Appendix F

918 Panel Subsidence Monitoring Program Clarence Colliery (Centennial 2026b)

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918 Panel
Subsidence Monitoring Program

Clarence Colliery

April 2026

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1 BACKGROUND

1.1 Introduction

Clarence Colliery (Clarence) is an underground coal mining operation located 10 kilometres east of Lithgow in the Western Coalfields of New South Wales (Figure 1). Clarence Colliery Pty Ltd is the operator and manager of Clarence Colliery on behalf of the shareholding entities, all of which are wholly owned subsidiaries of Centennial Coal Company Pty Ltd.

Clarence operates under three development consents, one of which is DA 504-00, which was granted in 2005 by the NSW Department of Infrastructure, Planning and Natural Resources (now the NSW Department of Planning, Housing and Infrastructure (DPHI)). Clarence also holds Mining Lease (ML) 1583 which lies within the DA504-00 consent area. The proposed secondary extraction of the 918 Panel lie wholly within DA504-00 and ML1583.

Under DA504-00 an Extraction Plan is required to be prepared to the satisfaction of the Planning Secretary prior to undertaking second workings (schedule 3 condition 2). The 918 Panel Extraction Plan describes the applicable regulatory framework, mine planning, management and monitoring measures to be implemented to protect all natural and built features in addition to administering public safety measures associated with second workings.

The 918 Panel Subsidence Monitoring Program (SMP) has been developed in accordance with the requirements of Condition 2g (i), Schedule 3 of DA 504-00 for the Panel and Pillar Partial Extraction (PPPE) using shortwall of the 918 Panel, within the Katoomba seam. PPPE is a mining technique that falls within partial extraction mining methods, extracting up to approximately 62% of the available coal resource. The 918 Panel contains sub-panels 918A, 918B1 and 918B2 (Section 3).

The SMP has been prepared generally in accordance with the Department of Planning & Environment, *Extraction Plan Guideline* (2022) and the Resources Regulator, *Managing Risks of Subsidence Guide: WHS (Mines and Petroleum Sites) Legislation* (2023).

1.2 Project Description

The 918 Panel Extraction Plan area (**EP Area**) comprises a surface area of 87.5 hectares (Section 3). The depth of cover above the Katoomba seam within the EP Area ranges from approximately 174 m to 329 m and varies between 227 m and 294 m directly above the sub-panels. The Katoomba seam thickness within the EP Area varies between approximately 1.5 m and 3.0 m. The existing natural surface environment of the EP Area includes native bushland, steep slopes, cliffs, minor cliffs, pagodas, creeks, swamps and archaeological heritage features.

The EP Area is contained within the Gardens of Stone State Conservation Area (GoS SCA) which is managed by the National Parks and Wildlife Service (NPWS). There are no private properties within the EP Area. The only existing built infrastructure identified within the EP Area are unsealed tracks and trails and Clarence environmental and subsidence monitoring infrastructure.

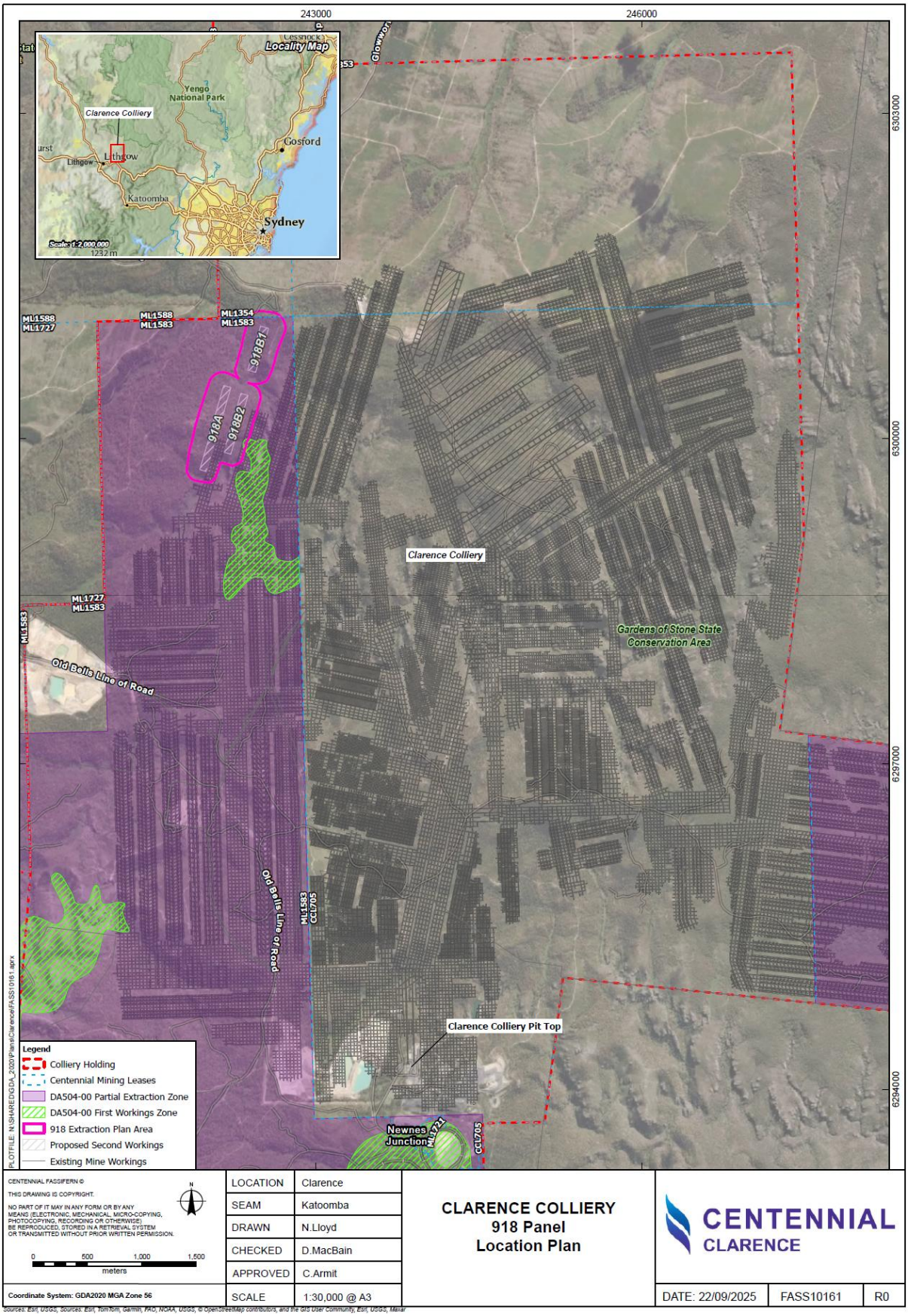

Figure 1 – 918 Panel Extraction Plan Area

2 Purpose

This SMP has been prepared to support the 918 Panel Extraction Plan. The SMP has been developed in accordance with the requirements of Condition 2g (i), Schedule 3 of DA 504-00.

The purpose of this management plan is to:

- Describe the ongoing conventional and non-conventional subsidence monitoring program;
- Provide data to assist with the management of risks associated with conventional and non-conventional subsidence;
- Validate the conventional and non-conventional subsidence predictions;
- Analyse the relationship between the predicted and resulting conventional and non-conventional subsidence effects and predicted and resulting impacts under the plan and any ensuing environmental consequences; and
- Inform the adaptive management process.

3 Scope

3.1 Extraction Plan Area

The EP Area shown in Figure 1 has been calculated by combining the areas bounded by the following limits:

- a 35° angle of draw line from the extents of secondary extraction for the 918A, 918B1 and 918B2 sub-panels; and
- the predicted limit of vertical subsidence, taken as the 20 mm subsidence contour, due to the extraction of the 918A, 918B1 and 918B2 sub-panels.

The SMP applies to the management of risks related to the development of subsidence from the proposed second workings of sub-panels; 918A, 918B1 and 918B2A within the EP Area. These sub-panels are located within Clarence Colliery Mining Lease (ML 1583) and the DA-504-00 approved Partial Extraction mining areas.

3.2 Proposed mining schedule

This Subsidence Monitoring Program covers the first workings and partial extraction until the completion of mining of Sub-panel 918B2 and for sufficient time thereafter to allow for completion of subsidence effects. The current schedule of mining is shown in Table 1.

Table 1 – Schedule of mining

Sub-panel	Start Date	Completion Date	Direction of mining
918A	December 2026	March 2027	South to North
918B1	June 2027	July 2027	North to South
918B2	July 2027	August 2027	North to South

The above schedule is subject to operational changes. Clarence will keep stakeholders informed of changes.

4 Consultation and Plan Development

The SMP is required to be prepared in consultation with DPHI and Resource Regulator (**RR**) as per Schedule 3 conditions 2 (g)(i) of DA 504-00.

A draft of the 918 and 920 Panels SMP, along with the 918 Panel SMP, was provided to Clarence employees with roles and responsibilities under the SMP for review. Additionally, a draft copy of the 918 and 920 Panels SMP was provided to DPE, RR and NPWS in November 2023. The document was updated in response to comments received, and the final 918 and 920 SMP was submitted with the 918 and 920 Panel Extraction Plan on the planning portal in April 2024. The Independent Expert Advisory Panel for Mining (IEAPM) was provided with the 918 and 920 Panels Extraction Plan and associated documentation by DPHI.

Following regulatory and IEAPM feedback in 2024, the 918 and 920 Panels Extraction Plan was withdrawn in October 2024. The mine plan was changed to avoid key natural features resulting in the removal of the 920 panel, reduction in 918 sub-panels lengths and void widths and increases in subsidence and environmental monitoring. The 918 SMP has been developed as a revised version of the original 918 and 920 SMP. This updated 918 SMP document incorporates the consultation outcomes from the earlier draft.

Following consultation with the IEAPM on 15 December 2025 and recommendations issued by the IEAPM in January 2026, Clarence Colliery supports a staged assessment and approval extraction process for the 918 Panel Extraction Plan. The IEAPM have recommended to *DPHI to consider a staged assessment approach whereby 918A and 918B1 sub-panels are determined and, subject to satisfactory confirmation of subsidence predictions and pillar monitoring, then determine 918B2 sub-panel if there remains a low likelihood of exceeding the long-term subsidence performance measure of 100mm*.

A copy of the draft 918 SMP has been provided to DPHI, RR, DCCEEW-CPHR, Heritage NSW and NPWS on 26 February 2026, via the DPHI planning portal. Evidence and a summary of 918 Panel SMP consultation is provided in **Appendix 1**. A copy of the final 918 BFMP was provided to DPHI on the 24 April 2026, via the DPHI planning portal with the associated 918 Panel Extraction Plan documents.

5 Regulatory Requirements

Clarence operations are conducted in accordance with relevant legislation and requirements of statutory authorities. Legislative and regulatory requirements are generally recognised through the imposition of conditions on the development consent, licences and mining approvals.

5.1 Development Consent

Development Consent DA-504-00 provides a number of conditions relating to the preparation of the SMP. These conditions are summarised in **Table 2** below, together with the notation of the section of this document in which each matter is addressed.

Table 2 – Development Consent Conditions DA504-00

Consent Condition	Section
Schedule 3 Condition 2g include a: (i) Subsidence Monitoring Program which has been prepared in consultation with the Resources Regulator to:	**Section 4**
• describe the ongoing conventional and non-conventional subsidence monitoring program;	
• provide data to assist with the management of risks associated with conventional and non-conventional subsidence;	**Section 6** **Section 9**
• validate the conventional and non-conventional subsidence predictions;	**Section 10** **Appendix 4**
• analyse the relationship between the predicted and resulting conventional and nonconventional subsidence effects and predicted and resulting impacts under the plan and any ensuing environmental consequences; and	**Section 6.2** **Section 9** **Section 10**
• inform the adaptive management process;	**Section 9.4** **Section 10.2** **Appendix 4**

5.2 Mining Leases

The 918 sub-panels are located in mining lease (ML1583) held by Centennial Coal Company Pty Ltd. There are no specific lease conditions that directly relate to subsidence monitoring.

5.3 Extraction Plan Guidelines

The Extraction Plan and SMP have been prepared generally in accordance with the Department of Planning & Environment, *Extraction Plan Guideline* (2022). **Appendix 2** provides a tabulated summary of the guideline's requirements for a Subsidence Monitoring Program.

6 Subsidence Assessment

6.1 Mine Design

The 918 Panel have been designed to provide minimal levels of subsidence by using the panel and pillar partial extraction mining method to achieve 100 mm (or less) of vertical subsidence.

The objectives of the mine design are to limit height of caving and retain pillars that support the overlying (and bridging) massive strata. The outcome from incorporating these fundamental key features into the mine design is the minimisation of surface subsidence to 100 mm or less.

The void widths associated with the 918A, 918B1 sub-panels is 75m and 918B2 sub-panel is 83 m wide. These narrow widths combined with long term stable barrier pillars (66 m to 74 m wide) and spine pillar system (84 m to 90 m wide) the mine design utilises the bridging effect of the overlying massive strata to minimise subsidence.

The groundwater system at Clarance Colliery consists of an upper (shallow and perched) water table and a lower (deep) water table. Groundwater monitoring data indicated that the Mt York Claystone forms the lower boundary of the upper water table. During the mine design process, limiting subsidence and height of vertical connective fracturing to avoid impacts to the Mt York Claystone was a key consideration to avoid impacts to sensitive surface features.

6.2 Subsidence Prediction

SCT (2026) has provided two-dimensional, vertical subsidence prediction profiles using numerical modelling methods, based on the site-specific geotechnical characteristics of the proposed 918 Panel layout and overburden. SCT (2026) developed and validated its numerical model primarily on observations during the extraction of Panels 910 to 906, which are located to the east of the proposed 918 Panel.

Whilst Clarence has yet to conduct panel-and-pillar partial extraction using the shortwall mining method, there are nearby examples of secondary extraction of Panels 910 to 906, which have mining geometries and extraction ratios that are similar to the proposed 918 sub-panels. A key difference, however, is that the spine pillar between Panels 918A and 918B2 is 84 to 90 metres in width, which is substantially greater than the pillar widths between Panels 910 to 906 (56 to 60 metres).

The Incremental Profile Method (IPM) has been used by MSEC (2026) to prepare three-dimensional predicted subsidence contours for the 918A, 918B1 and 918B2 sub-panels based on the predicted two-dimensional subsidence profiles determined by SCT (2026). The predicted subsidence contours are shown in Figure 2.

Subsidence profiles were developed to reasonably match the shape of SCT's predicted subsidence profiles at depths of cover of 180 m and 280 m. The IPM model adjusts the profiles within the EP Area based on actual depths of cover and seam thickness, interpolating between the two profiles at 180 m and 280 m. The subsidence profiles were adjusted to achieve an angle of draw of approximately 35° following a review of available subsidence monitoring data along the 900B and 900D Lines during and after the extraction of Panels 910 to 906.

A summary of the maximum predicted values of total vertical subsidence and tilt derived using the IPM is provided in Table 3. The total values are the accumulated movements after the extraction of each sub-panel.

Table 3 – Maximum predicted total vertical subsidence and tilt after the extraction of each of the 918A, 918B1 and 918B2 sub-panels

After Panel	Maximum predicted total vertical subsidence (mm)	Maximum predicted total tilt (mm/m)

918A	50	0.5
918B1	60	0.6
918B2	76	0.6

SCT (2026) advises that a variance of ± 20 mm is to be applied to its modelled maximum subsidence estimates.

