Douglas PARTNERS

GROUNDED EXPERTISE

Report on Shaft Condition Assessment

Geotechnical Engineering Services - Reids Ridge Abandoned Mine Site

Yalgoo-Ninghan Road, Paynes Find WA

Prepared for Department of Energy Mines Industry Regulation & Safety

Project 224768.00

18 November 2024

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Document History

Details

Project No.	224768.00
Document Title	Report on Shaft Condition Assessment
Site Address	Yalgoo-Ninghan Road, Paynes Find WA
Report Prepared For	Department of Energy Mines Industry Regulation & Safety
Filename	224768.00.R.002.Rev0

Status and Review

Status	Prepared by	Reviewed by	Date issued
Draft A	Damian Jagoe-Banks	Fred Verheyde	20 August 2024
Rev0	Damian Jagoe-Banks	Fred Verheyde	18 November 2024

Distribution of Copies

Status	Issued to
Draft A	Department of Energy, Mines, Industry Regulation and Safety (DEMIRS)
Rev0	Department of Energy, Mines, Industry Regulation and Safety (DEMIRS)

The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

Signature	Date
Author	18 November 2024
Reviewer	18 November 2024

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Report on Shaft Condition Assessment
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1. Introduction

This report presents the results of a shaft condition assessment undertaken for the main shaft, secondary shaft ('Rose Marie' shaft) and surrounding area at the abandoned Reids Ridge mine site located within the dead mining tenement M59/117, 55 km west of Paynes Find in the Karara Rangelands Park. The purpose of this report is to detail the site conditions and discuss the results and findings of the investigation at the Reid Ridge Mine Site.

The investigation was commissioned in a letter from the Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) (letter Ref: DMIRS23250) and was undertaken in accordance with Douglas' proposal dated 21 September 2023 and the conditions outlined in the acceptance letter.

Three reports discuss the features present in the immediate vicinity of the main shaft of Reids Ridge mine:

- Shaft assessment report (this report) – detailing the findings of the shaft assessment;
- Shaft rehabilitation report – providing recommendations on suitable rehabilitation options and budget estimates; and
- Subsidence Risk Report (Douglas report '*224768.00.R.001.Rev1.Subsidence Risk Report*' dated 31 July 2024).

The aim of the investigation was to assess the condition of two mine shafts and surrounding mine related (geotechnical) features and provide an assessment of the following:

- Condition of each feature and the presence of material or obstructions within the features;
- Stability of the features;
- Presence of fauna within the features; and
- Potential for noxious and/or flammable gases within the features.

The details of the investigation are presented in this report, together with comments and recommendations on the items listed above.

2. Site Description

2.1 Location

Reids Ridge mine is located within the Karara Rangelands Park, 7 km north-northwest of Warriedar homestead and approximately 55 km west of Paynes Find, WA. Three main areas of historical mining activity are present within the same dead mining tenement M59/117: Reids Ridge, Commodore and Reids North.

Drawing 1 in Appendix B shows an aerial view of the Reids Ridge mine site and relevant features discussed in this report.

2.2 'Main Shaft' and Ventilation Shaft ('Rose Marie')

Reids Ridge comprises a 'Main Shaft' and a ventilation shaft ('Rose Marie' shaft). The mined mineral was predominately gold. Several survey plans (by Engineering Construction Surveys) dated between 1983 and 1988 and a 1990 mining exploration report indicate that the main shaft is 167 m deep. Six lateral working levels (1A, 1, 2, 3, 4 and 5) exist, with the shallowest one (Level 1A) at -36 m depth (or -34 m, on some drawings) and the deepest one at -159 m.

The targeted lode is near vertical (dipping 80 degrees East), described to be between 1 m and 2 m wide, trending NNE. Therefore, lateral workings are aligned with the lode on a bearing of approximately 30 degrees to the north.

A longitudinal section of the underground mine is reproduced in Drawing 2 in Appendix B and was attached to a Notice of Intent (Gilbert Gokus Joint Venture, 2005) outlining the scope to reactivate operations of the existing Reids Ridge underground mine in 2005. The interest of this drawing includes that it forms the most complete longitudinal mapping of the mine developments identified during this study, and it shows two near vertical stopes above Level -36 m that are not shown on former survey plans but whose evidence was observed during the field work for this study. It is noted that further proposed underground developments are also shown; their completion (or otherwise) post 2005 are unknown but would have involved deeper levels with no impact on ground stability at ground surface. The accuracy of this longitudinal section is uncertain because its source is unreferenced, however it is noted that this longitudinal mapping is consistent with previous referenced surveys and field results made during this study.

In addition to the longitudinal section discussed above, Drawing 2 (Appendix B) also presents a plan view of the underground workings based on various survey plans dated between 1983 and 1988.

Figure 1 next page shows the conditions of the main shaft at the time of the investigation, and Figure 2 shows 'Rose Marie' shaft at the commencement of the field work.

Figure 1: Main shaft headframe and grizzly screen (foreground), facing southwest

Figure 2: Rose Marie Shaft with dilapidated fan positioned over shaft

2.3 **Northern Stope**

Approximately 2.5 m away to the north of the main shaft, a 7 m long, 2 m to 3.5 m wide, near vertical open void is aligned with the NNE trending lode, between the main shaft and Rose Marie shaft. This void is largely blocked with fallen disused mining equipment at depth of about 3 m. Its location and size are consistent with the northern stope shown in the 2005 longitudinal section (Drawing 2).

A secondary horizontal shallow void is visible in the northern face of this northern stope and follows the NNE direction of the lode towards Rose Marie shaft. The visible ground cover above this secondary void partially comprises bedrock and is 1.7 m thick. The visible horizontal extent of the secondary void is approximately 5 m towards the Rose Marie Shaft. It is interpreted as the remnant of an historical shallow lateral working independent of the stope and preceding the stoping, or possibly a northern extension of the stope that did not breach the ground surface.

Figure 3: Open stope north of Main Shaft, facing northeast, also showing (red dashes) secondary void in the northern face of the stope. Debris can be seen blocking the stope at about 3 m depth.

2.4 **Southern Stope**

Subsidence of the ground is evident over a 7.5 m length, 2 m width, and up to about 1 m depth, on the opposite and southwestern side of the main shaft and is considered to form likely evidence of a former stope aligned with the lode to the south of the main shaft, thus also corroborating the 2005 longitudinal section (Drawing 1). The subsidence was located within an area of mine waste rock, about 2 m thick in average (locally up to 3 m) and covering an area of between 400 m^2 and 500 m^2 adjacent to the main shaft.

Figure 4: Area of subsidence within stockpiles mine waste, southwest of Main Shaft, looking northeast

2.5 Grizzly Screen Feature

Another unnatural rectangular depression, about 150 mm deep and located under a disused grizzly screen, was identified during Douglas' field assessment between the northern open stope and Rose Marie shaft.

Figure 5: Grizzly Screen Feature.

3. Published Geology

The 1:100,000 Ninghan geological sheet indicates that Reids Ridge and Rose Marie mines are located within colluvium adjacent to both:

- Archaen basalt (symbol *ANOs-bb*) of the Norie Group, described as '*locally pillowed; thin hyaloclastic or siltstone horizons, metamorphosed*', and
- Archaean gabbro (*AAAWog*) of the Warriedar Suite described as '*Gabbro; locally includes layers of leucogabbro, gabbronorite, dolerite, minor pyroxenite and pegmatite gabbro; metamorphosed*'.

