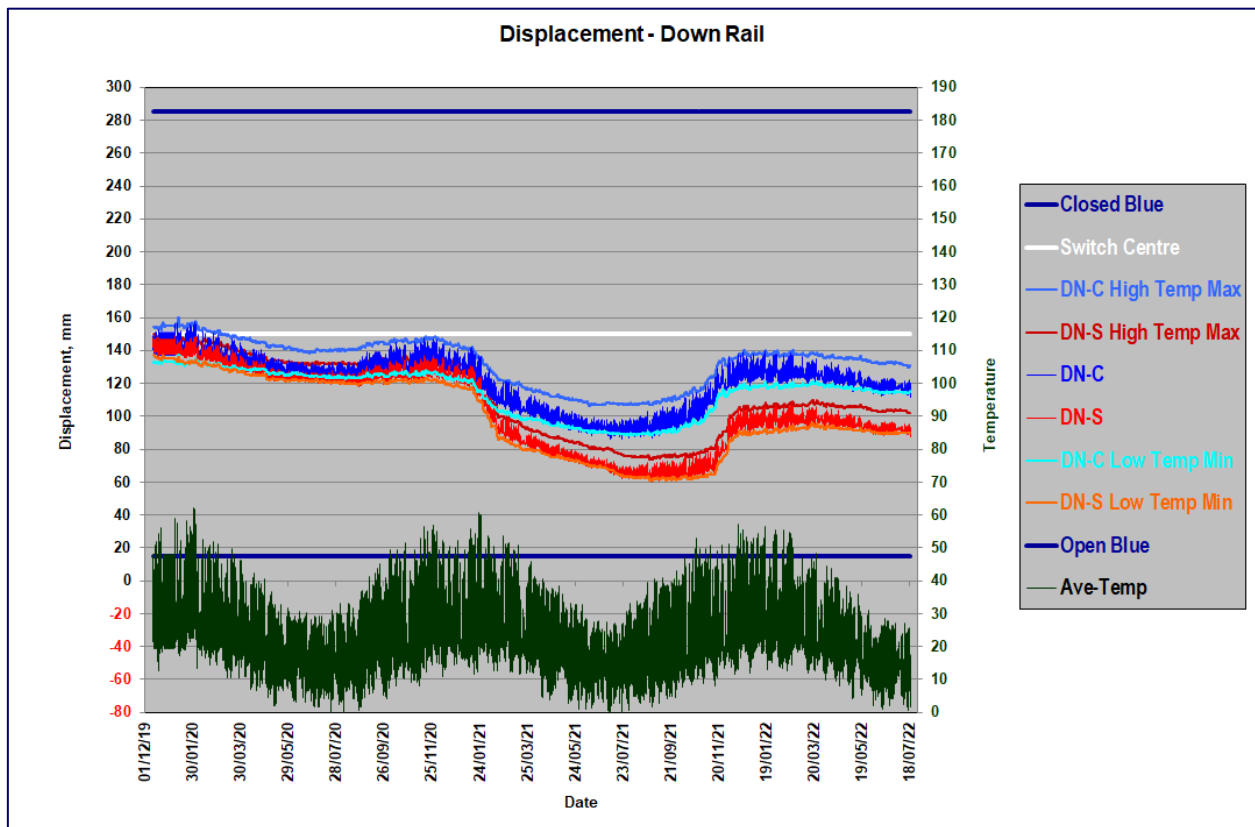


Figure 24 - Switch Rail Positions Down Rail, since 11/12/19

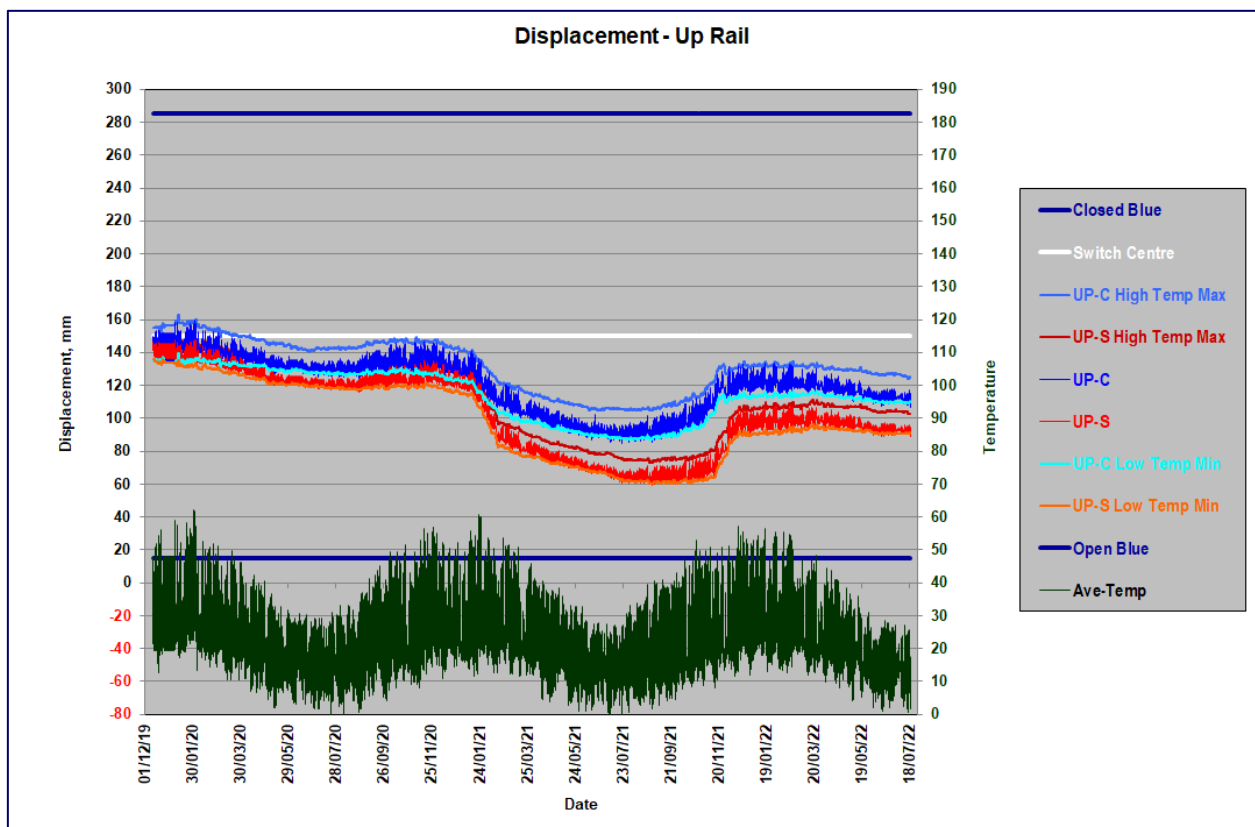


Figure 25 - Switch Rail Positions since 11/12/19

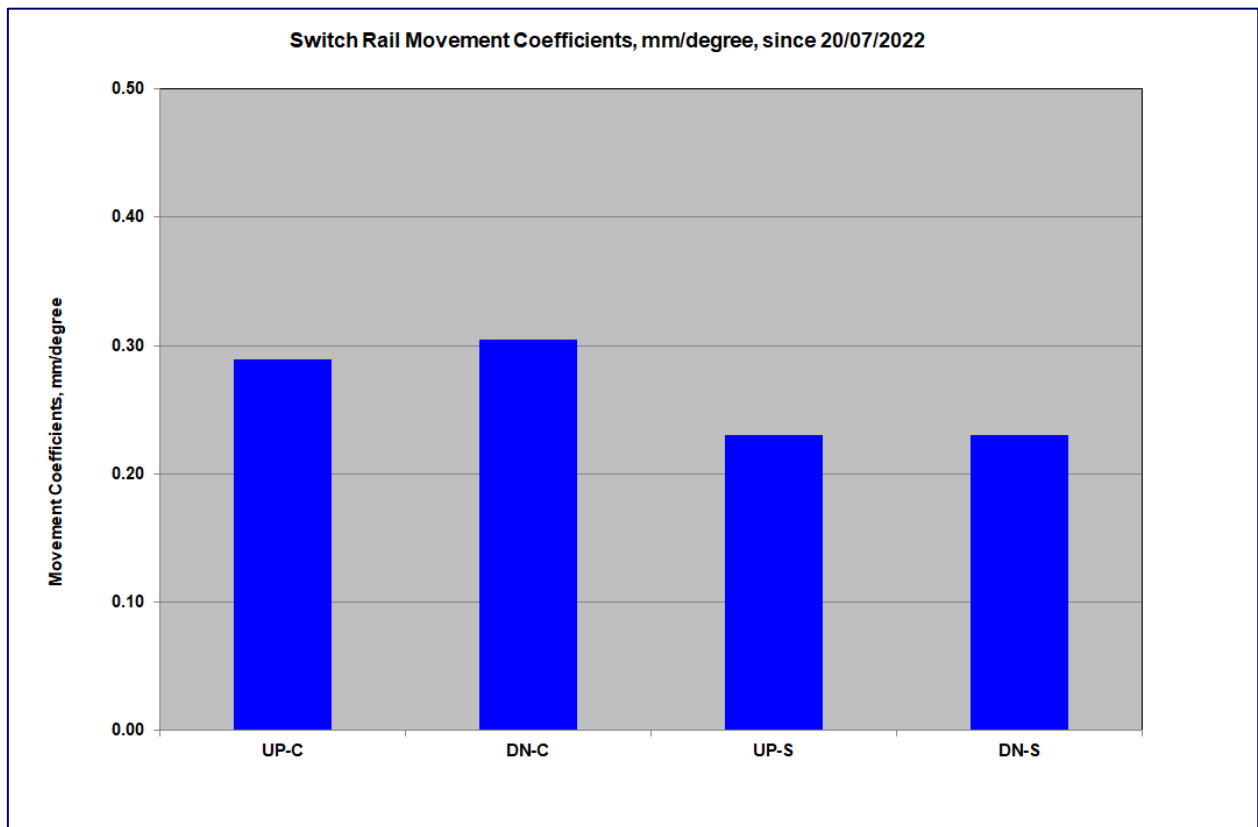


Figure 26 - Switch Rail Movement Coefficients

Glencore – LW18 Rail Monitoring System Status Report

20th July 2022

Summary Information						
Alarm Count	Blue	0	System Faults	Closed	Other Information	0
	Yellow	0		0		
	Red	0		Open	Attached Reports	0
	Grey	0		6	Server Status	Operational