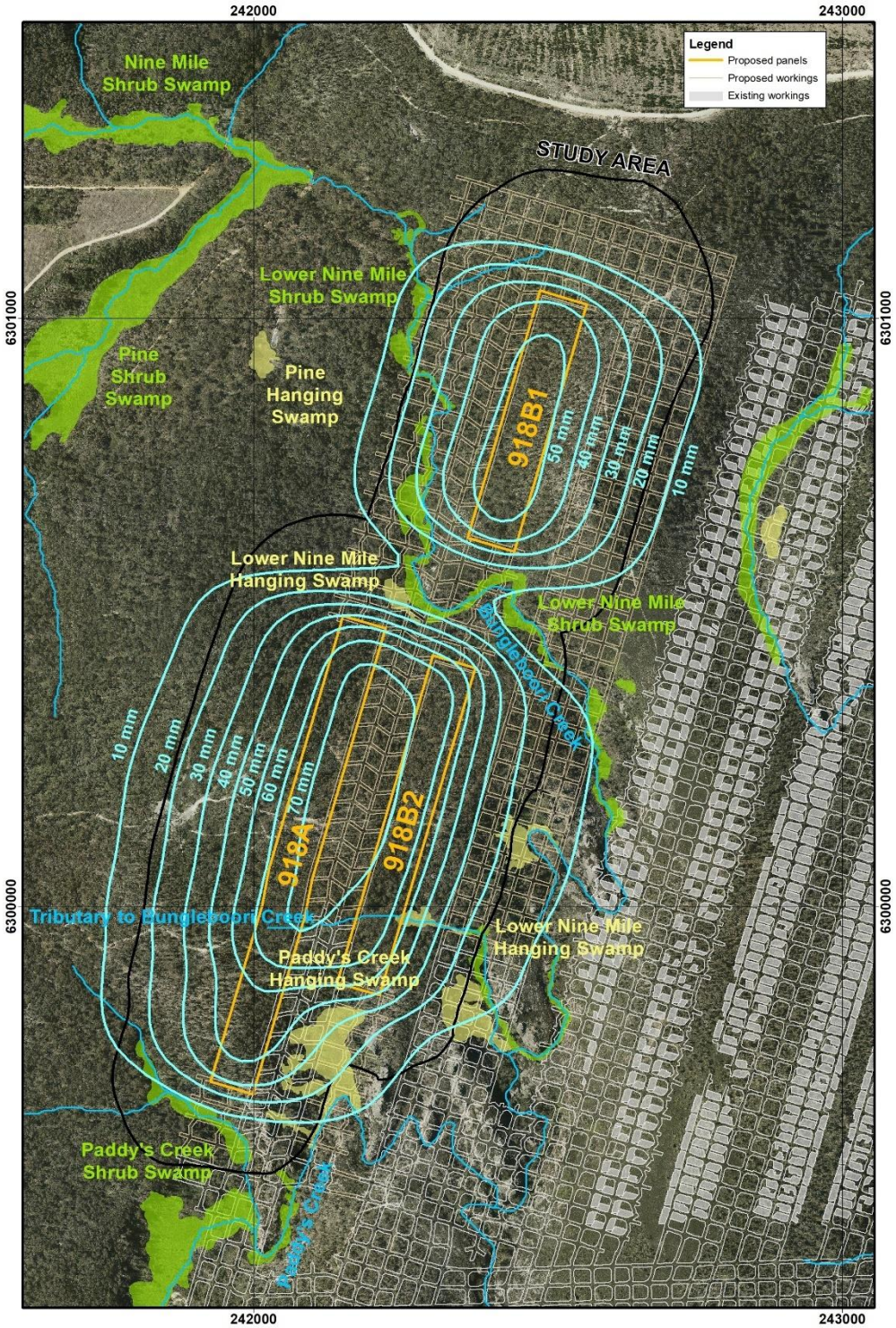

Figure 2 – Predicted total vertical subsidence contours due to the extraction of Panels 918A, 918B1 and 918B2

MSEC (2026) has carried out a statistical analysis of ground monitoring data to assist with the prediction of strains including the potential for irregular or anomalous movements. The range of potential strains has been determined using monitoring data from the NSW coalfields where the maximum measured vertical subsidence was less than 100 mm, as for the proposed 918 Panel.

The dataset contains 5000 available measurements of strains above partial or total extraction areas where the maximum measured vertical subsidence was less than 100 mm. The majority (approximately 95 %) of the measured strains were in the order of survey tolerance, taken as 0.3 mm/m. The 95th percentiles therefore are approximately 0.3 mm/m tensile and compressive.

The maximum predicted strains for 918 Panel have therefore been taken as 0.3 mm/m tensile and compressive. While strains greater than 0.3 mm/m can occur, the rate of occurrence is expected to be approximately 5 %.

Non-conventional ground movements may occur within the Study Area due to near surface geological conditions, steep topography and valley-related effects. Numerical modelling by SCT (2026) suggests that the ground surface will experience closure of approximately 70 to 75 mm across the width of Panel 918. Whilst the ground surface may experience closure across Panel 918, it is unlikely that closure will concentrate within a valley to a magnitude that results in adverse impacts.

MSEC (2026) advise that the potential for non-conventional movements is considered to be very low due to the low levels of subsidence that are predicted to occur. The natural and built features are predicted to experience low levels of vertical subsidence and horizontal movements. The corresponding curvatures and strains are expected to be in the order of survey tolerance, i.e. not measurable. Adverse physical impacts to the natural and built features are not expected due to the extraction of the proposed sub-panels. Impacts have not been observed at similar surface features above the existing panels at Clarence, where the predicted vertical subsidence was up to approximately 100 mm i.e., higher than predicted for the proposed extraction of the 918 sub-panels.

7 Subsidence Monitoring Strategy

Schedule 3, Condition 1 of the Development Consent (DA 504-00) provides the allowable subsidence effects due to partial extraction at Clarence. A comparison of the maximum predicted and allowable subsidence effects for 918 Panel is provided in Table 4.

Table 4 – Comparison of maximum predicted and allowable subsidence effects for Panel 918

Level of extraction	Type	Maximum total vertical subsidence (mm)	Maximum total tilt (mm/m)	Maximum total tensile or compressive strain (mm/m)
Partial extraction	Predicted	76	0.6	0.3
	Allowable	100	3.0	2.0

The maximum predicted subsidence effects are therefore less than the maximum allowable subsidence effects outlined in Schedule 3, Condition 1 of the Development Consent (DA 504-00, as modified).

The subsidence monitoring program will provide the "*vital signs*" for the overall mining performance. Environmental consequences are expected to be negligible and/or imperceptible if maximum

subsidence does not exceed 100 mm. As discussed by MSEC (2026), even if the 100 mm subsidence requirement is reached (exceeding the predictions of 76 mm), tilts and strains are expected to remain less than allowed under Development Consent DA 504-00. It is further noted that no environmental consequences have been observed at Clarence when actual subsidence movements over previous panels have been in the order of two times those predicted for 918 Panel.

The primary strategy of the SMP is to confirm that magnitudes of maximum subsidence are less than 100 mm as predicted. This will provide confidence that the expected environmental performance outcomes are achieved and the approved subsidence impact assessment criteria are not exceeded.

Whilst vertical subsidence is the primary focus, Clarence has also included monitoring measures to record horizontal movements during the extraction of 918 sub-panels. The monitoring plan includes a network of GNSS units and a 3D traverse of two survey cross lines, which are discussed below.

8 Subsidence Monitoring Methodology

An integrated approach to monitoring and inspections has been developed as a continuation of previously approved methodologies for existing Subsidence Management Plans, in order to address the following:

- Demonstrate second workings are undertaken as per the approved design;
- Provide information to demonstrate statutory performance criteria and obligations are satisfied (refer **Section 9.1**);
- Targeted monitoring of surface features within the EP Area;
- Meet stakeholder requirements to minimise environmental impact of monitoring;
- Meet infrastructure owners monitoring requirements;
- Establish a multi layered, multi-faceted monitoring program to collect performance data from the surface, at various intervals in the stratigraphy (overlying the Katoomba seam) to measure height of fracturing above the goaf area as well as fracturing and loading of the retained pillars of the coal seam and surrounding strata. Collectively, this approach will monitor the performance of the whole geomechanical system;
- Provide appropriate information required to assess against triggers within the relevant TARPs, including data for trend analysis to inform adaptive management; and
- Provide a suitable basis for future monitoring systems and Extraction Plans for ongoing mining within the partial extraction subsidence protection zone within the Clarence Colliery Holdings, including establishing correlation areas of conventional survey and non-conventional survey methods.

Clarence has a substantial subsidence monitoring network, comprising of subsidence monitoring lines and has considerable experience and collected data with regards to partial extraction mining methods. A substantial environmental monitoring network has also been established, including groundwater monitoring bores, biodiversity, cliffs, minor cliffs, pagodas, swamp and creek monitoring.

Tasks and actions associated with the SMP will be scheduled in a database. The database allows for surveys, inspections and notifications to be scheduled on either a time or production related (face position) schedule. The required actions are assigned to the relevant role to ensure the subsidence monitoring program is achieved, results reviewed and any subsequent actions required are undertaken.

Subsidence monitoring will be undertaken by appropriately qualified and experienced personnel. The results from the subsidence monitoring program will be evaluated by appropriately qualified and experienced personnel against the performance measures and subsidence predictions.

Clarence has prepared specific management plans as components of the Extraction Plan, including management plans for Water, Land, Biodiversity, Heritage, Public Safety and Built Features. These management plans set out the proposed monitoring for each component area.

8.1 Subsidence Movement and Effects Monitoring

Clarence has established a considerable network for monitoring subsidence movement and effects since the commencement of underground coal mining. This has incorporated a variety of survey and measurement techniques.

Clarence has established a comprehensive subsidence monitoring program for the 918 Panel incorporating the following elements:

- Conventional surface subsidence surveys;
- Near real time surface subsidence monitoring using GNSS installations;
- Surface inspections;
- Underground survey, monitoring and inspections;
- Surface to seam Extensometer monitoring; and
- Far field non-conventional subsidence movements using GNSS installations

The planned locations of monitoring measures are shown in **Figure 3**. Each of the above elements are discussed further in the following sub sections.

8.1.1 Conventional Surface Subsidence Survey

Two conventional subsidence lines (Crossline 900F and Crossline 900H) are proposed to be installed and monitored as part of the 918 Panel extraction.

Conventional subsidence monitoring lines typically consist of Feno markers, nominally spaced at approximately 20 m intervals. Survey marks were changed over from star pickets to Feno markers in consultation with the RR as a public safety improvement. The Feno markers are the safer option over the star pickets as they don't protrude from the ground like the star pickets and don't pose the same public safety risks to motorbike or mountain bike riders or 4WD drivers.

The survey data will provide subsidence and tilt profiles across the proposed 918 sub-panels, which can be used to compare with predictions and compliance against DA 504-00 Subsidence Impact Assessment Criteria, as described below.

900F Line:

- The location of the 900F Line has been approved by NPWS and the survey pegs have been installed.
- The pegs along the 900F Line will be surveyed by digital level to measure subsidence and tilt.
- The benchmark for the 900F Line is Peg 900F-02, which is located approximately 556 m from the western side of sub-panel 918A, at a setback angle of approximately 63 degrees. The western end of the 900F Line is sufficiently long to measure the location of the 20 mm limit of subsidence and calculate an angle of draw.
- The eastern end of the 900F Line is located approximately 68 m from the eastern side of sub-panel 918B2. The steep terrain at a sharp bend in Bungleboori Creek presents a challenge for extending the 900F Line beyond the Study Area to the east. GNSS 900_G10 has been installed to measure vertical subsidence beyond the eastern end of the 900F line and potential valley closure across Bungleboori Creek. GNSS 900_G10 is located approximately 260 m from the eastern side of sub-panel 918B2, at a setback angle of approximately 45 degrees.
- Monitoring results from the ground survey will be supplemented by GNSS units, which have also been installed along the survey line for continuously measuring horizontal movements and subsidence. The GNSS measurements can also be used to calculated changes in horizontal distances and average ground strain between the GNSS units.

900H Line:

- The location of the original 900H Line has been approved by NPWS and the planned survey pegs have been installed.
- In consultation with the IEAPM, the 900H line is proposed to be extended over the adjacent 900 mains. This additional 900H line section exempt development application was approved by NPWS and the additional pegs have been installed .
- The survey pegs along the 900H Line will be surveyed by 3D traverse and by digital level. This will provide information on absolute horizontal movements, ground strains and valley closure across Bungleboori Creek and sub-panel 918B1.
- The benchmark for the 900H Line is Peg 900H-01, which is located approximately 252 m from the western side of sub-panel 918B1, at a setback angle of approximately 45 degrees. The western end of the 900H Line is sufficiently long to measure the location of the 20 mm limit of subsidence and calculate an angle of draw.
- The eastern end of the 900H Line is located approximately 68 m from the eastern side of sub-panel 918B1, at a setback angle of approximately 39 degrees. The eastern end of the 900H Line is sufficiently long to measure the location of the 20 mm limit of subsidence and calculate an angle of draw.

Further information on the timing and frequency of ground surveys is provided in **Table 5**.

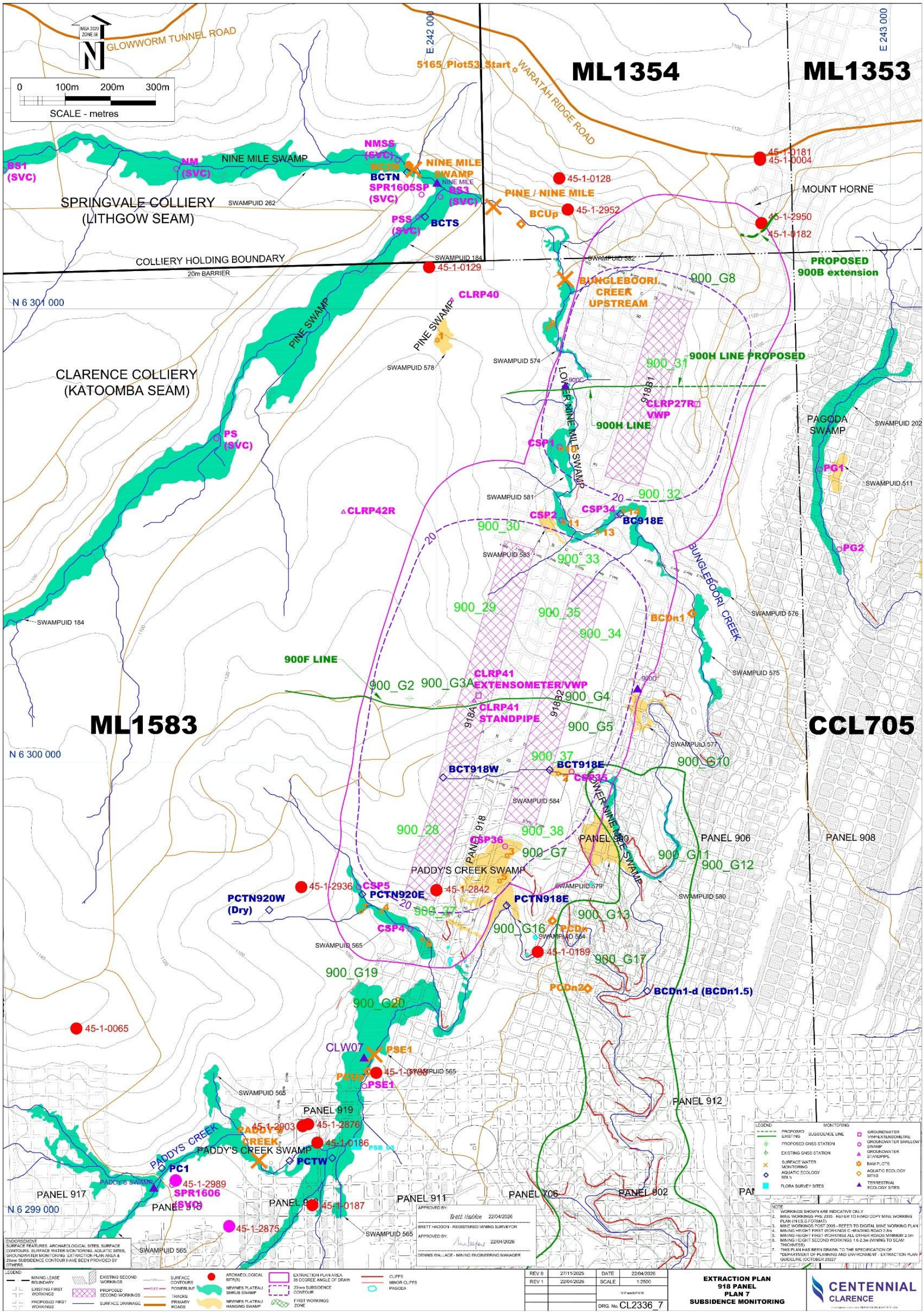

Figure 3 – Subsidence and Environmental Monitoring

8.1.2 GNSS and associated conventional monitoring

GNSS units are fixed survey stations that continuously measure their absolute horizontal and vertical positions in real time. The GNSS units are mounted on a pole that is fixed to rock or driven to refusal in soil. An adjacent ground survey mark will be installed at each GNSS unit to provide a backup monitoring point in the event that the GNSS unit and/or the mounting post is damaged by vandalism, bushfire or other reasons and to allow continued subsidence monitoring past the cessation of the GNSS units post mining.