The literature (WATKINS K, 1990) indicates the non-mineralised bedrock at Reids Ridge is 'metabasalt'.

Observation of the ground profile within the open northern stope during the geotechnical field work indicates that the weathered bedrock at Reids Ridge and Rose Marie occurs near ground surface. Weathered bedrock is visible at ground surface in places in proximity of these shafts. Stockpiles of waste rock excavated from Reids Ridge observed during the geotechnical field work comprised rock material of very high strength or stronger.

4. Field Work Methods

The field work was carried out under a Safety Management Plan which incorporated measures to manage safety when working around the features and bush fire risk.

Field work to assess the condition of the Reids Ridge mine, Rose Marie shaft and surrounding area was undertaken from 15 to 19 of April 2024 and comprised:

- Inspecting the main shaft, open stope and Rose Marie shaft from ground surface, by an experienced Geotechnical Engineer and a Principal Geotechnical Engineer from Douglas.
- Exposing the Rose Marie shaft by removing the dilapidated ventilation fan and associated wooden cover, using a backhoe.
- Exposing the rectangular depression located under a disused grizzly screen, identified between the northern open stope and Rose Marie shaft during the geotechnical field work.
- Excavating a trench to expose the ground conditions across the subsided zone to the south of the main shaft, where a 2005 longitudinal section (Drawing 1) shows a possible former stope.
- Targeted test pitting at a location to the east of the main shaft, following the identification during the field work of a geophysical anomaly at this location.
- Photos and video footage within all open voids (Reids Ridge main shaft, northern stope and Rose Marie shaft) and surrounding area.
- LiDAR scanning of the two open shafts and open stope and their surrounds.
- Geophysical survey of the area surrounding the shafts and stopes to assess the subsurface profile for potential anomalies that may be indicative of voids related to mine activity.
- Monitoring for noxious or flammable gases within features; and
- A walkover survey, of the surroundings of the main shaft, looking for relevant signs of nearby mine activities and assessing the potential for interconnectivity or relationship with mine.

The LiDAR scanning was undertaken using a Hovermap Platform and utilised Simultaneous Localisation and Mapping (SLAM) based LiDAR technology. Data were collected using a combination of hand-held and winch mounted scanning methods that were subsequently stitched together into a single, spatially correct model to provide accurate data on the spatial relationship between the features as well as dimensions and volumes of each feature. Douglas Partners engaged the services of specialist contractors, MineLiDAR to undertake this work.

A geophysical survey comprising two methods was undertaken in the vicinity of the shafts and open stope of Reids Ridge.

The methods used comprised:

- Electrical Resistivity Tomography (ERT) – to obtain subsurface electrical resistivity models to a target depth of 15 m; and
- Ground Penetrating Radar (GPR) using both 300 MHz and 80 MHz antennas to obtain high resolution subsurface reflection imagery to a target depth of 10 m.

The data was collected then results analysed by specialist geophysical consultants GBG Group. The results of the geophysical survey are provided in Appendix D.

The gas monitoring was undertaken using a Ventis MX4 portable multi gas monitor with pump attachment capable of detecting carbon monoxide, hydrogen sulphide and oxygen concentrations and the lower explosives limit (LEL). The unit was lowered to depths up to 20 m air was sampled directly into the unit.

5. Results of Desktop and Field Assessment

5.1 Description of Mine Features

Based on the desktop information, visual field observations, photos, video recordings, LiDAR data and geophysical survey interpretation, a description of the features observed around the Reids Ridge Mine is provided in this section.

To assist with the description, the observed extents of the mine features are shown in Drawings 3 to 5 in Appendix B, and internal photos for the Main Shaft and Rose Marie Shaft are included in Appendix C.

Reids Ridge Main Shaft

The Reids Ridge main shaft is a deep vertical shaft, approximately 2.4 m long by 1.5 m wide in plan view at its opening at ground surface, and flooded at depth. The shaft collar is formed of concrete and steel beams (at RL 323.5 m AHD) which support a steel headframe (approximately 12 m high) and hoist. At the time of investigation, the shaft opening was mostly blocked at ground surface by a skip suspended just above collar level by its cable running through the headframe pulley and then to the hoist. Below this, a hinged metal plate covered much of the northern half of the shaft opening. The southern half of the shaft was open at collar level (i.e. no steel cover), but from a depth of approximately 5 m, it was mostly blocked by timbering support, platforms, and fallen debris. Photos of the collar are included in Appendix C (photo plate 17).

Based on the alignment of the stopes (that would target the lode bearing of approximately 30 degrees to the north), the shaft appears to have been sunk within the lode at ground level. As such, owing to the dipping of the lode to the east, any lateral workings associated with this mine would extend to the east of the shaft, which is consistent with the information from reviewed survey plans (Drawing 2 in Appendix B). Results of the field investigation (LiDAR and video recordings) indicate that the internal faces of the main shaft are fully lined with timber lagging to a depth of 19 m, at which depth, the dip of the lode appears to exit the vertical shaft's footprint, resulting in the widening of the shaft to chase the lode on the hanging wall on the eastern side of the shaft footprint from -19 m depth down to Level 1A at approximately -34 m.

A lateral void, 2 m wide and horizontally extending to the south of the shaft over 7.5 m, can be seen in Lidar and video data from a depth of -17.9 m and appears to be associated with the southern stope shown on available desktop information and also evidenced by a depression at ground surface. This southern stope was discussed in Section 2.4 above and is further discussed in the next section below. The bottom of the connection between the southern stope and the shaft is at a depth of -22.1 m (resulting in a connecting height of about 4 m between these two features).

The roof of Level 1 is visible in the eastern face of the shaft at a depth of -46.8 m (RL 276.7). Groundwater was encountered slightly below at a depth of -49.2 m (RL 274.3) which is above the base of the lateral working Level 1. No measurements or observations was possible below water level, however, reviewed desktop information indicates a total shaft depth of -167 m, meaning the lower 115 m depth of shaft and lateral developments are flooded.

At the time of the investigation, vehicular access to the edge of the main shaft opening at ground surface was practically impossible owing to the headframe structure. Pedestrian access to the edge of the partially unprotected shaft opening was possible.

The results of the field assessment, notably the video recordings, indicate that the shaft and internal timbering reinforcement are overall in reasonable condition, apparently stable with no evidence of significant deterioration. The shaft collar was considered in good conditions for the purpose of this study, with no notable cracking or deformation of the concrete and steel, and no loss of level. Therefore, in the absence of evidence of instability from the results of this study, both the shaft and its collar are considered stable.

Southern Stope

A test trench was excavated during the field work for this study across the subsidence located to the south of the main shaft. Photos of this feature and testing are included in Appendix C (photo plate 18). This trench exposed natural strong ground on each side of the subsidence envelope, and rocky fill within the subsidence envelope, with a relatively sharp and vertical interface between the two material types. The results of this field testing are therefore consistent with a previous stope intersecting ground surface at this location, and subsequently backfilled with likely rocky fill that has subsided over time. The occurrence of a backfilled stope at this location is consistent with both the desktop information discussed in Section 2.4 that shows the existence of a stope intersecting ground level in 2005, and results of observations (video and Lidar) made within the shaft discussed in the previous section of this report and showing a lateral opening linking the shaft between depths of -18 m and -22 m approximately. Based on desktop information, the depth of this stope prior to backfill was up to -51 m, i.e. down to Level 1 of the underground mine.