On Call Number – 0410 686 568				Craig Banks – 0428 208 725		

Monitoring System Staging			
System	Stage 1 Locations	Stage 2 Locations	Stage 3 Locations
Rail Stress System	-	258.00 km – 260.350 km 262.63 km – 261.130 km	-

Alarms						
Alarms During Reporting Period	Date/Time	Device	Alarm Trigger Type	Description		
	19/07/2022 12:35am	UR_S_252.13	CWR Tensile. Stress BLUE Trigger	- False alarm triggered by train axle over sensor.		
Disabled Alarms	Device	Alarm	Alarm Off	Alarm On	Comment	
	DR_S_258.50	All	10/07/2022		Awaiting maintenance	
	DR_S_261.18	All	10/07/2022		Awaiting maintenance	
	UR_S_261.88	All	10/07/2022		Awaiting maintenance	
	UR_S_259.85	All	15/07/2022		Awaiting inspection	
	UR_S_261.58	All	15/07/2022		Awaiting inspection	
Alarm System Functionality	Latest Alarm Date/Time	Device	Alarm Trigger Type	Alarm Triggered (SMS)	Rail Response Group (RRG) Attended Teleconference	ACCC Received and Responded
	19/07/2022 12:35 am	UR_S_252.13	CWR Tensile. Stress BLUE Trigger	Yes	Yes	Yes
Next Scheduled Test Alarm – TBC						