Fourteen GNSS units have been installed and operating within the EP Area, of which six units were installed in July 2023 and eight units were installed in July 2024. There are a further 12 units planned for installation subject to NPWS approval within the EP Area. The locations of existing and planned GNSS units are shown in **Figure 3**.

The layout of the GNSS units have been designed to monitor:

- The development of vertical subsidence and horizontal movements directly above the sub-panel centrelines and centreline of the spine pillar between sub-panels 918A and 918B2. In conjunction with the results of surveys along the 900F and 900H Lines, the results from the GNSS units can be used to compare with predictions and compliance against DA 504-00 Subsidence Impact Assessment Criteria.
- The development of vertical subsidence and horizontal movements beyond the ends of the proposed sub-panels at the sub-panel centrelines.
- The development of vertical subsidence and horizontal movements near creeks, swamps and cliff lines. 6 pairs of GNSS units have been placed across Bungleboori Creek and Paddy's Creek. Whilst valley closure has not been measured previously at Clarence, there are only a limited number of available survey lines that have crossed over creeks (700A and 700B Lines). The units will provide information on valley closure (if any) to the sides of Panel 918. This will provide an important case study to assist with planning of future mining adjacent to deeply incised valleys and gorges at Clarence.

Some GNSS units have been placed near the 900F and 900H Lines, allowing the results from both survey methods to be compared with each other.

As the results from GNSS monitoring are updated on a daily basis and are available to be reviewed on the monitoring website, the GNSS results can be reviewed on a regular basis during mining and can be used to trigger additional surveys and inspections as documented in the TARP (**Appendix 3**).

Baseline GNSS monitoring at Clarence

Whilst there have been strong improvements in GNSS technology over time, the GNSS monitoring results can be affected by environmental and other effects. It is important to take these effects into account when assessing monitoring data, particularly when one objective of monitoring is to determine if mining-induced movements comply with Condition 1 of the Development Consent DA 504-00, which includes low level subsidence limits.

Fourteen GNSS units have been installed and operating within the EP Area, of which 6 units were installed in July 2023 and 8 units were installed in July 2024. The long period of baseline data has provided useful information on environmental and other effects on GNSS measurements.

Short term environmental or other effects

Short term environmental effects are generally due to atmospheric disturbances (e.g. solar flares) or satellite configurations (Nicholson *et al,* 2025).

An example of short term effects is shown in Figure 4 at GNSS 900_04 at Clarence. Some effects continue for many weeks and others occur only over a day. Some of the short term effects have been successfully addressed by improvements in data processing but multiple examples are visible in Figure 4.

Long term environmental or other effects

Baseline GNSS monitoring at Clarence have noticed seasonal changes in height at some GNSS units. The changes involve cyclical rising and falling of heights over long periods of time. The example shown in Figure 4 at GNSS 900_04 at Clarence represents the largest observed within the Clarence GNSS network, with seasonal changes in height ± 8mm. GNSS 900_04 was installed in soil.

Some GNSS units that were installed in rock, such as GNSS 900_25, recorded very little seasonal changes over time, as shown in Figure 5.

A study has been conducted of baseline GNSS monitoring results at Clarence, including consideration of the method of installation (soil or rock) and in which geological formation the units have been installed.

Summary plots of observed changes in eastings, northings and heights for GNSS units at Clarence are provided in Figure 6, Figure 7 and Figure 8. The GNSS units have been grouped into those with posts driven into soil, and those that have been bolted on either Burralow Sandstone or Banks Wall Sandstone.

The results demonstrate that:

- Seasonal changes in height have been observed at most GNSS sites.
    - While seasonal changes in soil were expected, many of the GNSS units that were bolted onto rock have also recorded seasonal changes.
    - In some cases, such as GNSS 900_19 and GNSS 900_20 on the edge of a swamp in Paddy's Creek, GNSS 900_19 recorded a gradual uplift while GNSS 900_20 recorded a gradual settlement before recording no further change in recent months.
- Observed changes in eastings and northings are generally less than observed changes in height.
    - Whilst most the measured changes are oscillating near zero, some have recorded a gradual drift, such as easting measured at GNSS 900_02 in soil and GNSS 900_07 in rock.

The observations demonstrate that seasonal changes and other environmental effects can be detected by GNSS units. A review of subsidence monitoring data take environmental effects will be into account when assessing whether mining-induced movements for TARP trigger level interpretation or to comply with DA 504-00 Subsidence Impact Assessment Criteria.

It can be seen in Figure 4, for example, that the baseline height for GNSS 900_04 has been provisionally set to equal the average measured height over the two-year period between July 2023 and July 2025. The same approach has been adopted for all GNSS units that have been installed on posts that were driven into soil, as shown in Figure 6. A similar approach may be applied to other GNSS units that demonstrate seasonal oscillations.

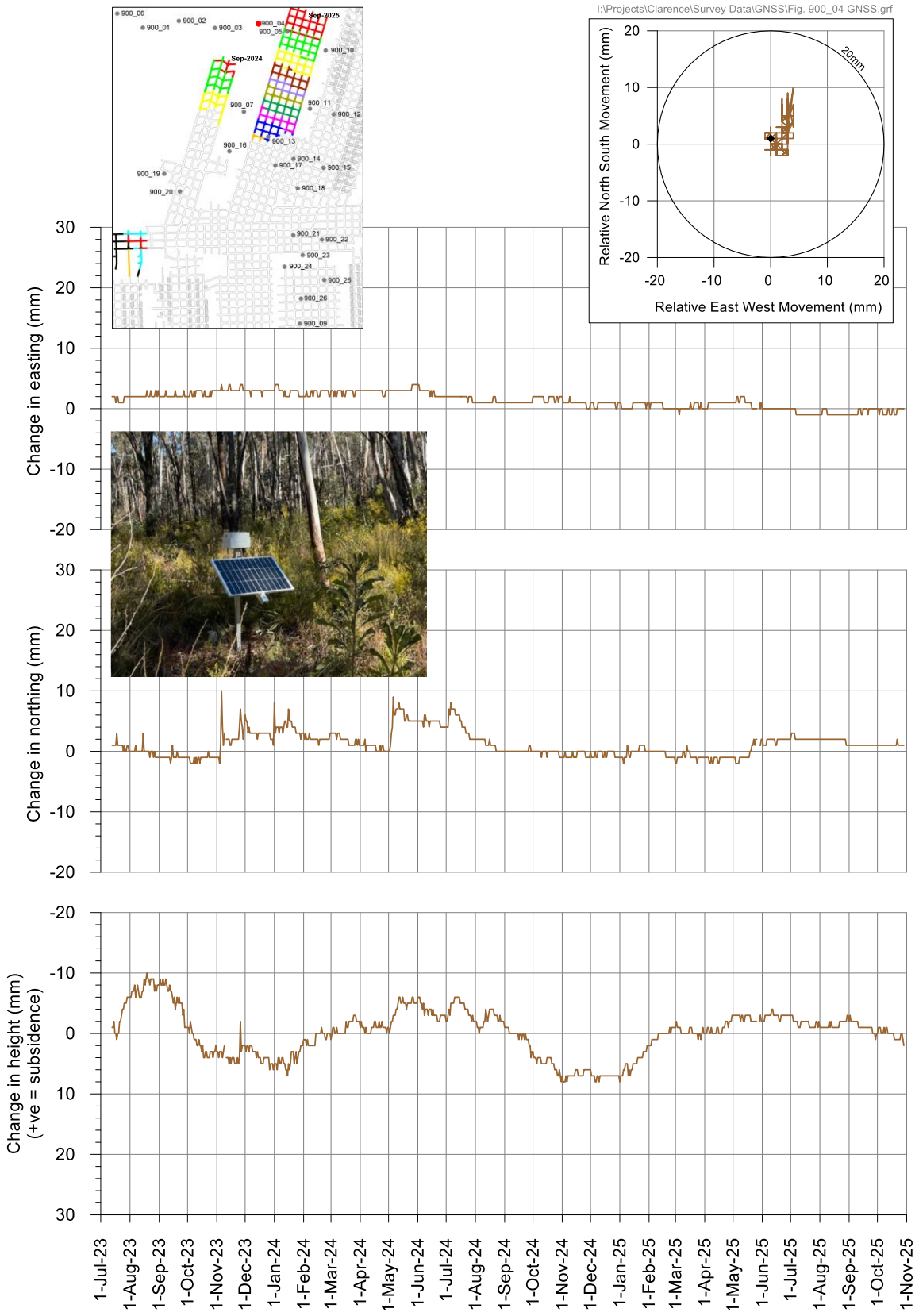

Figure 4 – Observed changes in easting, northing and height at GNSS 900_04 at Clarence

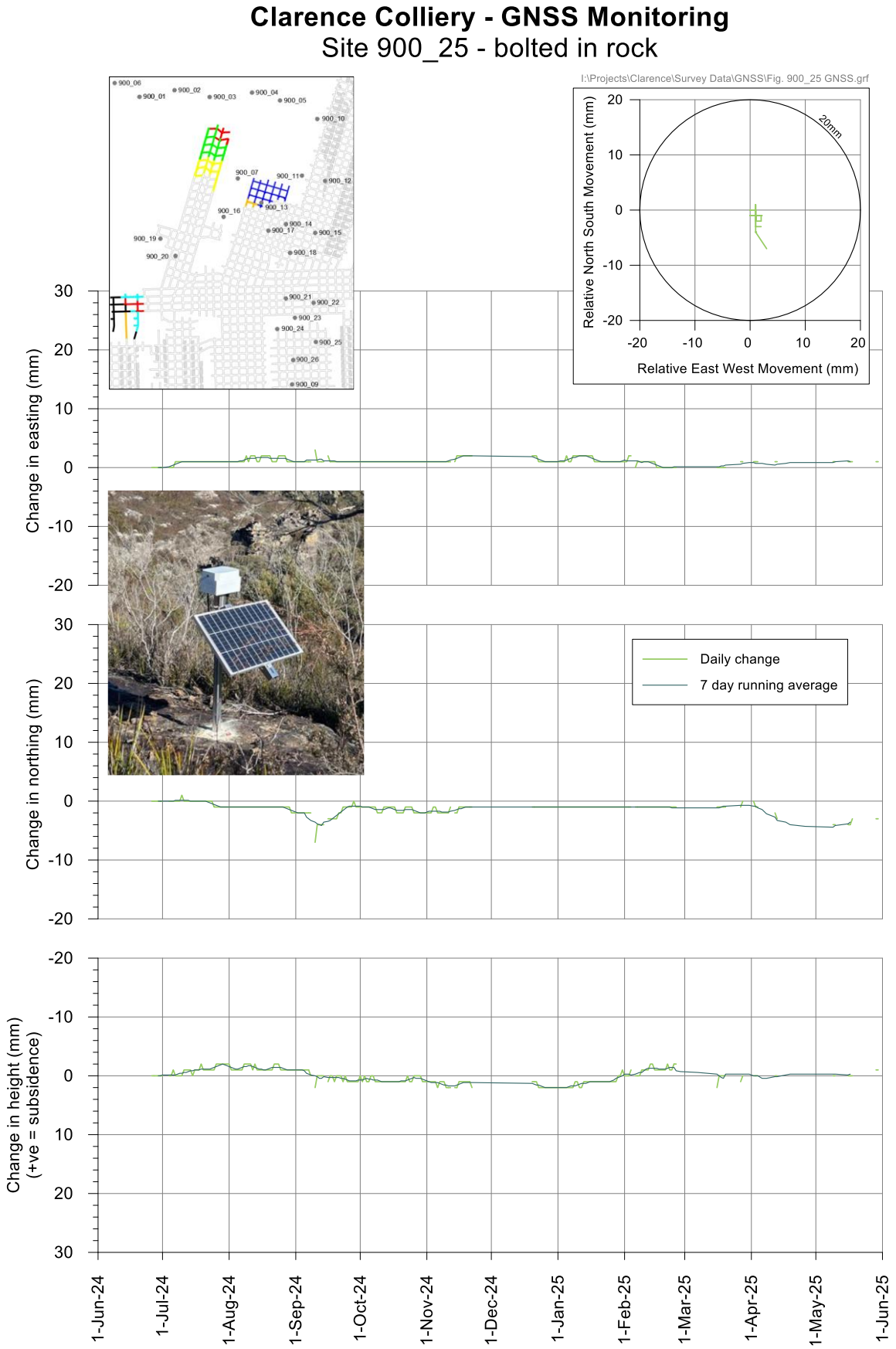

Figure 5 – Observed changes in easting, northing and height at GNSS 900_25 at Clarence

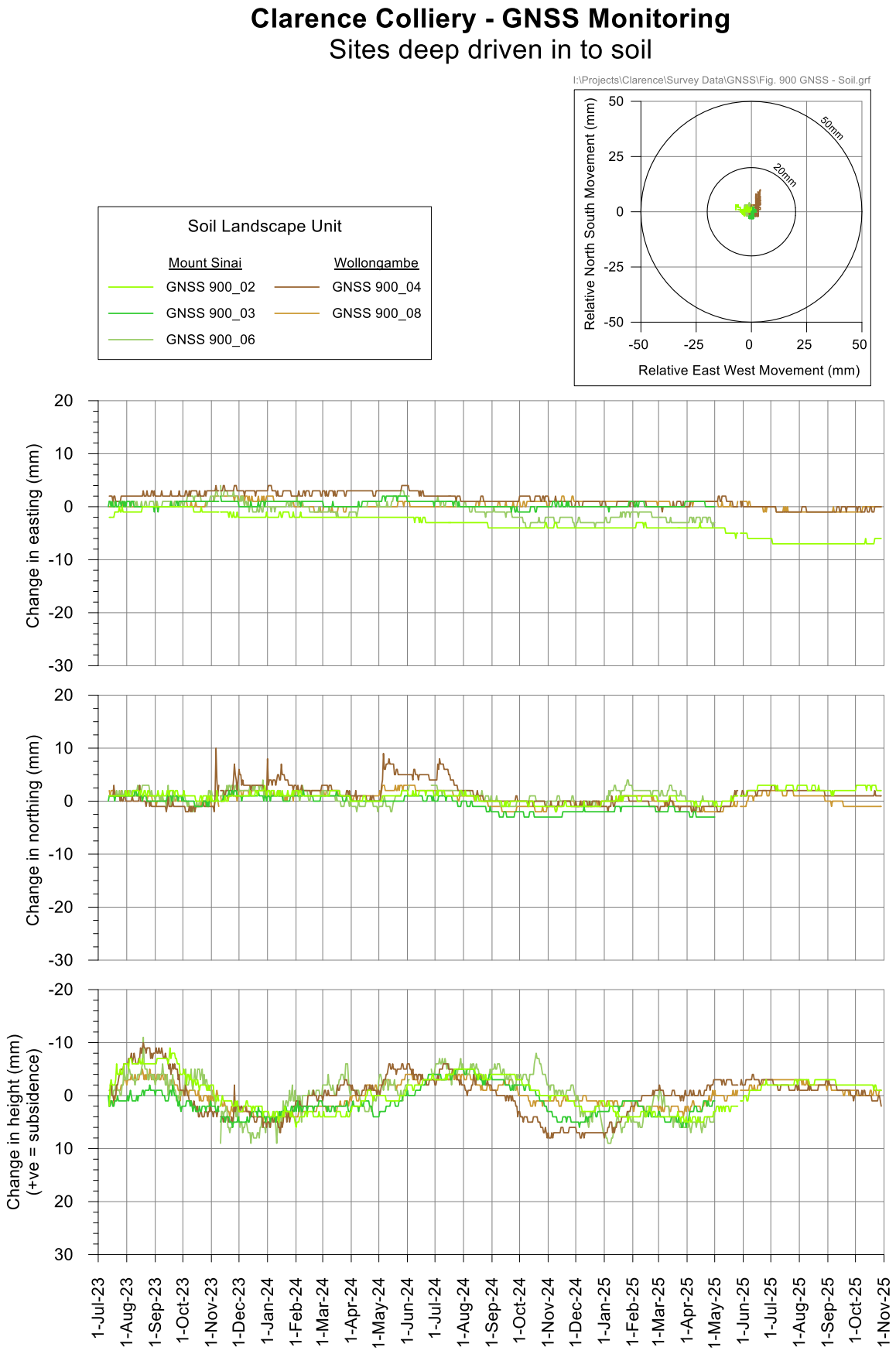

Figure 6 – Observed changes in easting, northing and height for sites driven into soil