At the time of the investigation, vehicular access to this feature that is on the top of mine rock waste would be difficult, but not entirely precluded. Pedestrian access was available.

The quality and stability of the backfill are unknown. Therefore, this feature should be considered unstable and not accessed in its current conditions, unless specific provisions are implemented as part of a rehabilitation programme to address the risk to safety caused by this feature.

Northern Stope

Survey plans indicate that the northern stope (that can be described as a '*gunnies*' in mining terminology) extends from the surface vertically down to Level 1A at -36 m depth, laterally connecting other stopes via lateral workings and winzes to Level 4 at -131 m depth. Available plans (e.g. Drawing 2) also indicate a link between the main shaft and the northern stope, however evidence of this was not observed in video footage recorded from the main shaft. LiDAR data collected within the main shaft indicates possible void adjacent to the north of the main shaft from between depths of approximately 6 m and 16 m (which is consistent with the 2005 longitudinal section in Drawing 2), however this part of the shaft is tightly lined with wooden lagging that strongly masked such a void and mostly precluded LiDAR data acquisition behind the lagging.

The northern stope was open at the surface for a length of 7 m and a width ranging between 2.0 m and 3.5 m. From a depth of 2.5 m however, the stope width narrows to 1.0 m. A secondary horizontal void, with an opening that was 0.6 m high was visible from a depth of 1.7 m on the northern wall of the stope (shown on Figure 3 in Section 2.3 above). Owing to the geometry of the narrow opening, limited data could be obtained within this secondary void, however LiDAR data indicates it extends at least 5 m to the north along the lode alignment and to a depth of at least 4.1 m (RL 319.4) (see Drawing 3, Appendix B).

At the time of investigation waste and debris such as pieces of metal, a ladder and wooden pallets had fallen into the northern stope. A gap within the debris allowed a tape measure to be lowered to a depth of -24.4 m (RL 299.1 m).

At the time of the field work, vehicular access to the northern stope was deterred along its eastern long side by a rock waste bound, along its northern long side by disused mining equipment (mostly a tank), on its southern short side by the headframe, and on its northern short side by a large bush.

Considering the near verticality and relatively narrow width of this stope and the strength of the ground and shallow bedrock, the risk of subsidence in the vicinity of this feature is considered very low to barely credible along its long sides (east and west) and its southern short side. Some risk of subsidence exists, specifically under vehicular traffic (noting access to such trafficking is currently limited and unlikely based on current site conditions) on its northern side in the lode alignment towards the Grizzly Shaft, owing to a relatively shallow horizontal working following this alignment.

Grizzly Shaft

A previously unnamed feature, therefore referred to in this report as the 'Grizzly Shaft', was identified during the field work of this study located 19 m north-northeast of the main shaft, and about 10 m north-northeast of the northern stope opening, along the lode alignment, between the northern stope and the Rose Marie shaft (Drawing 3, Appendix C).

At the time of the investigation, a steel metal mining grate/grizzly screen was positioned over this 1.2 m by 1.2 m, approximately 150 mm deep depression. Following excavation of this depression to a depth of 1.8 m using a backhoe during the geotechnical field work, the feature was interpreted as a backfilled shaft. The excavation was terminated due to the maximum reach of

the plant available at the time of the investigation and the narrowness of the feature. The base of the feature is likely deeper than 1.8 m.

No evidence of lateral workings was visible within the excavated depth of the Grizzly Shaft, nor was there any evidence of subsidence in the immediate area surrounding this feature.

At the time of the investigation, vehicular access over the Grizzly Shaft envelope was restricted by a piece of disused mining equipment (a grizzly screen), which also mostly deters pedestrian access over the feature. This piece of equipment was replaced over the feature after the geotechnical field work, as a satisfactory temporary protection measure until a more permanent rehabilitation is implemented.

Owing to no documentation of a shaft between the Main Shaft and the Rose Marie shaft and from observations made on site, it is considered that the Grizzly Shaft is possibly a relatively shallow exploration shaft to assess the lode at that location. Owing to the strength of the ground and shallow bedrock in the vicinity of this feature, risk of subsidence on its eastern, western and northern sides is considered barely credible to very low. It is considered prudent to assume that a risk of subsidence may exist on its southern side, mostly for vehicular access, owing to the existence of a shallow horizontal working heading from the northern slope towards the Grizzly Shaft, discussed in the previous section of this report. Owing to the unknown quality, thickness and stability of the backfill within this mining feature, a risk of subsidence/instability must be assumed across the feature envelope covering about 1.2 m by 1.2 m in plan view.

Rose Marie Shaft

The Rose Marie shaft is understood to be the historical shaft for the Reids Ridge mine. The shaft is vertical to a depth of 20.2 m (RL 302.7) then head to the south on a 45° angle to the vertical. LiDAR data captured information 7 m past the 45° bend (Drawings 4 and 5, Appendix B). Survey plans indicate it links an underground stope of the Reids Ridge mine near Level 1A (-36 m). The historical Rose Marie shaft appears to have been repurposed as a ventilation shaft for Reids Ridge, as indicated by the dilapidated ventilation fan covering the shaft at commencement of the geotechnical field investigation (Figure 2 in Section 2.2).

The shaft opening is 1.2 m by 0.9 m in plan view, however at a depth of 0.5 m, the shaft widens up to 2.6 m (possibly from some shallow collapse) before returning to relatively consistent shaft dimensions of approximately 1.2 m x 1.8 m from a depth of 1.0 m.

The shaft was apparently hand excavated through hard rock and, aside from some timbering at the opening of the shaft, is freestanding without any internal support. From video observation, the ground profile is interpreted to be weathered rock. The shaft is considered to be in relatively good condition and stable, except its upper meter from ground surface. Some images of the shaft at various depths are included in photo plates 11 to 15, Appendix C.

At the commencement of the investigation, the shaft was greatly unmarked (other than the dilapidated ventilation fan and four steel star-pickets), masked by a rotten timber cover and unprotected (without any bunds), resulting in significant safety risk to public. During the geotechnical field work, the shaft was opened (thus made visible), a bund of rock fill was placed around it and flagging and signage were placed to form a provisional measure prior to permanent rehabilitation solution, to deter vehicular and pedestrian access to this feature and

therefore to significantly decrease the risk this feature posed to the public. Photo plate 19 shows the conditions of the shaft at ground surface during and at completion of the field work.

Owing to the strength of the ground and shallow bedrock in the vicinity of this feature, risk of subsidence or collapse beyond 1.5 m on all sides of this feature is considered barely credible to very low.

5.2 Gas Meter Monitoring

A Ventis MX4 gas monitor was lowered to depth of 20 m in the Main Shaft and Rose Marie Shaft and to the top of obstruction within the Northern Stope (approx. 3.5 m deep). No abnormal or harmful gas concentrations were detected. The monitor assessed oxygen, carbon monoxide, hydrogen sulphide and lower explosive limit (LEL) levels.

5.3 Evidence of Fauna

No fauna or evidence of fauna (eg dejection, smell...) was noted by the field geotechnical engineers during the field work undertaken between 15 to 19 of April 2024 and from subsequent reviews of video recordings inside the features.

5.4 LiDAR Volumes

The visible volume of each feature, i.e. the volume of all areas visible to the LiDAR scanning equipment as shown in Drawings 4 and 5 (Appendix B), are summarised in Table 1 below. It is emphasised that all features in the table are expected to be connected to lateral workings that occur beyond the detection capabilities of a LiDAR scanner and volumes below water level in the main shaft are also not included. Therefore the observed volumes in Table 1 represent a small component of the total mine underground development.