System Faults and Maintenance			
Item	Issue	Action Required	Status
DR_S_261.18	25/02/2022 – Sensor reading noisy. 12/07/2022 – Replaced connection.	Replace sensor	Open
UR_S_261.88	30/01/2022 – Gauge drifting. 12/07/2022 – Replaced offset required. 20/07/2022 – Sensor requires further maintenance.	Inspect	Open
Zone 5	28/06/2022 – Some noise in multiple arrays. This indicates water ingress in the logging equipment.	Inspect	Open
DR_S_258.5	28/06/2022 – Drifting.	Inspect	Open
UR_S_259.85	20/07/2022 – Sensor measurements irregular at times however returned to normal measurements.	Monitor	Open
UR_S_261.58	20/07/2022 - Sensor measurements irregular and underestimating at times.	Inspect	Open

Other Information	
Item	Comments

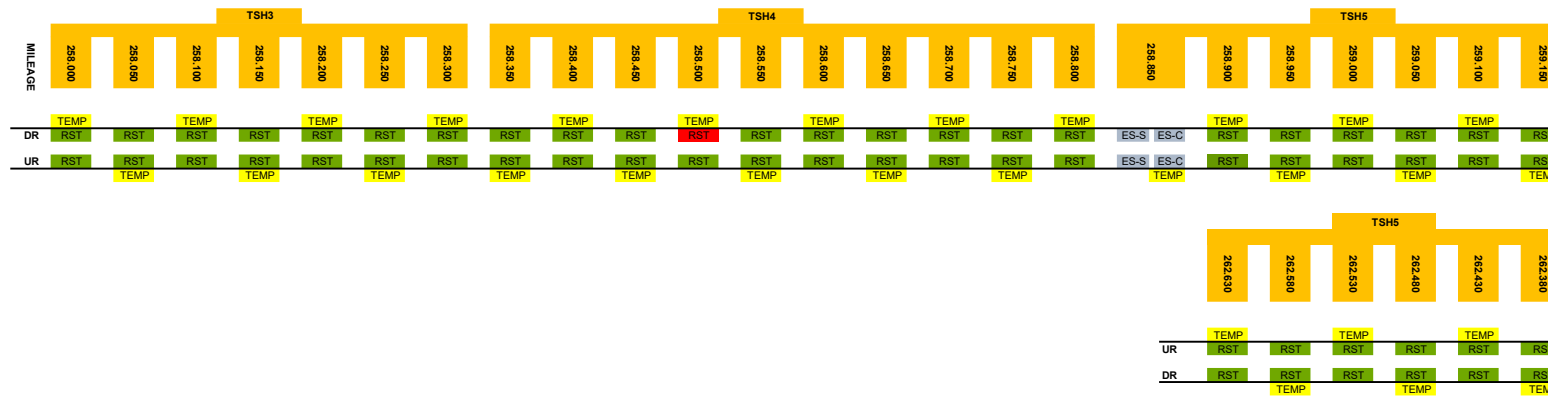
Attached Report	
Report Number	Comments

Craig Banks
 Surveyor,
 Lynton Surveys Pty Ltd.

Sensor Location Sketch (20-07-2022)
 Mt Owen Rail Monitoring System - LW18
 Lynton Solutions

STATISTICS	
Type	Faults
Stress	2
Temp	0
Disp	0

LEGEND	
RST	Rail Stress Transducer
TEMP	Temperature Sensor
ES-S	Switch Displacement Sensor
RST	Faulty Sensor
RST	Repair not required



Sensor Location Sketch (20-07-2022)
 Mt Owen Rail Monitoring System - LW18
 Lynton Solutions

STATISTICS	
Type	Faults
Stress	5
Temp	0
Disp	0

LEGEND	
RST	Rail Stress Transducer
TEMP	Temperature Sensor
ES-S	Switch Displacement Sensor
RST	Faulty Sensor
RST	Repair not required