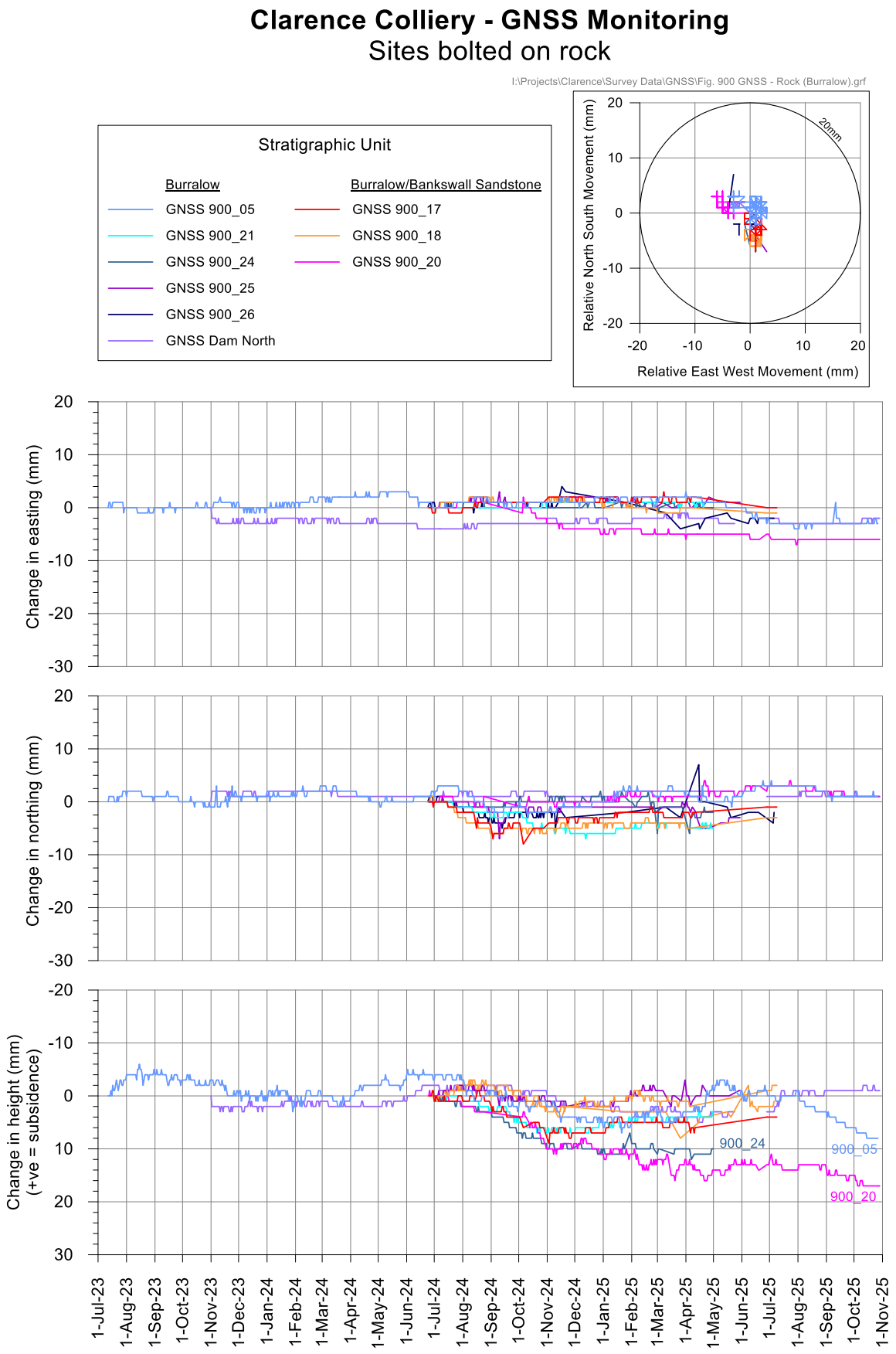

Figure 7 – Observed changes in easting, northing and height for sites bolted on rock (Burralow Sandstone)

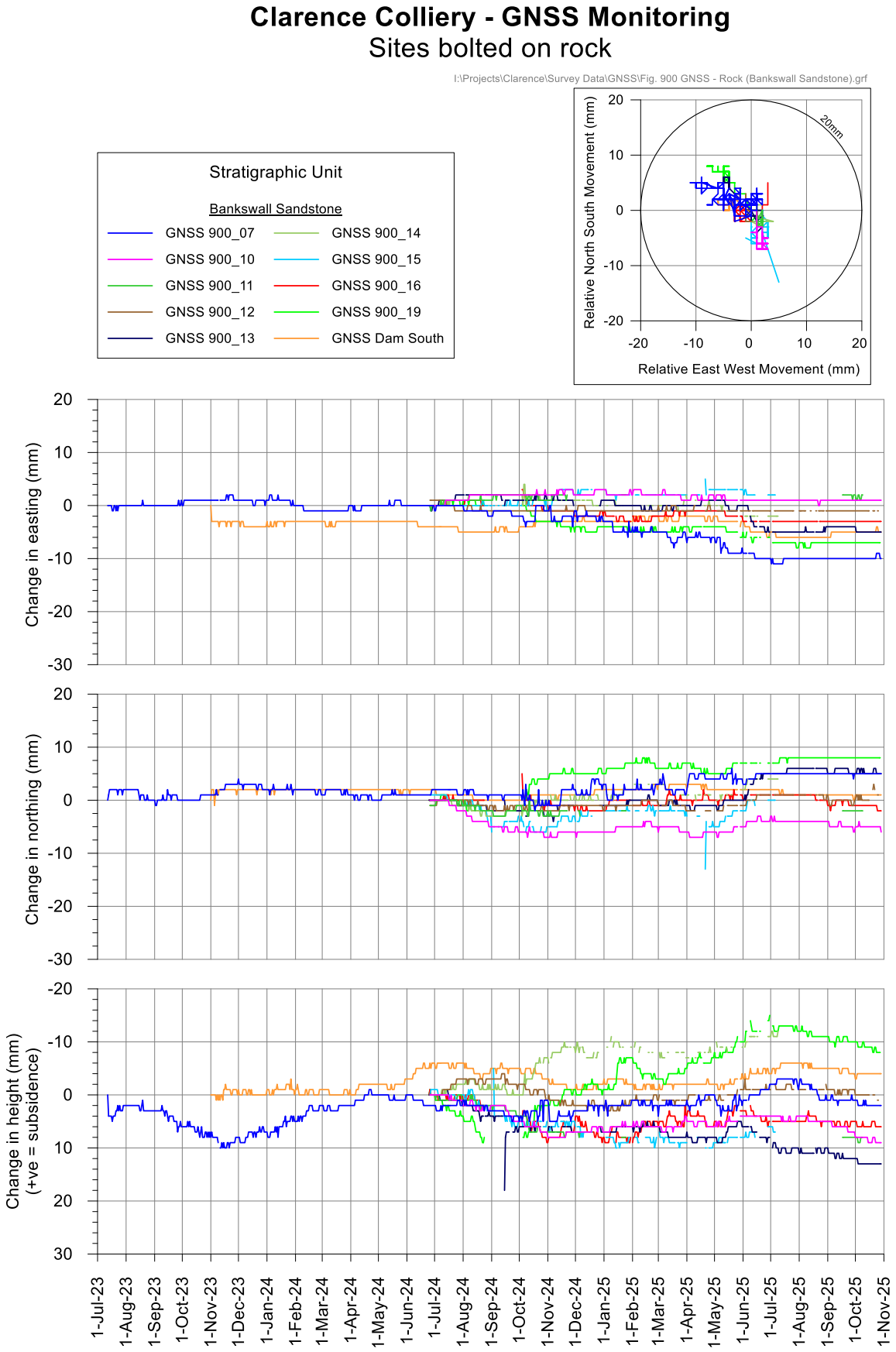

Figure 8 – Observed changes in easting, northing and height for sites bolted on rock (Banks Wall Sandstone)

8.1.3 Surface walkover inspections

Surface walkover inspections will also be undertaken when and where required under the TARP and where safe and readily accessible (such as where 4WD tracks traverse the EP Area and dependent on GoS SCA entry permissions).

Walkover inspections will be guided wherever possible by related information provided by the subsidence and environmental monitoring and inspections to identify and target key areas required for further inspection.

Opportunistic walkover inspections and observations will be undertaken by mine personnel and contractors during routine monitoring visits within the EP Area. This will include conventional surveys, GNSS maintenance visits, surface extensometer downloads, biodiversity surveys, aquatic monitoring, streamline geomorphology inspections, surface and groundwater water monitoring, cliff inspections. Considering the person hours involved in the overall monitoring program, there will be significant opportunity to extensively inspect the EP Area, both pre and post mining.

8.1.4 Underground survey, monitoring and inspections

The mine design has been developed to avoid and minimise impacts to public safety, landowners, built and natural features. The Mines Inspection Plan, Strata Failure Management Plan (2023a) and Survey Management Plan (2023b) which are parts of the Safety Management System (SMS) includes detail on survey, geotechnical, geological and workings inspections and the methods, frequency and reporting to ensure the as mined first and second workings are cut to the planned design specifications.

The underground surveys, monitoring and inspections include:

- Ensuring the mine layout is in accordance with design parameters – including pillar dimensions, roadway widths, mining heights and panel void widths;
- Conventional survey of first workings pillars updated weekly in the active panel during development, with final survey once final first workings pillars are formed – to provide accurate “as-built or as-cut” survey of pillar and roadway dimensions for confirmation against mine design;
- Routine pillar inspections and audits;
- Pillar, roof and floor geotechnical instrumentation; including roof extensometers and pillar stress cell monitoring;
- Geological and geotechnical hazard mapping of roof, pillars and floor conditions; and
- TARP includes detailed measures for the underground mining controls monitoring to ensure that appropriate responses are taken if the mining geometry is not formed as per the approved design.

8.1.4.1 Pillar and Roadway Size, Condition and Formation (in the EP Area)

Underground visual inspections, conventional survey and/or automated data recording and response for as-built (as-cut) workings will be compared to mine design requirements for:

- Pillar size (by survey);
- Roadway position / location (online/offline drivage);
- Roadway width;
- Rib height and as cut height;
- Panel void width; and
- Pillar condition / floor heave / roof condition.

The Clarence Technical Services Manager and Mine Surveyor will record and issue designs for minimum pillar dimensions conforming to the relevant approvals as part of the Authority to Mine process prior to commencement of panel development workings which are then implemented by development and extraction crews. Any non-conformances will be managed in accordance with the TARP and Strata Failure Management Plan.

The mine design for proposed workings will be overlaid against the "as-built/as-cut" surveyed workings. The results will be compared with key mine design parameters presented within the Extraction Plan Main Report and Graphical Plans and corrective actions issued to rectify any non-conformances and/or corrective actions to avoid a recurrence.

8.1.5 Surface Extensometer

A surface borehole extensometer, CLRP41, has been installed to provide displacement measurements of overburden fracturing above 918A Panel which will assist with subsidence and groundwater model validation. CLRP41 is located near the 900F Line, as shown in Figure 3.

In conjunction with other available monitoring data (including subsidence, VWP and groundwater and climatic data), the extensometer data will be used to determine height of fracturing above the seam and potential bedding plane separation.

Seventeen Extensometer anchors have been placed below ground level (BGL) and cemented at the following depths; 76 m, 96 m, 116 m, 126 m, 131 m, 136 m, 141 m, 146 m, 151 m, 156 m, 166 m, 176 m, 186 m, 201 m, 216 m, 226 m and 236 m within the borehole and data is downloaded manually at the surface logger location. The Mount York Claystone (a regionally significant aquitard) is located between 149 m and 168 m BGL at the extensometer location, so the intensity and spacing of anchors was increased within as well as above and below this stratigraphic unit to increase data sensitivity. The Katoomba seam is located between 280 m and 282 m BGL at the extensometer site.

The surface extensometer data will measure (at a minimum) on daily basis changes in distances between the anchors and the displacement at the anchors relative to the surface. This data will be downloaded from the bore site as the 918A second workings are extracted. Results from this installation will be reported in the End of 918A Sub-panel report and will be used to validate the subsidence model in conjunction with the other neighbouring groundwater and subsidence monitoring data. Monitoring details are provided in Table 5.

8.1.6 Non-Conventional Subsidence

The normal ground movements resulting from the PPPE mining method is referred to as conventional or systematic subsidence movements. Conventional subsidence profiles are typically smooth in shape

and can be explained by the expected mechanisms expected to be predominantly associated with pillar compression and responses from the overlying strata spanning the extracted void.

The depths of cover directly above the proposed 918 sub-panels varies between 227 m and 294 m. The subsidence due to the extraction of the proposed panels is predominately caused by pillar compression, rather than sag subsidence, and therefore the potential for irregular movements is reduced.

Irregular subsidence movement (non-conventional or non-systematic) can be observed at deeper depths of cover along an otherwise smooth subsidence profile. The cause of these irregular subsidence movements can be associated with:

- Changes in geological conditions such as significant geological structures;
- Steep topography, where elevated tensile strains at the tops of the steep slopes and elevated compressive strains develop near the base of the steep slopes due to slope instability movements; and
- Valley related mechanisms, including upsidence and valley closure.

In some cases, it is not possible to predict the locations and magnitudes of non-conventional movements. In other cases, approximate predictions can be made where underlying geological or topographic conditions are known in advance, such as faulting and steep slopes.

The subsidence monitoring program for 918 Panel provides for adequate coverage to detect non-conventional subsidence with a particular focus on valley closure and sensitive features such as significant cliff line clusters outside of the EP Area. The monitoring point spacing, survey methods and scheduled visual inspections allow for the detection of non-conventional subsidence movements due to potential changes in geological conditions and mining within steep slope areas, as described below.

- The survey pegs along the 900H Line will be surveyed by 3D traverse and by digital level. This will provide information on absolute horizontal movements, ground strains and valley closure and upsidence across Bungleboori Creek due to the extraction of sub-panel 918B1.
- Pairs of GNSS units have been placed across Bungleboori Creek and Paddy's Creek. The units will provide information on valley closure (if any) to the sides of 918 Panel. This will provide an important case study to assist with planning of future mining adjacent to deeply incised valleys and gorges at Clarence.