Table 1: LiDAR detected volumes

Feature	Volume (m^3)
Reids Ridge Main Shaft, above water (-49.2 m)	409
Rose Marie	64
Northern Stope	64[1]

Note [1]: Volume includes consideration of limited LiDAR data recovered from below the blockage at approximately 3 m depth. As such, true volume is anticipated to be greater.

5.5 Geophysical Survey Results

One main geophysical anomaly was identified during the field work and was further investigated during the field work with a test pit excavation at the location of the anomaly (approximately 10 m east of the Main Shaft). No problematic conditions were observed within the test pit and it was interpreted that the geophysical anomaly was a below ground concrete structure from previous mining infrastructure.

Post field work analysis comprising a combination of data from ground penetrating radar and electrical resistivity tomography was undertaken by GBG Group and 12 geophysical anomalies were identified in the vicinity of the Reids Ridge mine. The locations of the anomalies are provided

in the plan in the geophysical survey report, included in Appendix D. Approximately 2,800 m^2 of area around Reids Ridge mine was scanned.

Douglas assessed each anomaly identified in the GBG Group report, in the context of all other data available for the area around the Main Shaft and Rose Marie Shaft, and considers them to be unlikely related to any notable ground mine features such as voids or backfilled shafts, thus with no requirement for further consideration.

5.6 **Summary of Field Work Data, Observations and Interpretation**

The table on the following pages summarises the pertinent information collected and interpreted regarding the Reids Ridge mine feature

Table 2: Summary

Feature	Dimensions (LxWxD) (m)	Volume (m^3)	Lateral Working Observed	Gas Detected	Fauna Detected
Reids Ridge Main Shaft	2.4 x 1.5 x 49 observed, flooded at -49 m, likely extending to -170 m.	409 m^3 observed, but likely significantly greater.	~30 m deep Level 1a observed ~50 m deep Level 1 observed. Several deeper lateral workings likely	No	No
Rose Marie	1.8 x 1.2 x 20.2 (vertical shaft), 45° bend at -20.2 depth continuing linearly over ≥7 m length (observed), likely longer and linking Reids Ridge Main Shaft underground development.	64 m^3 observed, likely significantly greater considering the likely continuation into Reids Ridge underground development.	45° bend towards Main Shaft from a depth of -20.2 m, likely linking Reids Ridge underground development	No	No
Northern Stope	7 x 1 x ≥24.4 (observed), possibly vertically extend to -36 m depth into Reids Ridge mine, and possibly laterally connecting other stopes within Reids Ridge mine to -131 m depth.	64 m^3 observed, likely significantly greater considering various possible connections within Reids Ridge mine to -131 m depth.	Lateral working observed to extend north over ≥ 5.1 m horizontal length at depth ≥ 4.1 m. Possible link to Main Shaft observed between 6 m and 16 m depth.	No	No
Southern Stope	7.7 x 2 x ≥22 Backfilled with rocky fill at ground surface. Connection between Southern Stope and Main Shaft observed at -22 m depth in the Main Shaft. Base of stope possibly at -51 m.	Unknown (Unknown depth and conditions of backfill).	Link to Main Shaft between 18 m and 22 m depth.	No void at ground surface	No void at ground surface
Grizzly Shaft	1.2 x 1.2 x >1.8	Unknown (backfilled feature).	None observed to 1.8 m depth.	No void	No void

6. References

AS 1726. (2017). *Geotechnical Site Investigations.* Standards Australia.

Carbon Gold Pty Ltd. (1985, October). Reids Ridge Gold Mine Composite Plan.

Gilbert Gokus Joint Venture. (2005). Notice of intent, Reids Ridge Mine - Payne's Find WA.

WATKINS K, H. A. (1990). *Geological Evolution and Mineralization of the Murchinson Province Western Australia.* Perth: Geological Survey of Western Australia.

7. Limitations

Douglas Partners Pty Ltd (Douglas) has prepared this report for this project at Reids Ridge abandoned mine site in accordance with Douglas' proposal dated 21 September 2023 and acceptance received via letter from the Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) (letter Ref: DMIRS23250). This report is provided for the exclusive use of Department of Energy Mines Industry Regulation & Safety for this project only and for the purposes as described in the report. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of Douglas, does so entirely at its own risk and without recourse to Douglas for any loss or damage. In preparing this report Douglas has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after Douglas' field testing has been completed.

Douglas' advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by Douglas in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

The assessment of atypical safety hazards arising from this advice is restricted to the (geotechnical / environmental / groundwater) components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. Douglas cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by Douglas. This is because this report has been written as advice and opinion rather than instructions for construction.

Appendix A

About this Report

About this Report

November 2023

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

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About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

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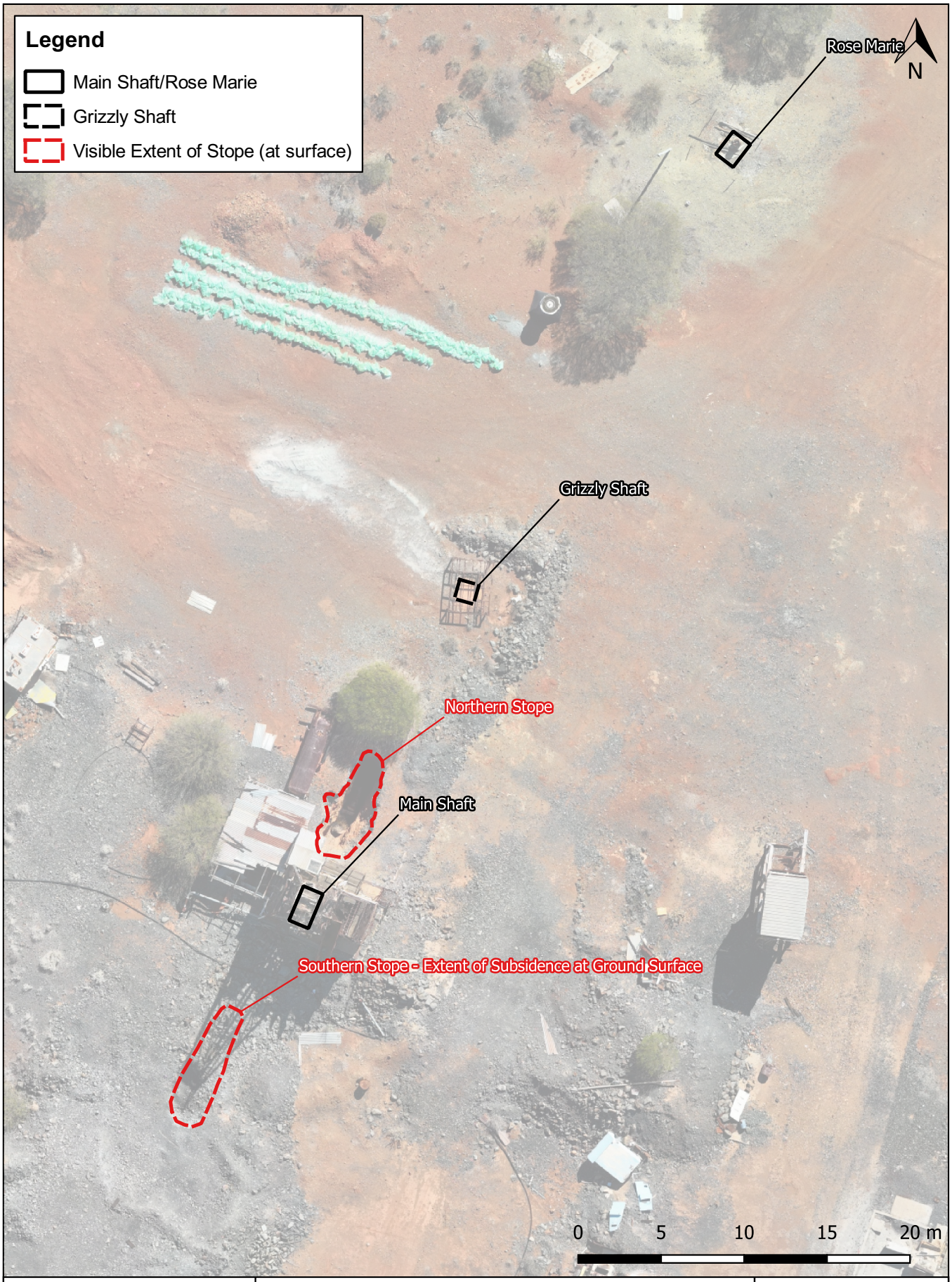
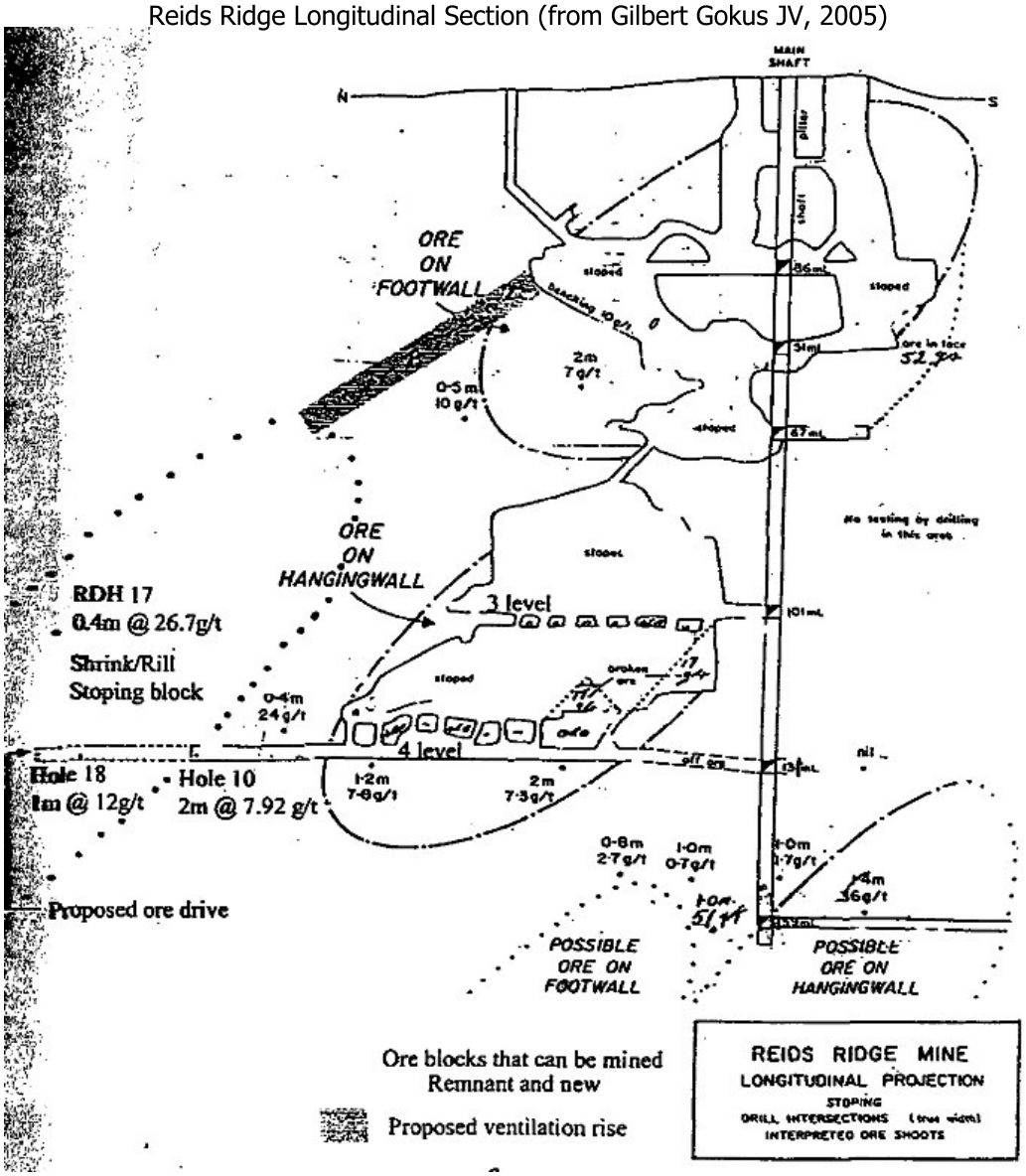
Appendix B