8.1.7 Surface Inspection and Photo Monitoring

General Surface Inspection

Clarence has developed a surface inspection program. Photographic monitoring will be carried out in safely accessible representative locations of interest including swamps, Archaeological sites, tracks and cliffs within the EP Area. These include sites in Pine Swamp, Nine Mile Lower Swamp, the confluence area of Paddy's Creek and Bungleboori Creek and adjacent hanging swamp, along the ground survey lines and access road.

It is noted that the most important component of a visual inspection program is not necessarily the photos that are taken, but the paths that are taken, both on foot and by vehicle, which are inspected, along with the general surrounds, en-route to the photo monitoring site. Any adverse impacts i.e. cracking, cliff falls, vegetation dieback, erosion, areas of instability, uncharacteristic surface water losses or pooling, etc, found during the inspection process, will be photographed, investigated and

reported to the land owner, NPWS and DPHI in addition to the baseline photo inspection sites already recorded.

A baseline inspection report will the produced, which includes the inspection point locations and a photo catalogue. Future inspections will visit (at a minimum) the same locations and record the same views as a record of inspection compliance. Photographic inspections of each location will be undertaken to coincide with the progress of the panel extraction as detailed below:

- Pre-mining baseline;
- Within 3 months of post mining of each sub-panel; and
- Annually within 2 months of the anniversary of panel completion (i.e. 918A&B) for 3 years.

Cliff and Pagoda Monitoring

A pre-mining walkover inspection of the steep slopes and cliffs was undertaken by Centennial staff to inform the subsidence predictions and impact assessment report. A further desktop review and pre-mining inspection of the steep slopes, pagodas, minor cliffs and cliffs for the more generally accepted steep landform definitions was undertaken in 2023 and 2024. A list of the cliff lines, minor cliff lines and pagodas are also provided in Table 3 of the LMP (Centennial, 2026a).

Post mining visual inspections and photographic monitoring will be conducted after the extraction of each sub-panel, for the features located above that sub-panel. The photographic monitoring will include a catalogue of pre and post mining photographs of each cliff and pagoda feature above the applicable sub-panel.

The results of the post mining inspections will be included in the End of Sub-panel Report.

8.1.8 Subsidence Monitoring Summary

Table 5 presents a summary of the subsidence monitoring program.

Table 5 – Summary of Subsidence Movement and Effects Monitoring for 918 Panels

Subsidence Monitoring	Location	Purpose	Parameter / Target Accuracy	Survey Marks	Mark Spacing	Monitoring Frequency and Duration	Responsibility
Crossline 900F	Sub-Panels 918A and 918B2 Gardens of Stone State Conservation Area Refer **Figure 3**	Subsidence and pillar compression. Check compliance against DA 504-00 Validate subsidence model	Vertical Subsidence (± 5mm)	Marks on rock outcrop or driven into ground.	≈20 m	Pegs installed and baseline surveyed Prior to and 3 months after extraction of sub-panel 918A 3 months after extraction of sub-panel 918B2 Annually on the anniversary of sub-panel completion (i.e. 918A,918B1&918B2) for 3 years and continue if ongoing adverse changes are observed	Mine Surveyor Technical Services Manager
Crossline 900H	Sub-Panel 918B1 Gardens of Stone State Conservation Area Refer **Figure 3**	Subsidence and pillar compression. Check compliance against DA 504-00 Validate subsidence model	Vertical Subsidence (± 5mm) Easting and Northing (± 15mm) Horizontal distance between survey marks (± 5mm)	Marks on rock outcrop or driven into ground.	≈20 m	Pegs 900H-01 to 900H-15 installed. Install remaining pegs prior to mining 900 Mains and 918 Panel First workings Baseline survey prior to mining 918 Panel First workings Prior to and 3 months after extraction of sub-panel 918B1 Annually on the anniversary of sub-panel completion (i.e. 918A,918B1&918B2) for 3 years and continue if ongoing adverse changes are observed	Mine Surveyor Technical Services Manager

Subsidence Monitoring	Location	Purpose	Parameter / Target Accuracy	Survey Marks	Mark Spacing	Monitoring Frequency and Duration	Responsibility
Subsidence Line 900B-46 to 900B-57	Adjacent to sub-panel 918B1 and rock shelters 45-1-2950 and 45-1-0182 Gardens of Stone State Conservation Area Refer **Figure 3**	Subsidence near rock shelters Check compliance against DA 504-00 Validate subsidence model	Vertical Subsidence (± 5mm) Easting and Northing (± 15mm) Horizontal distance between survey marks (± 5mm)	Marks driven into ground.	≈10 m	Install and survey 900B-46 to 900B-57 pegs prior to undermining by 900 Mains first workings or prior to commencement of 918B1 sub-panel extraction, which ever comes first Survey 3 months after extraction of sub-panel 918B1 Annually on the anniversary of 918B1 sub-panel completion for 3 years and continue if ongoing adverse changes are observed	Mine Surveyor Technical Services Manager
Near real time points (GNSS) within EP Area (refer Figure 3) and adjacent survey marks	918 Panel Gardens of Stone State Conservation Area Refer **Figure 3**	Subsidence and pillar compression. Check compliance against DA 504-00 Refine subsidence model	Eastings, Northings and Level (± 5mm)	Marks on rock outcrop or driven into ground.	Refer **Figure 3**	Automated, continuous monitoring with average daily reading recorded Cease GNSS monitoring after 1 year of secondary extraction. After GNSS stations removed, annual surveys for 3 years on the adjacent conventional survey marks	Mine Surveyor Technical Services Manager
CLRP41 Surface Extensometer	918A Panel CLRP41 borehole site Gardens of Stone State Conservation Area Refer **Figure 3**	Heights of Fracturing / bedding plane separation Displacement To assist with subsidence and groundwater model validation	Heights of Fracturing (±1 m) Displacement (± 10mm)	n/a	n/a	Continuously logging data Download data on weekly basis when 918A Panel sub-panel face within 100m radius Read Post mining of each sub-panel Cessation after 1 year of completion of planned secondary extraction of 918 Panel	Technical Services Manager

Subsidence Monitoring	Location	Purpose	Parameter / Target Accuracy	Survey Marks	Mark Spacing	Monitoring Frequency and Duration	Responsibility
Surface inspection and Photo monitoring	Various surface features	Formal and physical inspection of representative sensitive surface features	Photo monitoring sites	n/a	n/a	Pre-mining inspection Within 3 months of post mining of each sub-panel Annually within 2 months of the anniversary of Panel completion (i.e. 918A&B) for 3 years and continue if ongoing adverse changes are observed	Environment and Community Co-ordinator

Note 1: Target accuracy allows for instrument error and field error
Note 2: Survey techniques and equipment will be chosen to achieve 4th order results or better as defined by ISCM SP 1

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8.2 Summary of Built Features Monitoring

Built Features within the EP Area include unsealed tracks and trails. It is acknowledged that there will be mountain bike trails established over the area as well, noting that the final location of these are yet to be finalised by NPWS.

The 918 Panel Built Features Management Plan (Centennial, 2024b) has been developed in consultation with NPWS. The full monitoring program is included in the Built Features Management Plan. A summary of the Built Features monitoring for 918 panel are shown in **Table 6**.

Table 6 – Summary of Built Features Monitoring Program

Feature	Location	Monitoring Methods
Unsealed tracks and trails	**GoS SCA**	**Survey Monitoring** Crossline 900F, 900H and 900B
		GNSS Units (that are located near existing tracks)
		Visual Inspection

8.3 Summary of Environmental Monitoring

The full monitoring program, evaluation of performance measures and potential mining related impacts on groundwater, surface water, biodiversity, heritage and surface features are described in detail within the management plans detailed in **Table 7**.

Table 7 - Summary of Environmental Management Plans and Features Monitored

Key Component Management Plan (Document No.)	Feature Managed and Monitored
918 Panel Public Safety Management Plan (Centennial, 2026c)	Steep slopes, minor cliffs and cliffs Public infrastructure Unsealed access tracks and trails
918 Panel Heritage Management Plan (Umwelt, 2026)	Aboriginal Heritage sites Non-Aboriginal Heritage sites
918 Panel Water Management Plan (GHD, 2026)	Surface Water – creeks and swamps Channel stability Groundwater
918 and 920 Panel Land Management Plan (Centennial, 2026a)	Steep slopes, pagodas, minor cliffs, and cliffs

Key Component Management Plan (Document No.)	Feature Managed and Monitored
918 Panel Biodiversity Management Plan (RPS, 2026)	Habitat Threatened flora and fauna Critically and Endangered Ecological Communities (**CECs** and **EECs**) Groundwater Dependent Ecosystems (**GDEs**) including Temperate Highland Peat Swamps on Sandstone Aquatic ecosystems

A summary of the consolidated environmental monitoring programs implemented to evaluate the impacts from subsidence within the EP Area is provided in **Section 8.3.1.**

8.3.1 Environmental Monitoring Locations

The environmental monitoring site locations are summarised in **Table 8** and shown in **Figure 3** (with the exception of the BAM plot control sites). **Figure 9** presents the BAM monitoring plots, along with the control sites (i.e. C1, C2 and C3) which are located several kilometres to the north of the EP Area.

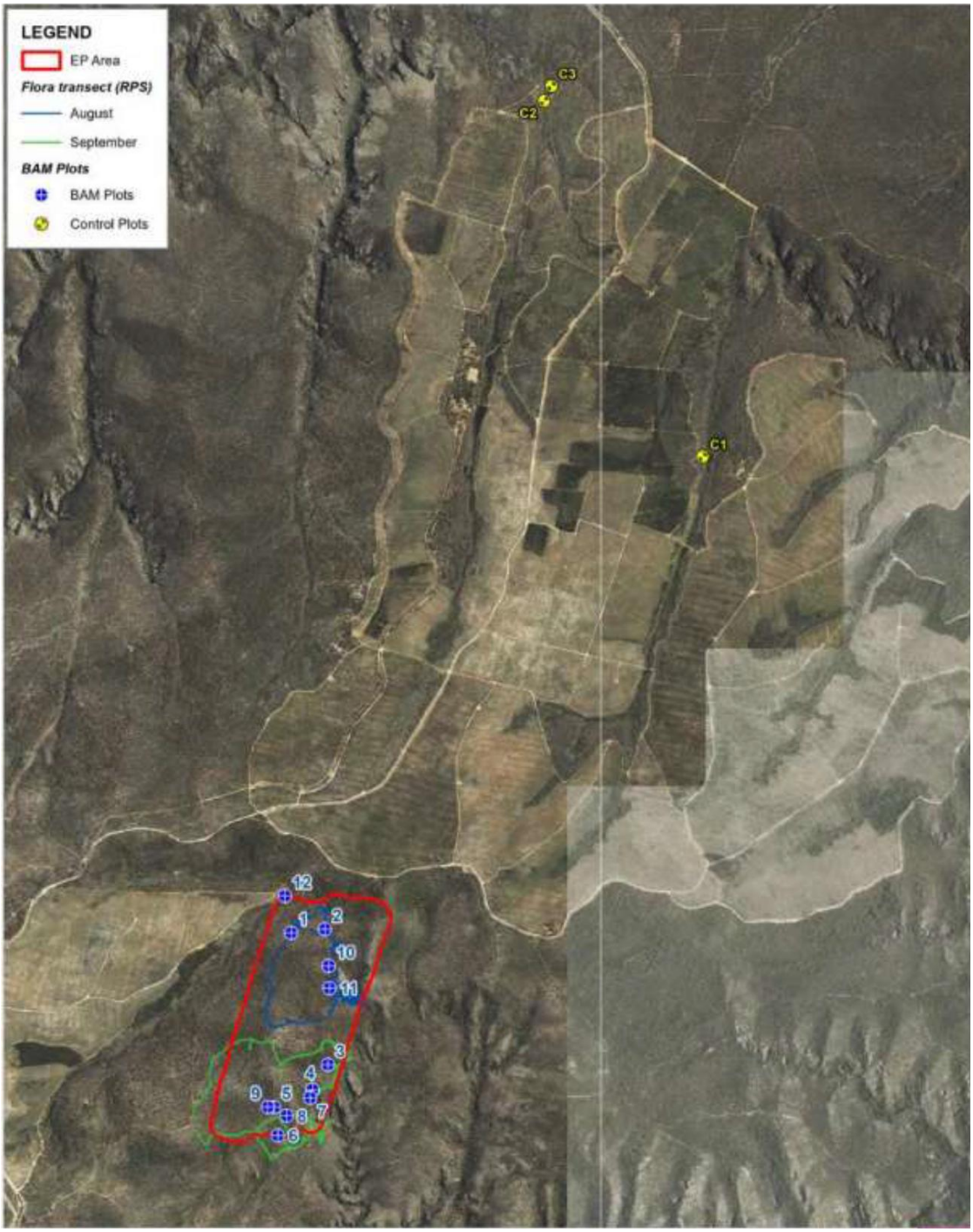

Figure 9 –BAM plot monitoring

Table 8 – Summary of Environmental Monitoring Program 918 Panel

Feature	Management Plan	Monitoring Component / Location	Monitoring Method	Parameter	Timing, Frequency and Duration
Steep slopes, pagodas, minor cliffs, and Cliffs	918 Panel Land Management Plan 918 Panel Public Safety Management Plan	Gardens of Stone State Conservation Area	Visual inspections and photography Subsidence Monitoring	Presence of mine-induced damage, surface cracking and rock falls, damage to tracks and drainage	Pre-mining Prior to second workings Post Mining -once 1 month after mining each sub-panel -once 2 years post extraction for each sub-panel
Groundwater	918 Panel Water Management Plan	Clarence Groundwater Bore Monitoring Network	Water Level	Water Level	Pre-mining Prior to second workings Post Mining Quarterly up to 2 years post mining
Water Courses	918 Panel Water Management Plan	Bungleboori Creek and Paddy's Creek tributaries	Visual inspections Water flow Water quality	Erosion, flow conveyance, ponding Water quality parameters	Pre-mining Prior to second workings Post Mining Flow and water quality - monthly 2 years after mining 918 Channel stability – -once 2 to six months after mining each 918 sub-Panel -once 2 years after 918 sub-panels
Aboriginal Heritage	918 Panel Heritage Management Plan	Three heritage sites located over 918 EP Area / Gardens of Stone State Conservation Area	Visual inspection Photography and condition report Subsidence Monitoring line 900B for rock shelters 45-1-2950 and 45-1-0182 3D scan of rock shelters	Presence of mine-induced damage, surface cracking and rock falls Condition assessments	Pre-mining Prior to second workings Post Mining Phase 2 -within 3 months after 918A (for 45-1-2842) and within 3 months after 918B1 for 45-1-2950 and 45-1-0182. Phase 3 – 8 months after mining completed

Feature	Management Plan	Monitoring Component / Location	Monitoring Method	Parameter	Timing, Frequency and Duration
Flora & Fauna	918 Panel Biodiversity Management Plan	Threatened flora species identified during ongoing surveys with potential to occur in riparian areas i.e. B.deanii	Representative sample of known locations of threatened species, ideally monitored against reference populations.	Persistence/ condition assessments	Pre-mining Baseline between 2021 and 2026 Post Mining Annually for 5 years
		Vegetation communities and threatened species habitat assessments (EECs and GDEs) to assess potential impacts from extraction PCT 3945 Newnes Plateau Shrub Swamp	BAM plots	Vegetation condition	Pre-mining Baseline between 2021 and 2026 Post mining Annually for 5 years
		Aquatic Ecology (Macroinvertebrates, Water Quality and Site condition) Larger Creeks with permanent flows within the EP Area (or immediately downstream if permanent water is not sufficiently available in this area)	NSW AUSRIVAS Riparian-Channel-Environment (RCE) measure of site condition	Invertebrate species diversity and water quality – pH, EC Stream health	Pre-mining Baseline between 2021 and 2026 Post Mining Annually for 5 years

9 Management and Mitigation

9.1 Performance Measures

As outlined in **Section 6** the main objectives of the mine design is to minimise impact to natural and heritage features and prevent any mine induced risk to public safety by providing low levels of subsidence, that allow built features including public infrastructure to remain safe, serviceable and repairable with negligible environmental consequences and negligible additional risk to public safety (Centennial, 2024c).