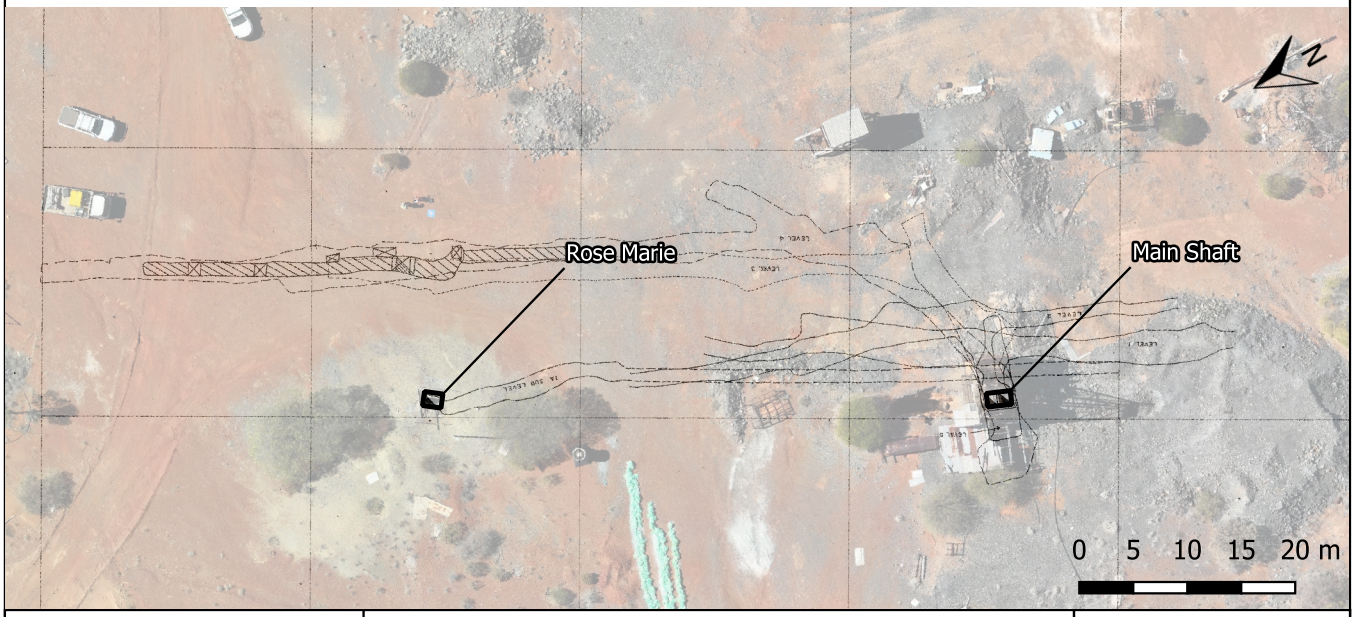
Drawings 1 to 5



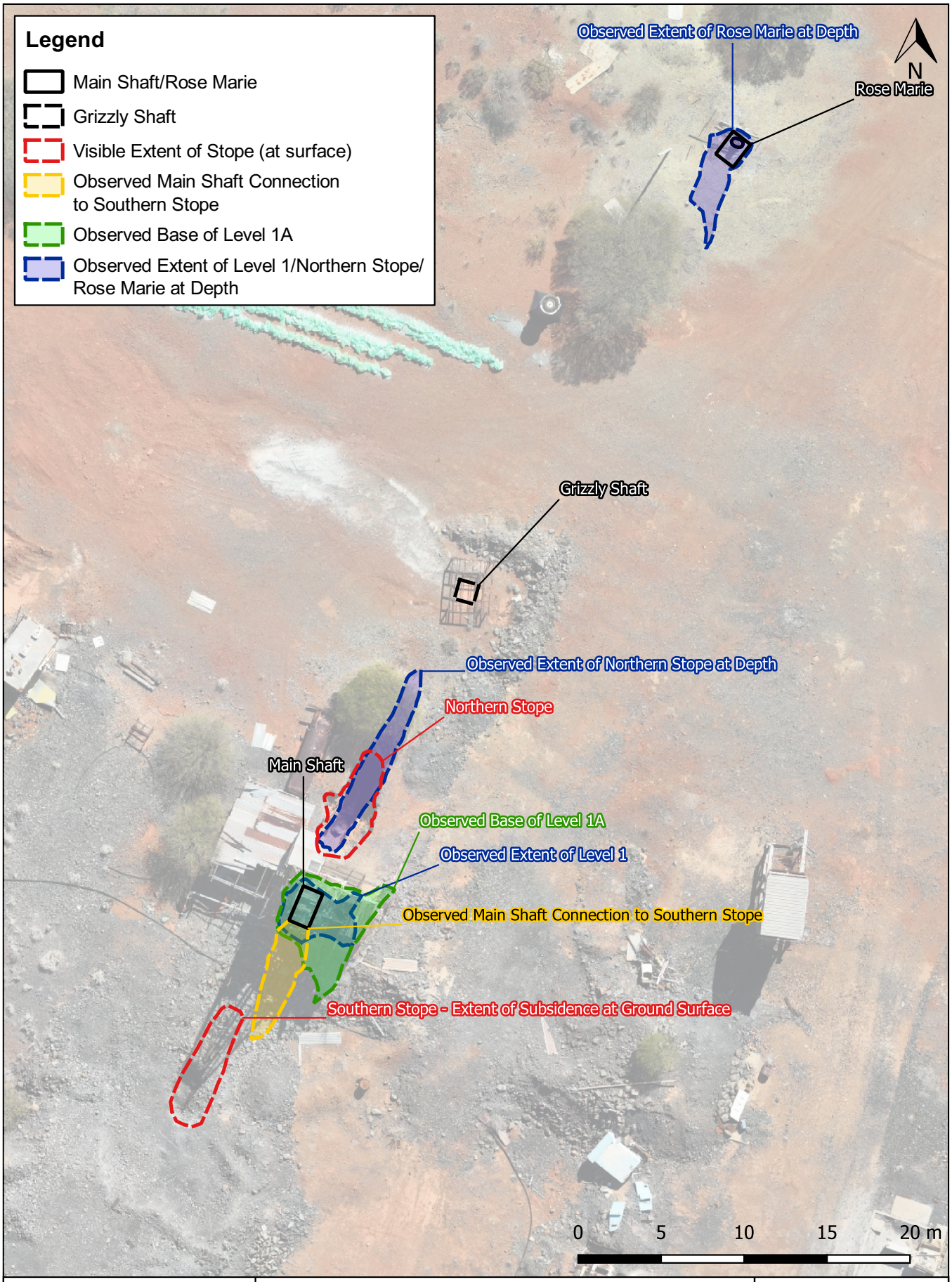
Douglas PARTNERS	**Reid Ridge Mine Features**	PROJECT: 224768.00
	Shaft Condition Assessment	Drawing No: 1
	Reids Ridge Abandoned Mine Site, WA	REV: 0
	CLIENT: DEMIRS	DATE: 20/8/2024

Reids Ridge Longitudinal Section (from Gilbert Gokus JV, 2005)

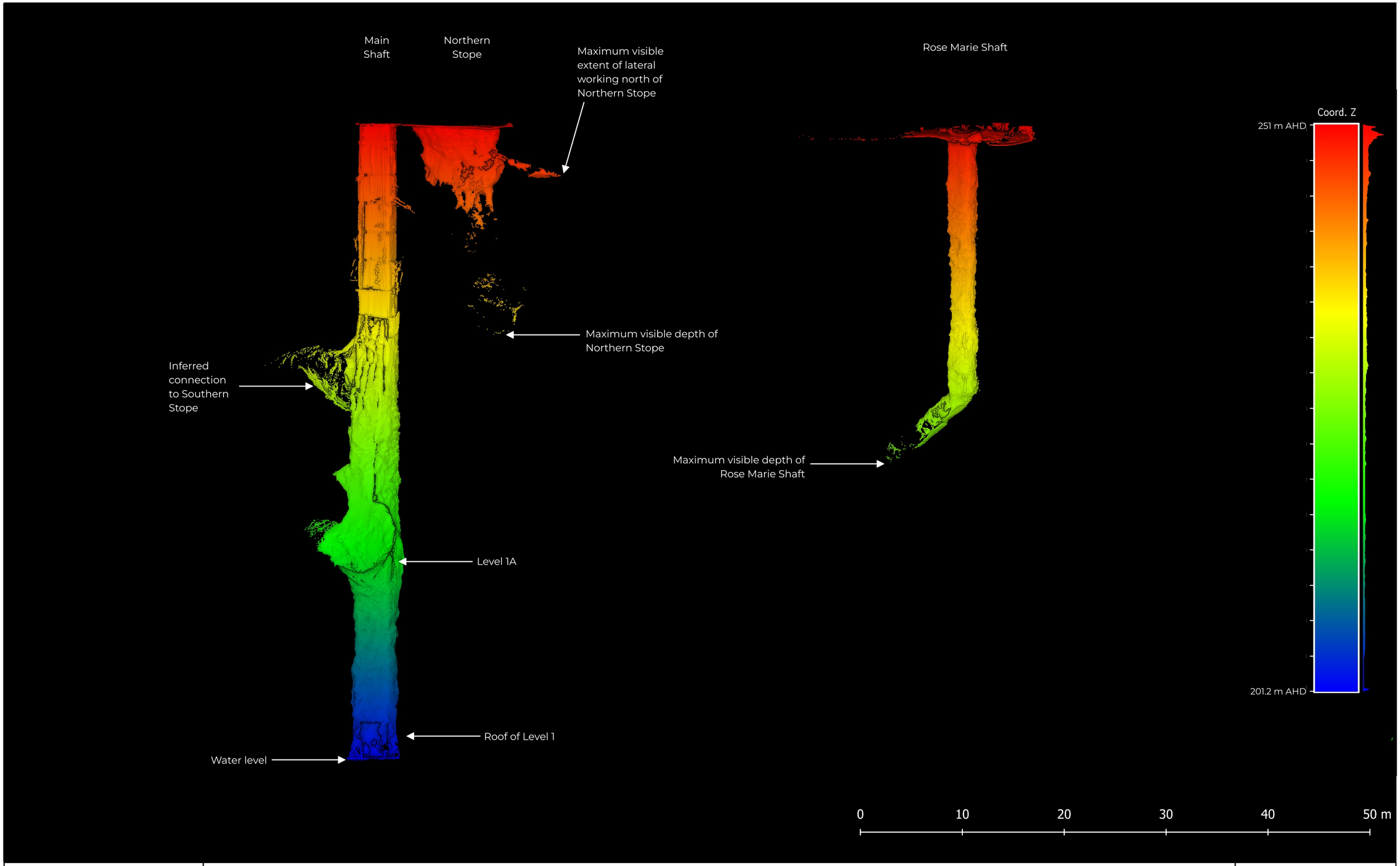




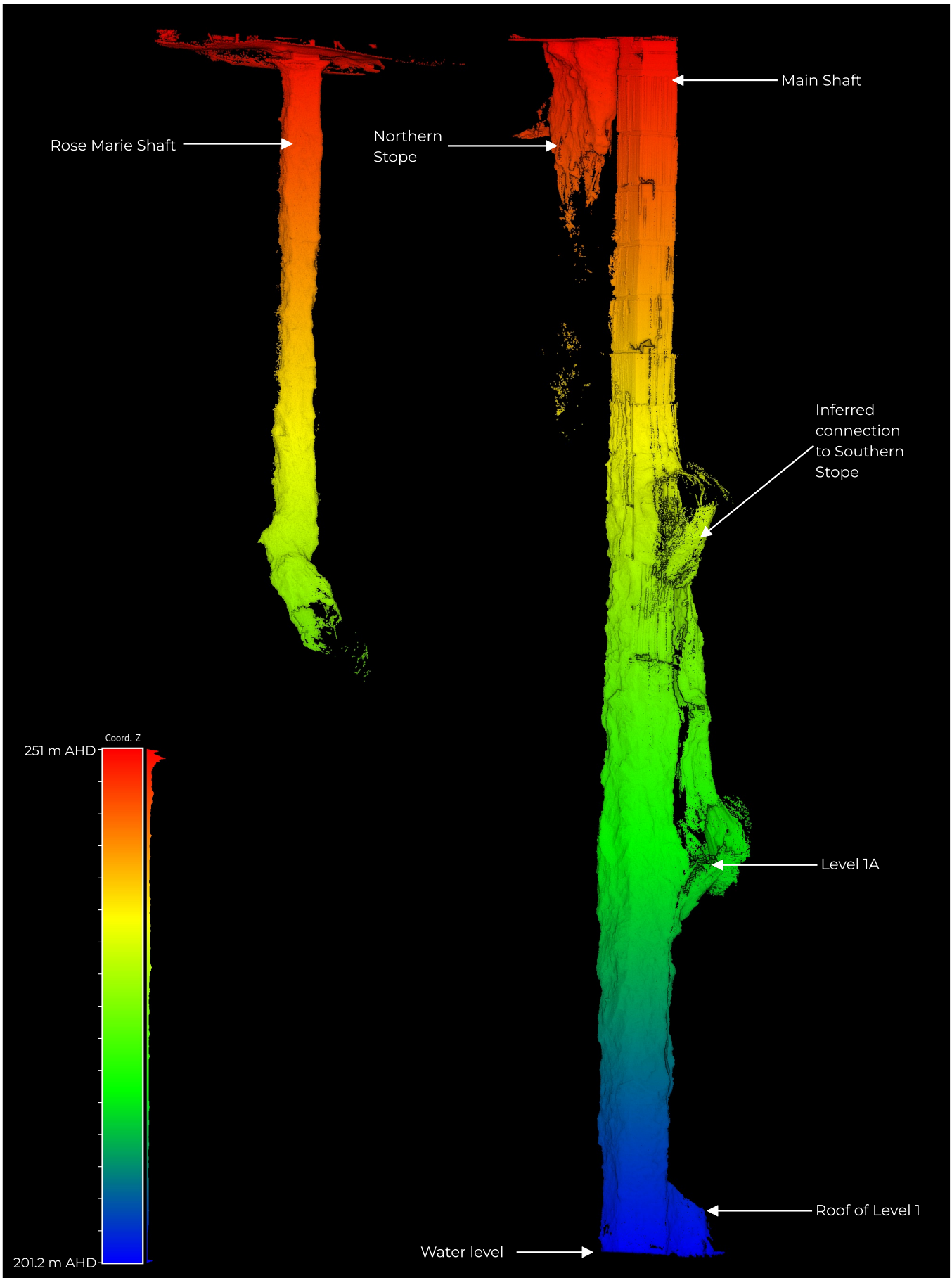
Douglas PARTNERS	**Mine Longitudinal Section and Composite Plan**	PROJECT: 224768.00
	Shaft Condition Assessment	Drawing No: 2
	Reids Ridge Abandoned Mine Site, WA	REV: 0
	CLIENT: DEMIRS	DATE: 20/8/2024



Douglas PARTNERS	**Reid Ridge Mine Features**	PROJECT: 224768.00
	Shaft Condition Assessment	Drawing No: 3
	Reids Ridge Abandoned Mine Site, WA	REV: 0
	CLIENT: DEMIRS	DATE: 20/8/2024



Douglas PARTNERS	**Reids Ridge LiDAR Data Mine Cross Section**	PROJECT: 224768.00
	Shaft Condition Assessment	Drawing No: 4
	Reids Ridge Abandoned Mine Site, WA	REV: 0
	CLIENT: DEMIRS	DATE: 20/8/2024



Douglas PARTNERS	**Reids Ridge LiDAR Data Northeast View (45 degree)**	PROJECT: 224768.00
	Shaft Condition Assessment	Drawing No: 5
	Reids Ridge Abandoned Mine Site, WA	REV: 0
	CLIENT: DEMIRS	DATE: 20/8/2024

Appendix C

Photoplates

Photograph 1: Main Shaft 3 m depth

Douglas Partners Geotechnics / Environment / Groundwater	**Photographs - Main Shaft** Shaft Condition Assessment Reids Ridge Abandoned Mine Site, WA	Project No.:	224768.0
		Photo Plate No.:	1
		Revision:	0
	CLIENT: DEMIRS	Date:	Aug-24

Photograph 2: Main Shaft 10 m depth

Douglas Partners Geotechnics / Environment / Groundwater	**Photographs - Main Shaft** Shaft Condition Assessment Reids Ridge Abandoned Mine Site, WA	Project No.:	224768.0
		Photo Plate No.:	2
		Revision:	0
	CLIENT: DEMIRS	Date:	Aug-24

Photograph 3: Main Shaft 15 m depth

Douglas Partners Geotechnics / Environment / Groundwater	**Photographs - Main Shaft** Shaft Condition Assessment Reids Ridge Abandoned Mine Site, WA	Project No.:	224768.0
		Photo Plate No.:	3
		Revision:	0
	CLIENT: DEMIRS	Date:	Aug-24