9.2 Performance Indicators

To establish compliance with the performance measures outlined in **Section 9.1**, Centennial has established a subsidence and environmental monitoring program developed in consultation with the affected stakeholders including Trigger Action Response Plans (TARPs), that inform an adaptive management process (**Section 9.4**).

DA504-00 (Schedule 3 Condition 1) provides performance indicators including Subsidence Impact Assessment Criteria (**Table 9**) as well as Water Resources Impact Assessment Criteria (Schedule 3 condition 5).

Table 9 – Subsidence Impact Assessment Criteria

Level of Extraction	Subsidence	Tilt	Horizontal Strain (compressive and tensile)
First Workings	20 mm	1.0 mm/m	1.0 mm/m
Partial Extraction	100 mm	3.0 mm/m	2.0 mm/m

As confirmed in correspondence between DPHI and Centennial Coal, the vertical subsidence limit of 20mm specified in Condition 1 of Schedule 3 to the consent (DA504) applies to subsidence impacts arising solely from one or more first workings. To avoid doubt this means that it is acceptable to attribute cumulative subsidence impacts at the surface to first workings and partial extraction methods independently.

Performance Indicators have also been established for each surface feature within the EP Area. These are detailed within Section 6.2 of the EP Main Report. The TARPS provide the trigger values as outlined in **Table 10**.

Table 10 – Performance Indicators

Performance Indicator	Trigger	Action / Response
Level 1 Low	Operations within prediction and approved impact.	Continued operations and monitoring as normal.
Level 2 Medium	Operations within approved impacts but exceed or potentially exceed predictions.	Review and investigation processes are engaged, with adaptive management as required.
Level 3 High	Operations exceed approved impact. *The approved Performance Measures of Development Consent SSD-504-00 and other relevant approvals.*	Adaptive management fully engaged

9.3 Subsidence and Monitoring Infrastructure Rehabilitation

Rehabilitation and remediation are outlined in the Clarence Rehabilitation Management Plan. There is no other public infrastructure that has been identified other than the access tracks and future mountain bike trails within the EP Area.

Even though there is no damage predicted and there is no surface subsidence cracking predicted for 918 Panel, as a contingency, subsidence remediation will be completed in timely manner in consultation with NPWS where required. If required, the erection of signage and appropriate barricading and repair of subsidence impacts (e.g. filling of subsidence cracks) will be undertaken in consultation with NPWS.

As recognised during consultation with NPWS and as set out in the GoS SCA Plan of Management, many recreational users of GoS SCA (bush walkers, orienteering groups, mountain bike riders etc.) may venture off the tracks and trails and be subject to additional risks from any un-remediated subsidence. Should remediation be required as a result of subsidence (which is highly unlikely), works will be done in consultation with NPWS to ensure remediation does not cause more environmental harm or public safety impact than any potential subsidence has caused.

Clarence will consult with NPWS and arrange prompt temporary repairs to make access tracks safe, followed by timely permanent repairs to the appropriate NPWS standards to make access tracks safe and serviceable where, in the very unlikely event, subsidence has caused damage. As there are numerous pieces of monitoring equipment that have been installed the removal and rehabilitation of these, when required will also be undertaken in consultation with NPWS.

9.4 Adaptive Management and Staged Implementation

Adaptive Management Strategy

In addition to the conservative narrow sub-panel widths and wide spine and barrier pillar widths, which were specifically designed to provide reduced levels of subsidence and impact, Clarence has developed an adaptive management approach in accordance with Condition 2(g)(ix) of Development Consent DA504-00, which requires a *"**Contingency Plan** that expressly provides for:*

- *adaptive management where monitoring indicates that there has been an exceedance of any impact assessment criteria in Table 1 or condition 5, or where any such exceedance appears likely;*
- *an assessment of remediation measures that may be required if exceedances occur and the capacity to implement those measures."*

Table 1 refers to the Subsidence Impact Assessment Criteria, which are described in Section 9.2. DA504-00 Schedule 3 Condition 5 refers to Water Resources Impact Assessment Criteria, which are monitored and managed in accordance with Clarence's Water Management Plan (GHD, 2026)

The Adaptive Management Strategy includes the following three steps:

1. Implementation of a detailed monitoring program to measure and record mining-induced ground movements and impacts on natural and built features during and after mining;
2. A review of relevant observations at appropriate stages, when:
   a) mining of each sub-panel has progressed a sufficient distance such that the majority of mining-induced movements have occurred; and
   b) there remains sufficient time to adjust the mine plan for future sub-panels without resulting in delays to mine production if required; and/or
   c) monitoring results exceed the TARPs (**Appendix 2**)
3. A decision on whether to adjust the mine plan for future sub-panels to further reduce the potential for exceeding the conditions of approval of development consent DA504-00.

For clarity, changes to extraction void widths (and associated changes to barrier pillar widths) can be made prior to the extraction of each sub-panel, if required. It is difficult but possible to adjust extraction void widths mid extraction.

The process for assessing and determining if a change to the mine plan is required during or after the mining of an approved sub-panel is illustrated by the Adaptive Management Strategy (**Figure 10**).

In relation to Criteria A, Clarence will engage a suitably qualified and experienced person to review and assess subsidence monitoring data and conduct Assessment 1. If Assessment 2 is required, Clarence will engage a subsidence expert to recalibrate the subsidence modelling/predictions and determine whether a change to the mine plan is likely to be effective in reducing likelihood of exceeding Criteria A.

As shown in Figure 10, the review will be conducted on at least two occasions: once during the extraction of sub-panel 918A and again during the extraction of sub-panel 918B1, prior to the commencement of the next sub-panel. In addition to the review, Clarence will not extract sub-panel 918B2 until approved by DPHI following a review of monitoring results for sub-panels 918A and 918B1. A review would also be conducted if monitoring results exceed the TARPs during the mining of sub-panels 918A, 918B1 and 918B2.

The findings of the review will be included in an Adaptive Management Report, which will be submitted to DPHI for review. The Adaptive Management Report can be a standalone report or be included as part of an End of Sub-Panel Report.

Staged Implementation

In addition to the Adaptive Management Strategy, Clarence Colliery supports a staged assessment and approval process for the 918 Panel Extraction Plan. This is in alignment with IEAPM Advice (23 January 2026) Recommendation 7 that states:

Should the Applicant resubmit a new EP application, the Department could consider a staged assessment approach whereby 918A and 918B1 are determined and, subject to satisfactory confirmation of subsidence predictions and pillar monitoring, then determine 918B2 panel if there remains a low likelihood of exceeding the long-term subsidence performance measure of 100 mm.

The approved 918 Extraction Plan would be undertaken in stages, with the extraction of the 918A sub-panel and the 918B1 sub-panel followed by a hold point prior to the extraction of the 918B2 sub-panel.

After completion of mining of sub-panel 918A, and stabilisation of subsidence, an 918A End of Sub-panel Report will be prepared by a suitably qualified and experienced person and will incorporate environmental and subsidence monitoring data to validate subsidence performance predictions, and confirm compliance status within the applicable consent conditions.

The 918A End of Sub-panel Report will provide a defined compliance and adaptive management hold point and inform whether any refinement to the adjacent 918B2 sub-panel design, e.g. reduction of void width or length, is required prior to 918B2 approval determination and extraction commencement.

The 918A End of Sub-Panels Report will be submitted to the DPHI via the planning portal for assessment and determination.

An End of Sub-panel Report will also be prepared and submitted for 918B1 upon completion of mining, noting that as an individual extraction void, its performance will not significantly affect subsidence in the 918A/918B2 area.

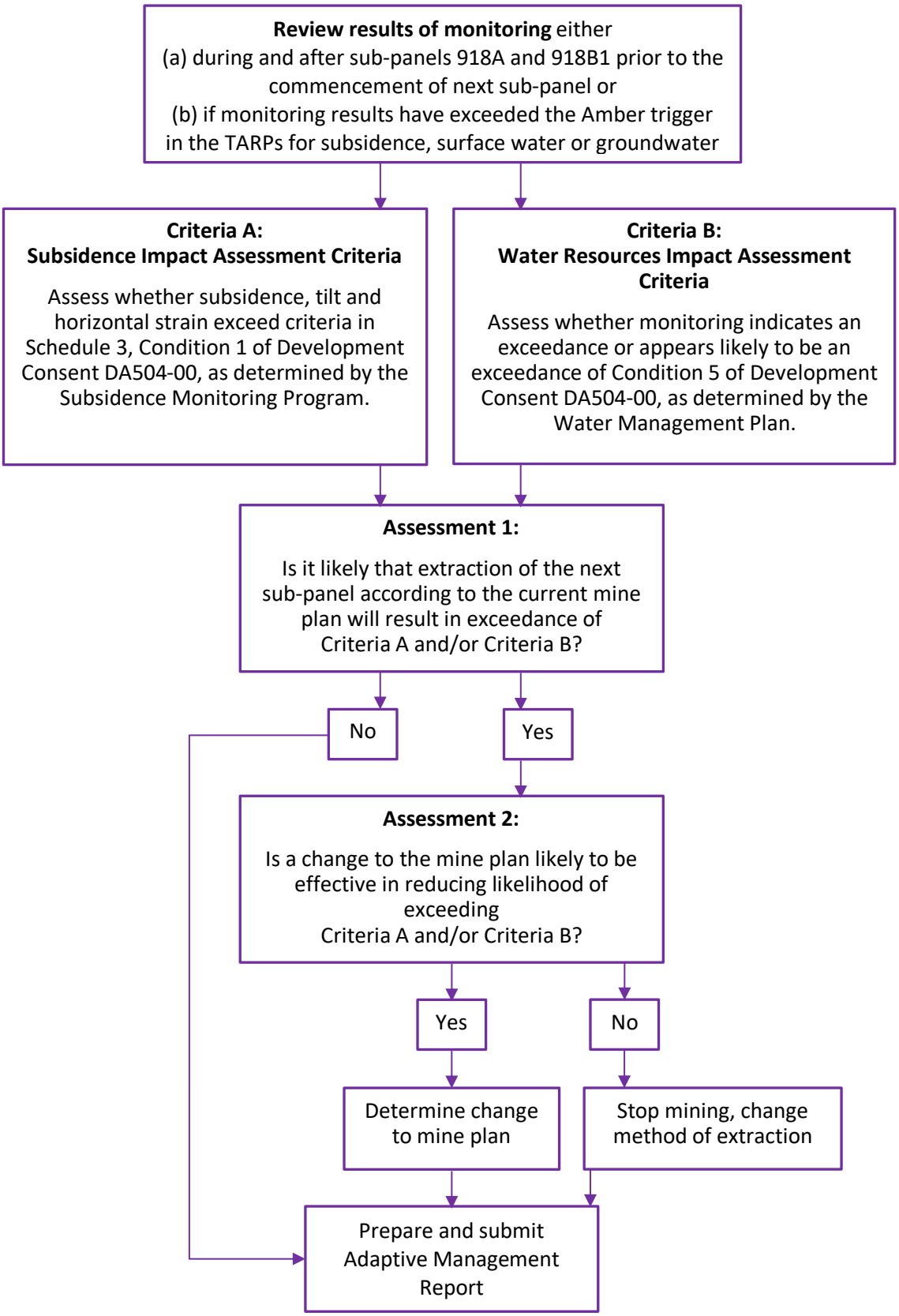

Figure 10 –Staged Implementation and Adaptive Management Strategy decision flowchart

10 Administration

10.1 Roles and Responsibilities

The responsibility for implementation, monitoring and review of the Subsidence Monitoring Program lies with the Technical Services Manager. The roles and responsibilities for the Subsidence Monitoring Program are outlined in **Table 11**.

Table 11 – Roles and Responsibilities

Position	Responsibility
Mine Manager	• Ensuring that sufficient resources are available to implement this program and associated plans within the SMS and Environmental Management System • Approving changes to the mine design if required as a result of the Adaptive Management Procedure. • Notifying the Resources Regulator in the event that there is Notifiable incident as per the WHS (Mines and Petroleum) legislation.
Production Manager	• Monitor workings and correct (where necessary) any excursions from the mine design dimensions • Notify Mine Surveyor and TSM of variances to the mine design • Panel inspections and audits as per the Mines Inspection System • Provide as mined second workings panel void distances to survey department
Technical Services Manager (**TSM**)	Implementation, monitoring and review of this program, including: • Ensure that the associated Subsidence Monitoring Program tasks are scheduled prior to the commencement of each sub-panel • Ensuring surface and underground monitoring and inspections are conducted at the required schedule and persons conducting monitoring / inspections are trained in the requirements of this plan • Monitor workings and report (where necessary) any excursions from the mine design dimensions • Consulting with the landowners (NPWS) and relevant government departments including DPHI and RR • Review and assess the subsidence monitoring results against the performance measures and predictions • Notification of any exceedance of performance indicators in accordance with the TARPs, management plans and WHS legislation • Coordinating any remedial work as required • Preparation and submission of formal reporting requirements (in particular the End of Sub-Panel Report) outlined in this plan • Managing and implementing Adaptive Management as required including, design, communication and training should the panel layout require changes • Review and audit the Subsidence Monitoring Program and TARP
Mine Surveyor	• Establishment of subsidence monitoring in accordance with the Subsidence Monitoring Program • Ensure all subsidence surveys are conducted in accordance with the approved Subsidence Monitoring Program • Manage the GNSS monitoring network and troubleshoot/investigate data anomalies • Conduct as cut underground inspections, surveys and mine plan reconciliations against the approved second workings designs • Review and assess subsidence monitoring results • Provide the TSM and ECC with subsidence monitoring survey results

	• Notify the TSM and ECC of any identified public safety or approval variance issues • Provide the survey monitoring results to the RR
Environment and Community Coordinator (**ECC**) or delegate	• Consultation and reporting with the landowners and relevant government departments including DPHI, RR, NPWS • Notification of any exceedance of performance indicators in accordance with the TARPs, management plans and consent conditions • Manage the environmental monitoring network • Coordinating any remedial work as required • Preparation and submission of formal reporting requirements outlined in this plan • Update the Clarence website as required • Carry out the surface and photo monitoring inspections as set out in this Subsidence Monitoring Program • Review and audit the Subsidence Monitoring Program • Preparation and submission of formal reporting requirements (in particular the Annual Review, Quarterly Subsidence Monitoring status reports, Adaptive Management Assessment Report and CCC) outlined in this plan

10.2 Reporting

Reporting will be completed as summarised in **Table 12**.

Table 12 - Reporting Requirements

Report	Trigger	Requirements	Stakeholders
Incident or Non-compliance Reporting	Incident or non-compliance in accordance with consent condition, WHS Regulations or TARP.	In accordance with requirements of: • Development Consent Schedule 5 Condition 5A or 5B; or • WHS Regulation (Mines and Petroleum Sites) or • TARP.	RR DPHI NPWS
Four monthly Subsidence Monitoring Status Report	At least every four months	In accordance with requirements of Development Consent DA504-00, Schedule 5 Condition 12	Public (website)

Report	Trigger	Requirements	Stakeholders
End of Sub-panel Report	Completion of each sub-panel	Present a summary of the relevant subsidence and environmental monitoring for the relevant sub-panel Provide a preliminary characterisation of any impact exceedances in accordance with the relevant TARP(s) and/or performance measures. Distinguish impact: • subsidence and environmental monitoring within or exceeding predictions; • those which exceed predictions but remain within performance measures and/or performance indicators; and • those which exceed performance measures and/or performance indicators. Report to include: • monitoring data analysis; • full description of any subsidence impacts that exceed predictions and/or performance measures; • location identification of unpredicted impacts using aerial photos with mine layout superimposed; • photos of the impact that exceeded predictions; and • mine design recommendations including any required mine design changes triggered by the Adaptive Management Procedure	DHPI RR NPWS
Annual Review	Annual Review required under development consent DA504-00	Report to include: • Reports of impacts and environmental monitoring results; • Monitoring results, predicted versus actual; and • Summary of subsidence impacts	RR DPHI CCC LCC NPWS
Community Consultative Committee (**CCC**)	Twice yearly CCC meetings	Subsidence and environmental performance are included as an agenda item at each meeting.	CCC

10.3 Audit

Audit and review procedures are outlined in Centennial Clarence's Safety Management System that comply with the NSW Work Health and Safety (Mines and Petroleum Sites) Regulations. These procedures are utilised to manage, audit and review functions of the Subsidence Monitoring Program. Auditing is also outlined in the Clarence Environmental Management System and an Independent Environmental Audit is to be conducted every three years under DA504-00.

The requirements of the Subsidence Monitoring Program are to be audited annually for compliance and effectiveness during the extraction of 918 sub-panels.

Any non-conformances or deficiencies found during the audit are to be brought to the attention of the Technical Services Manager and the Mine Manager so that corrective actions can be outlined.

10.4 Review

The Subsidence Monitoring Program will be reviewed in the event that one of the following occurs:

- Stakeholders raise issues that necessitates a review;
- Where unpredicted impacts or consequences have required implementation of contingency actions under this plan;
- Monitoring, incident or audit processes demonstrate a review is required;
- With each Extraction Plan;
- Where triggered by a level 3 (red) TARP;
- Where triggered by circumstances in WHS (Mines and Petroleum Sites) Regulation;
- A review is conducted as a result of the Adaptive Management Procedure;
- The End of Sub-panel Report identifies monitoring data exceeds predictions requiring a review of the mine design; or
- Change in mine design or layout.

10.5 Document Control

Document Control Procedure is incorporated into Clarence's Safety Management System.

11 References

Centennial (2023a) *Clarence Strata Failure Management Plan*

Centennial (2023b) *Clarence Survey Management Plan*

Centennial (2026a) *Clarence 918 Panel Land Management Plan*

Centennial (2026b) *Clarence 918 Panel Built Features Management Plan*

Centennial (2026c) *Clarence 918 Panel Public Safety Management Plan*

GHD (2025) *Clarence Colliery 918 Panel Watercourse Stability and Geomorphological Assessment*

GHD (2026) *Clarence Colliery 918 Panel Water Management Plan*

JBSG (2026) *Clarence Colliery 918 Panel Groundwater Assessment and modelling report*

WHS (Mines and Petroleum Sites) Legislation

MSEC (2026) *Clarence Colliery 918 Panel Subsidence Predictions and Impact Assessment Report*

NSW Department of Planning & Environment (2022) *Extraction Plan Guidelines*

RPS (2016) *Centennial Coal Western Regions Biodiversity Management Plan*

RPS (2026) *918 Panel Biodiversity Management Plan*

NSW Resources Regulator (2026) Guide: *Managing Risk of Subsidence*

SCT (2026) *Geotechnical, subsidence and caving assessment for 918 Panel*. Report No. CLR5894

Umwelt (2026) *Clarence Colliery 918 Panel Heritage Management Plan*

Appendix 1 – Consultation

Summary of Consultation			
Stakeholder	*Comments Requested (and date)*	*Comments Received (and date)*	*Comments / Issues Raised*
DPHI	*26/2/2026* *24/4/2026*	*26/1/2026*	*IEAPM recommendation 23/1/2026 letter provided* *Draft SMP Provided* *Final SMP submitted to DPHI on planning portal*
RR	*26/2/2026* *24/4/2026*	*18/3/2026*	*Draft SMP Provided* *No comments or objections* *Final SMP submitted to DPHI on planning portal*
NPWS	*26/2/2026* *24/4/2026*	*17/4/2026*	*Draft SMP Provided* *Comment received on Biodiversity Monitoring. See Biodiversity Management Plan for updates* *Final SMP submitted to DPHI on planning portal*
NSW DCCEEW-CPHR	*26/2/2026* *24/4/2026*	*21/4/2026*	*Draft SMP Provided* *Comment received on Biodiversity Monitoring. See Biodiversity Management Plan for updates* *Final SMP submitted to DPHI on planning portal*
Heritage NSW	*26/2/2026* *24/4/2026*	*26/3/2026*	*Draft SMP Provided* *Comments received from HNSW on additional Heritage Monitoring requirements in line with WRACHMP. See updated Figure and Table 8 for additional 900B survey line and 3D scan monitoring for the rock shelters.* *Final SMP submitted to DPHI on planning portal*
IEAPM	*3/6/2025* *19/6/2025* *3/7/2025*	*11/11/2025* *15/12/2026*	*Presentation of Proposed Monitoring Feedback on Subsidence Monitoring provided* *Draft GW Monitoring locations provided* *Draft Ecology Monitoring locations provided* *Feedback on GW and Ecology Monitoring locations provided* *IEAPM Presentation/Meeting*

Appendix 2 – Guideline Compliance

Extraction Plan Guideline Requirement – Key Component Plans	Section
5. Subsidence Monitoring Program The key component plans should be followed by a Subsidence Monitoring Program. This program should address two purposes. The first is to set out the program for monitoring the subsidence effects associated with the proposed coal extraction. The second is to summarise and consolidate the various environmental monitoring programs presented in each of the key component plans. These environmental monitoring programs should be directed towards monitoring the subsidence impacts and environmental consequences of mine subsidence.	**Section 2** **Table 8** **Section 8.3** This Document
Subsidence Effects Monitoring Program The Subsidence Effects Monitoring Program must provide sufficient information on subsidence effects to fully support implementation of the Extraction Plan. It should have clearly stated objective(s) and address the following: • proposed subsidence monitoring activities (individually specified); • information or subsidence parameters to be obtained from each monitoring activity; • proposed locations and/or extents where each monitoring activity will be undertaken, in particular, the proposed layout and/or locations of monitoring points or inspections (including graphical plans); • proposed timing, frequency and duration of each monitoring activity; • proposed monitoring methods, technologies, industry standards (e.g. ICSM Standards (SP1) Version 2.0) or Codes of Practice to be applied in undertaking each monitoring activity; • proposed measures and procedures for quality assurance and competence of personnel undertaking monitoring activities; • proposed procedures to record monitoring results; • proposed reporting monitoring results, including the frequency of reporting. The primary recipient of reports is DRE, and required reporting frequency will depend on the significance of features which are subject to risk of subsidence impact and consequence, and the scale of that risk; and • capacity of the program to detect early warning of deviations from the defined performance measures and associated performance indicators.	**Figure 3** **Table 5** **Section 10.2** **Appendix 4**
Environmental Monitoring Program Summary The Subsidence Effects Monitoring Program must summarise and consolidate the various monitoring programs presented in each of the key component plans, including the Built Features and Public Safety Management Plans. These environmental monitoring programs should be directed towards monitoring the subsidence impacts and environmental consequences of mine subsidence. It should contain figures showing the monitoring sites for each of the various monitoring programs, as well as a consolidated figure or figures showing all monitoring sites. It should be noted that the purpose of this summary is not to repeat the monitoring programs which are in themselves important elements of each of the key component plans. Instead the purpose is to present a consolidated overview of the six monitoring programs, enabling ready review of the overall monitoring program. As such, clear figures and tabulated information are critical.	**Figure 3** **Figure 9** **Table 8** **Section 8.3**

Appendix 3 – Summary TARP

Aspect	Performance Criterion Consent Criteria / EIS or EP Commitments	Condition Green (Operations within Predictions & Approved Impacts) *Continue Operations/Monitoring as Normal*	Condition Amber (Operations within Approved Impact Performance Measures but potentially exceeding predictions/designs) *Review Processes & Adaptive Management as Required*	Condition Red (Operations Exceed Approved Impact Performance Measures) *Adaptive Management Process Fully Engaged*
Underground Mining Control: **First Workings (development) and Second Workings (extraction) width / height / pillar size**	**All Second Workings to be carried out within the Partial Extraction workings Subsidence Protection Zone (DA504-00 Appendix 2) and in accordance with an approved Extraction Plan** **(Sch. 3 cond. 2/2A)** **Design Parameters to achieve predicted subsidence** *Note: Exceedance of approved mine design parameters may not automatically cause a surface impact or environmental consequence / non-compliance with the performance measures of DA 504-00. Subsequently, appropriate responses to check if such impacts have occurred are additionally triggered elsewhere below for all relevant aspects.*	**TRIGGERS:** • Underground mine inspections and surveys confirm dimensions as mined are within compliant specifications, including: ○ Maximum void width (sub-panel width including development roadway width) are less than or equal to design across each sub-panel as mined ≤75m for sub-panels 918A and 918B2; and ≤83m for sub-panel 918B1 ○ Extraction height ≤ 2.3 m average across sub-panel as mined ○ Offline drivage ≤ 1 m ○ Maximum development roadway widths: ▪ B and C Heading - 5.5 m – 6.0 m average across heading as mined ▪ A and D Headings ≤ 6.5 m – 6.7 m average across heading as mined ○ Rib spall in development roadways < 0.5 m on both ribs ○ Floor heave negligible or not observed ○ No additional potential impacts of any anomalous geological structures (i.e., normal faults with throws exceeding seam thickness or thrust faults)	**TRIGGERS:** ○ Underground mine inspections and surveys confirm **minor variations** in dimensions as mined compared to compliant specifications, including: ○ Extraction height >2. 2m to ≤2.5m average across sub-panel as mined ○ Offline drivage > 1 0 m ≤ 3.0 m ○ Maximum development roadway widths: ▪ B and C Heading - ≥ 6.0 m and < 6.4 m average across heading as mined ▪ A and D Headings ≥ 6.7 m and < 7.2 m average across heading as mined ○ Rib spall in development roadways > 0.5 to ≤ 1.0 m ○ Floor heave observed not severe enough to impede operations	**TRIGGERS:** ○ Underground mine survey and inspections confirm **significant variation** (i.e. greater on average across panel as mined) in dimensions as mined compared to approved minimum design parameters and /or statutory design requirements, including: ○ Maximum void width >8 5 m on average across each sub-panel as mined ○ Extraction height > 2.5 m average across sub-panel as mined ○ Offline drivage > 3 m ○ Maximum development roadway widths: ▪ B and C Heading - ≥ 6.5 m ▪ A and D Headings ≥ 7.2 m ○ Rib spall ≥ 1.0 m on both ribs ○ Significant pillar condition deterioration ○ Significant roof deterioration and floor heave observed that is not isolated and consistently impedes operations ○ Potential impacts of anomalous geological structures (i.e., normal faults with throws exceeding seam thickness or thrust faults) inconsistent with the Extraction Plan
		ACTIONS & RESPONSES: ○ No response required when above parameters are met ○ Continue Subsidence Monitoring Program to ensure impacts are as designed	**ACTIONS & RESPONSES**: ○ Refer to and implement *Strata Failure Management Plan* as required for additional roof support and/or rib support ○ Review training and communication with mining crews ○ Retraining of mining crews where required ○ Internal incident investigation process if offline drivage has occurred ○ Review and upgrade operational control and communication systems ○ Review current subsidence monitoring results against the criteria of the related TARP aspects	**ACTIONS & RESPONSES**: In addition to all actions and responses as per Condition Amber, Clarence will: ○ Notify and consult with relevant stakeholders as per requirements specified within the Extraction Plan/SMP/PSMP, Development Consent and related approvals ○ Take all reasonable and feasible steps to ensure that the exceedance ceases and does not recur ○ Review and change mine design as appropriate ○ Cease secondary extraction operations in relevant areas, if appropriate

Aspect	Performance Criterion Consent Criteria / EIS or EP Commitments	Condition Green (Operations within Predictions & Approved Impacts) *Continue Operations/Monitoring as Normal*	Condition Amber (Operations within Approved Impact Performance Measures but potentially exceeding predictions/designs) *Review Processes & Adaptive Management as Required*	Condition Red (Operations Exceed Approved Impact Performance Measures) *Adaptive Management Process Fully Engaged*
Ground Movement and Subsidence Effects Monitoring: **Incremental and Cumulative Vertical Subsidence (Modelled vs Actual)**	**Observed subsidence, tilt and strain due to extraction of 918 Panel exceed Subsidence Impact Criteria as defined by Schedule 3, Condition 1 of DA 504-00 for partial extraction:** **Subsidence ≤ 100 mm** **Tilt ≤ 3.0 mm/m** **Strain ≤ 2.0 mm/m** *Note: Exceedance of triggers may not automatically result in a surface impact or environmental consequence. Therefore, surface impact triggers (i.e. groundwater, cliffs, steep slopes, etc) are separate and in addition to and separate from subsidence ground movement*	**CONDITION:** • Weekly review of the GNSS monitoring network and end of panel surveys along the 900F and 900H Line shows that cumulative subsidence effects during and after partial extraction of each sub-panel are within 20% of Subsidence Impact Criteria in DA 504-00, taking into account environmental effects and survey error: ○ Vertical subsidence ≤ 80 mm ○ Tilt ≤ 2.4 mm/m ○ Strain ≤ 1.6 mm/m • NOTE: survey error and environmental effects can represent a substantial proportion of trigger levels • No alarm / notification from the GNSS monitoring network is received by Mine Surveyor / Technical Services Manager i.e., vertical subsidence measured at all GNSS stations as set out above • NOTE: Operation within Green condition would be within subsidence predictions, taking into account survey error and environmental effects (SCT, 2025 and MSEC, 2025).	**TRIGGERS:** • Weekly review of the GNSS monitoring network and end of panel surveys along the 900F and 900H Line shows that cumulative subsidence effects during and after partial extraction of each sub-panel are more than 20% of Subsidence Impact Criteria in DA 504-00, taking into account environmental effects and survey error: ○ Vertical subsidence > 80mm to 100mm ○ Tilt > 2.4 mm/m to 3.0 mm/m ○ Strain > 1.6 mm/m to 2.0 mm/m • NOTE: survey error and environmental effects can represent a substantial proportion of trigger levels • Alarm / notification from the GNSS monitoring network is received by Mine Surveyor / Technical Services Manager i.e., vertical subsidence measured at any GNSS station as set out above	**TRIGGERS:** • Weekly review of the GNSS monitoring network and end of panel surveys along the 900F and 900H Line shows that cumulative subsidence effects during and after partial extraction of each sub-panel are greater than Subsidence Impact Criteria in DA 504-00, taking into account environmental effects and survey error: ○ Vertical subsidence > 100 mm ○ Tilt > 3.0 mm/m ○ Strain > 2.0 mm/m • Alarm / notification from the GNSS monitoring network of the above triggers is received by Mine Surveyor / Technical Services Manager and Mine Manager i.e., vertical subsidence measured at any GNSS station is > 100mm vertical subsidence
		ACTIONS & RESPONSES: ○ No response required when above parameters are met ○ Continue Subsidence Monitoring Program including end of panel review under Adaptive Management Plan, which compares observations against predictions	**ACTIONS & RESPONSES**: Clarence will conduct a review of available monitoring results and consider implementing the following actions: • Investigate exceedance of trigger threshold / performance measure • Request Geomatix to review and assess GNSS monitoring results for potential environmental effects or survey error • Conduct additional ground survey along 900F or 900H Line; • Conduct additional visual inspections of surface features, including streams, swamps, archaeological sites, cliff lines and local roads • Review execution of mining methods, operations and monitoring against mine design criteria; • Review extensometer, VWP, groundwater data and climatic data; • Conduct a review and make decisions in accordance with the Adaptive Management Strategy decision flowchart as described in the Subsidence Monitoring Program; • Slow or stop partial extraction of current active sub-panel; • Increase monitoring and reporting procedures; • Review TARP triggers, if investigation indicates that they are not appropriate to prevent impacts • Report exceedance of Amber trigger and review	**ACTIONS & RESPONSES**: Clarence will: • Notify and consult with relevant stakeholders as per requirements specified within the Extraction Plan/SMP/PSMP, Development Consent and related approvals • Notify the landowner i.e., NPWS • Slow or stop partial extraction of current active sub-panel; • Conduct additional ground survey along 900F or 900H Line; • Conduct additional visual inspections of surface features, including streams, swamps, archaeological sites, cliff lines and local roads • Review execution of mining methods, operations and monitoring against mine design criteria; • Review extensometer, VWP, groundwater data and climatic data; • Conduct a review and make decisions in accordance with the Adaptive Management Strategy decision flowchart as described in the Subsidence Monitoring Program • Propose amendment to mine plan to reduce likelihood of exceeding Subsidence Impact Criteria in forward mining areas in 918 Panel for review and approval by DPHI, including additional monitoring and/or TARP; • Confirm if mine design changes need Extraction Plan variation prior to implementation

Aspect	Performance Criterion Consent Criteria / EIS or EP Commitments	Condition Green (Operations within Predictions & Approved Impacts) *Continue Operations/Monitoring as Normal*	Condition Amber (Operations within Approved Impact Performance Measures but potentially exceeding predictions/designs) *Review Processes & Adaptive Management as Required*	Condition Red (Operations Exceed Approved Impact Performance Measures) *Adaptive Management Process Fully Engaged*
Ground Movement and Subsidence Effects Monitoring: **Height of Caving (Modelled vs Actual)**	Height of caving to remain below the Mount York Claystone 166m below ground levels (116m above the Katoomba seam) Katoomba Seam 282m below ground level	**GREEN CONDITION:** Height of caving remains below predictions and below the base of the Mount York Claystone **TRIGGER:** Extensometer: - Strain > 2 mm/m limited to between adjacent anchors below 81 m above the Katoomba Seam (ie. More than 201 m below ground level) **ACTIONS & RESPONSES**: ○ Third party expert to analyse and interpret data ○ No response required when above parameters are met ○ Continue Subsidence Monitoring Program	**AMBER CONDITION:** Height of caving reaches the base of the Mount York Claystone **TRIGGER:** Extensometer: - Strain > 2 mm/m limited to between adjacent anchors below 116 m above the Katoomba Seam (ie. more than 166 m below ground level) **ACTIONS & RESPONSES**: ○ Third party expert to analyse and interpret data ○ Review data for instrumentation effects, anomalies, errors (will require assistance from relevant experts) On the basis that the data is not erroneous, Clarence will: • Investigate exceedance of trigger, including review of associated: ○ Vertical subsidence ○ VWP and groundwater data ○ Climatic data (i.e. rainfall, CRD) • Review hydrogeological / geotechnical model to assess the likelihood that height of caving due to the extraction of 918 Panel will remain below the maximum predictions of the Extraction Plan • Review TARP triggers • Review / calibrate groundwater model • Review need for Adaptive Management of mine design	**RED CONDITION:** Height of caving is at or above the top of the Mount York Claystone **TRIGGER:** Extensometer: - Strain > 2 mm/m, limited to between adjacent anchors below 141 m above the Katoomba Seam (ie less than 140 m below ground level **ACTIONS & RESPONSES**: ○ Third party expert to conduct a review of available monitoring data, including subsidence, extensometer, VWP and groundwater data and climatic data to assess whether height of caving has reached or is above the top of the Mount York Claystone: If the review assesses that height of caving is at or above the top of the Mount York Claystone, the monitoring condition has exceeded Red level, in which case Clarence will: • Notify and consult with relevant stakeholders as per requirements specified within the Extraction Plan/SMP/PSMP, Development Consent and related approvals • Notify the landowner i.e., NPWS • Following monitoring analysis and confirmation by specialist external consultant, consultation with Independent Experts to agree on Adaptive Management Strategy. Potential modifications include reducing width of void, increase width of barrier pillar amongst others. • Implementation of agreed Adaptive Management outcomes. If the review assesses that height of caving is below the top of the Mount York Claystone, the monitoring condition remains at Amber level, in which case Clarence will: • Review hydrogeological / geotechnical model to assess the likelihood that height of caving due to the extraction of 918 Panel will remain below the maximum predictions of the Extraction Plan • Review TARP triggers • Review / calibrate groundwater model • Review need for Adaptive Management of mine design

Aspect	Performance Criterion Consent Criteria / EIS or EP Commitments	Condition Green (Operations within Predictions & Approved Impacts) ***Continue Operations/Monitoring as Normal***	Condition Amber (Operations within Approved Impact Performance Measures but potentially exceeding predictions/designs) ***Review Processes & Adaptive Management as Required***	Condition Red (Operations Exceed Approved Impact Performance Measures) ***Adaptive Management Process Fully Engaged***
Land **Steep slopes, cliffs and pagodas**	*Negligible subsidence impacts - no surface cracking, collapse of features or slope failure due to mining*	**TRIGGERS**: ○ Subsidence monitoring and results from surface inspections remains compliant within condition green triggers for ground movements and effects, and does not identify any mining induced impacts from extraction within the EP Area, including: ○ No Damage to steep slopes and cliffs (including visible cracking, rock fall). ○ No Damage to cliff faces (e.g. no rock fall, cracking). ○ Underground Mining Controls and monitoring indicates all parameters are within design criteria / Level Green trigger levels.	**TRIGGERS**: **Level A: Surface impacts are not yet observed but monitoring indicates *potential* to occur:** • Subsidence monitoring indicates potential for surface impact requiring further investigation (i.e., Condition Amber triggered for ***Ground Movements and Subsidence Effects Monitoring*** and/or ***Underground Mining Control***) • Subsidence monitoring indicates potential for development of subsidence which may result in a failure of ground (*High Potential Incidents* as per Part 7, s124(5m)of the WHS(M&PS) Regulations 2022) **Level B: Surface impacts are observed:** • Impact observed but yet to be confirmed if mining induced or natural causes • The following mining-induced impacts occur but are **within** approved impact criteria of development consent DA504-00 (i.e. still below Condition Red): • Any of the following events occurs that would have been a dangerous incident if a person were reasonably in the vicinity at the time when the event occurred (*High Potential Incidents* as per Part7, s124(5a) of the WHS(M&PS) Regulations 2022). Part 15 s190: *p) a failure of ground, or of slope stability control measures* *q) rock falls, instability of cliffs, steep slopes or natural dams, occurrence of sinkholes, development of surface cracking or deformations due to subsidence*	**TRIGGERS**: • Subsidence monitoring and results from surface inspections identifies that there are mining induced surface impacts exceeding the Performance Measures which cause or threaten material harm to the environment or safety of persons on the surface over the mining area **Impacts Exceeding Performance Measures** ○ **Cliffs and steep slopes:** subsidence impacts due to mining to the above features which exceed negligible impacts, e.g. rock falls, displacement or dislodgment of boulders or slabs, fracturing or collapse of steep slopes, cliffs and pagodas) **Other Relevant Impacts:** ○ Failure of ground/slope stability control measures occurs (including landslips) ○ Mining-induced instability of cliffs, steep slopes occurs ○ Development of surface cracking or deformations which present potential risk to the public/others (i.e., where trip hazards / step formation occurs or where there is potential for instability of a rock formation)

Aspect	Performance Criterion Consent Criteria / EIS or EP Commitments	Condition Green (Operations within Predictions & Approved Impacts) *Continue Operations/Monitoring as Normal*	Condition Amber (Operations within Approved Impact Performance Measures but potentially exceeding predictions/designs) *Review Processes & Adaptive Management as Required*	Condition Red (Operations Exceed Approved Impact Performance Measures) *Adaptive Management Process Fully Engaged*
Land **Steep slopes, cliffs and pagodas (Continued)**		**ACTIONS & RESPONSES**: • No response required. Continue Subsidence Monitoring Program.	**ACTIONS & RESPONSES**: In addition to Condition Amber action/responses for *Underground Mining Control* and/or *Ground Movement and Subsidence Effects Monitoring*, Clarence will: **Level A: Surface impacts are not observed but monitoring indicates their potential to occur:** ○ Engage suitably qualified geotechnical/civil engineer to assess the public safety risk, likelihood for mine-induced surface impacts, assess cause and effect, and Record Assessment ○ If no public safety risk identified and/or mine-induced surface impacts are considered unlikely, continue Subsidence Monitoring Program ○ If public safety risk identified and/or mine-induced surface impacts are considered likely: ○ notify NPWS and key stakeholders and consider installation of warning signs / closure of access in affected areas ○ Further notify Resource Regulator under relevant WHS laws (i.e., for high potential incidents) ○ Undertake targeted surface visual inspection over area possibly impacted and if surface impacts are observed refer Level B responses **Level B: Surface impacts are observed:** In addition to Level A action/responses above, Clarence will review available data or undertake targeted surface investigations to confirm if the impact is mining-induced or related to natural surface movements or activation of a natural feature: ○ If confirmed as not a mine-induced impact, continue Subsidence Monitoring Program and notify NPWS and key stakeholders ○ If mine-induced impact is confirmed: ○ Notify and consult with relevant stakeholders as per requirements specified within the Extraction Plan/SMP/PSMP, Development Consent and related approvals ○ Compare the impacts to relevant approved performance measure thresholds (refer condition red trigger levels), if above thresholds, refer Condition Red responses ○ Calibrate subsidence model and review mine design ○ Implement Adaptive Management procedures where required	**ACTIONS & RESPONSES**: In addition to all actions and responses as per Condition Amber, Clarence will: ○ Take all reasonable and feasible steps to ensure that the exceedance ceases and does not recur ○ Undertake targeted surface inspections (by suitably qualified personnel) if safely and readily accessible (or aerial if otherwise) where potential impact necessitates further assessment is required to quantify impacts, as determined in consultation with key stakeholders (NPWS, DPHI and the NSW RR) ○ Where fracturing has occurred and potential for instability is noted, undertake specialist geotechnical assessment to confirm level of residual instability, potential safety risks and recommended courses of action (with direction from PIS[1], DPHI, NPWS/DCCEEW-CPHR) ○ Cease secondary extraction in relevant areas where appropriate (with direction from PIS[1] and DPHI) ○ Consider all reasonable and feasible options for remediation (where relevant) and submit a report to the Department describing those options and any preferred remediation measures or other course of action ○ Implement remediation measures as directed by the Secretary, to the satisfaction of the Secretary Written reporting to relevant agencies as per Development Consent/relevant approvals as detailed in Extraction Plan

Aspect	Performance Criterion Consent Criteria / EIS or EP Commitments	Condition Green (Operations within Predictions & Approved Impacts) *Continue Operations/Monitoring as Normal*	Condition Amber (Operations within Approved Impact Performance Measures but potentially exceeding predictions/designs) *Review Processes & Adaptive Management as Required*	Condition Red (Operations Exceed Approved Impact Performance Measures) *Adaptive Management Process Fully Engaged*

Built Features
Access Tracks and Trails
(GoS SCA 4WD tracks and motorbike, mountain bike and walking trails)
	Negligible impacts, surface cracking is not expected, no impact on tracks	**TRIGGERS**:
		• Surface walkover inspections of the GoS SCA tracks remains compliant within condition green triggers for ground movements and effects, **and** does **not identify** any mining induced impacts, such as:
		  ○ Visible cracking/fracturing
		• Underground Mining Controls and Monitoring indicates all parameters are within design criteria / Level Green trigger levels
			TRIGGERS:
			○ Surface walkover inspections of GoS SCA tracks does **not identify** any mining induced impacts (refer examples in Condition Green); however, underground monitoring or subsidence monitoring systems trigger further investigation/surface inspection and/or
			○ Condition Amber for ground movements and effects is triggered (refer earlier above)
			
			See also *Subsidence* and *Underground Mining Control* elements above for related triggers/responses that require further investigation to confirm any *potential* surface impacts
				TRIGGERS:
				• Surface walkover inspections of GoS SCA tracks and trails **identifies** the development of mining induced surface cracking/fracturing or deformation
				• Mining-induced changes in grade, heaving or buckling, increased ponding or other significant damage to GoS SCA tracks and trails are observed during monitoring
				• Any of the following events occurs that would have been a dangerous incident if a person were reasonably in the vicinity at the time when the event occurred (High Potential Incidents as per Cl 128(5a) of the WHSMP Regulations 2014):
				  ○ *a failure of ground, or of slope stability control measures*
				  ○ *rock falls, instability of cliffs, steep slopes or natural dams, occurrence of sinkholes,* ***development of surface cracking*** *or deformations due to subsidence.*

		ACTIONS & RESPONSES:
		• No response required when above parameters are met.
		• Continue Subsidence Monitoring Program
			ACTIONS & RESPONSES:
			• Clarence Environment and Community Coordinator (or delegate) to undertake targeted surface inspection of accessible access tracks and trails in relevant area to confirm if any impact at surface
			• Notify landowner i.e., NPWS
			• **If no impacts observed**, continue Subsidence Monitoring Program
			• Calibrate subsidence model and review mine design
			• **If impact observed, refer Condition Red responses.**
				ACTIONS & RESPONSES:
				Review available data or undertake targeted surface investigations to confirm if the impact is mining-induced or related to natural surface movements or activation of a natural feature:
				• If confirmed related to natural surface movements or activation of a natural feature, continue Subsidence Monitoring Program
				• If confirmed mining induced impacts, Clarence will:
				  ○ Notify and consult with relevant stakeholders as per requirements specified within the Extraction Plan/SMP/PSMP, Development Consent and related approvals
				  ○ Assess public safety risk. Consider erecting warning signs/warning tape or restricting access in immediate area
				  ○ Notify Resource Regulator under relevant WHS laws (i.e. for high potential incidents)
				  ○ Take all reasonable and feasible steps to ensure that the exceedance ceases and does not recur
				  ○ Implement **Adaptive Management** process as described within the Extraction Plan
				  ○ Cease secondary extraction in that area if appropriate (with direction from PIS[1] and DPHI)
				Investigate remedial options in consultation with relevant stakeholders (incl. NPWS and DPHI). Implement suitable remedial option once agreed

Aspect	Performance Criterion Consent Criteria / EIS or EP Commitments	Condition Green (Operations within Predictions & Approved Impacts) *Continue Operations/Monitoring as Normal*	Condition Amber (Operations within Approved Impact Performance Measures but potentially exceeding predictions/designs) *Review Processes & Adaptive Management as Required*	Condition Red (Operations Exceed Approved Impact Performance Measures) *Adaptive Management Process Fully Engaged*
Biodiversity and Sensitive Vegetation: EEC / GDE, Threatened Species, Habitat, Aquatic Ecology	Negligible Environmental Consequences to threatened species and populations, CEECs, EECs and GDE's. No significant adverse Impacts	***Refer to dedicated TARP within the Clarence 918 and Biodiversity Management Plan (Clarence 918 Panels BMP)***		
Surface water and Groundwater	Does not result in any: significant inflows to mine workings; reduction in surface flows and groundwater baseflow to Newnes Plateau Shrub Swamps and wetlands; and reduction in surface flows and groundwater baseflow to waterbodies	***Refer to dedicated TARP within the Clarence 918 Panels Water Management Plan (Clarence 918 Panels WMP)***		
Aboriginal and Cultural Heritage Sites	Negligible impacts to Aboriginal and Cultural Heritage sites	***Refer to dedicated TARP within the Clarence 918 Panels Heritage Management Plan (Clarence 918 HMP)*** *Note: Other Aboriginal heritage sites located elsewhere within the Clarence development consent area are managed under the Clarence Western Region Aboriginal Cultural Heritage Management Plan, including actions for managing discovery of any new sites.*		
Historic Heritage Sites	Negligible impacts to historic heritage sites	***No Historic Heritage sites are located within the EP Area*** *Note: Other heritage sites located elsewhere within the Clarence development consent area are managed under the Clarence Western Region Historic Heritage Management Plan, including actions for managing discovery of any new sites.*		

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1) PIS – Principal Inspector - Subsidence, NSW Department of Planning and Environment – NSW Resource Regulator (Mine Safety).