Photograph 4: Main Shaft 20 m depth

Douglas Partners Geotechnics / Environment / Groundwater	**Photographs - Main Shaft** Shaft Condition Assessment Reids Ridge Abandoned Mine Site, WA	Project No.:	224768.0
		Photo Plate No.:	4
		Revision:	0
	CLIENT: DEMIRS	Date:	Aug-24

Photograph 5: Main Shaft 25 m depth

Douglas Partners Geotechnics / Environment / Groundwater	**Photographs - Main Shaft** Shaft Condition Assessment Reids Ridge Abandoned Mine Site, WA	Project No.:	224768.0
		Photo Plate No.:	5
		Revision:	0
	CLIENT: DEMIRS	Date:	Aug-24

Photograph 6: Main Shaft 30 m depth

Douglas Partners Geotechnics / Environment / Groundwater	**Photographs - Main Shaft** Shaft Condition Assessment Reids Ridge Abandoned Mine Site, WA	Project No.:	224768.0
		Photo Plate No.:	6
		Revision:	0
	CLIENT: DEMIRS	Date:	Aug-24

Photograph 7: Main Shaft 35 m depth

Douglas Partners Geotechnics / Environment / Groundwater	**Photographs - Main Shaft** Shaft Condition Assessment Reids Ridge Abandoned Mine Site, WA	Project No.:	224768.0
		Photo Plate No.:	7
		Revision:	0
	CLIENT: DEMIRS	Date:	Aug-24

Photograph 8: Main Shaft 40 m depth

Douglas Partners Geotechnics / Environment / Groundwater	**Photographs - Main Shaft** Shaft Condition Assessment Reids Ridge Abandoned Mine Site, WA	Project No.:	224768.0
		Photo Plate No.:	8
		Revision:	0
	CLIENT: DEMIRS	Date:	Aug-24

Photograph 9: Main Shaft 45 m depth

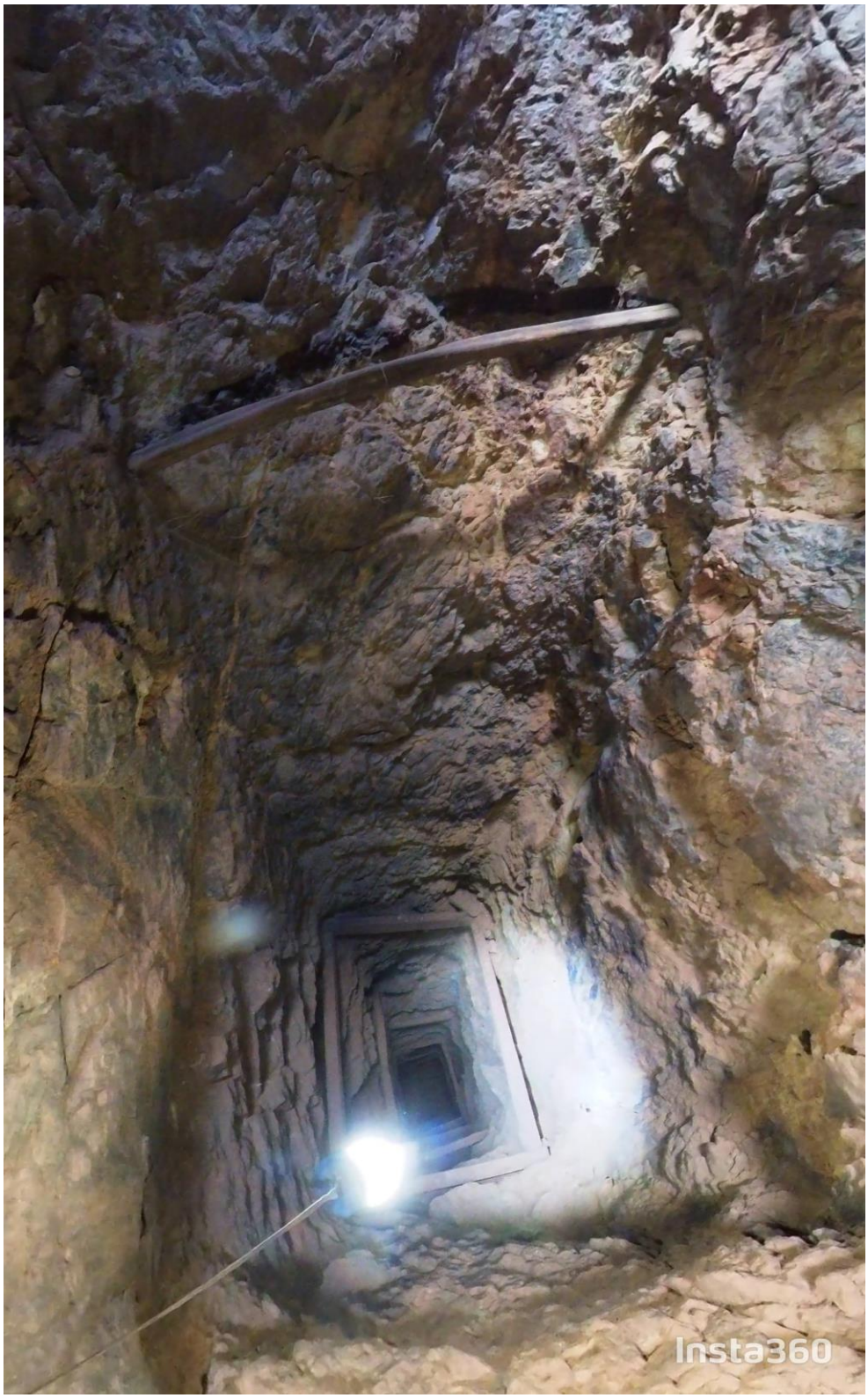
Douglas Partners Geotechnics / Environment / Groundwater	**Photographs - Main Shaft** Shaft Condition Assessment Reids Ridge Abandoned Mine Site, WA	Project No.:	224768.0
		Photo Plate No.:	9
		Revision:	0
	CLIENT: DEMIRS	Date:	Aug-24

Photograph 10: Main Shaft 47 m depth

Douglas Partners Geotechnics / Environment / Groundwater	**Photographs - Main Shaft** Shaft Condition Assessment Reids Ridge Abandoned Mine Site, WA	Project No.:	224768.0
		Photo Plate No.:	10
		Revision:	0
	CLIENT: DEMIRS	Date:	Aug-24

Photograph 11: Rose Marie Shaft 1 m depth

Douglas Partners Geotechnics / Environment / Groundwater	**Photographs - Rose Marie Shaft** Shaft Condition Assessment Reids Ridge Abandoned Mine Site, WA	Project No.:	224768.0
		Photo Plate No.:	11
		Revision:	0
	CLIENT: DEMIRS	Date:	Aug-24



Photograph 12: Rose Marie Shaft 5 m depth

Douglas Partners Geotechnics / Environment / Groundwater	**Photographs - Rose Marie Shaft** Shaft Condition Assessment Reids Ridge Abandoned Mine Site, WA	Project No.:	224768.0
		Photo Plate No.:	12
		Revision:	0
	CLIENT: DEMIRS	Date:	Aug-24

Photograph 13: Rose Marie Shaft 10 m depth

Douglas Partners Geotechnics / Environment / Groundwater	**Photographs - Rose Marie Shaft** Shaft Condition Assessment Reids Ridge Abandoned Mine Site, WA	Project No.:	224768.0
		Photo Plate No.:	13
		Revision:	0
	CLIENT: DEMIRS	Date:	Aug-24

Photograph 14: Rose Marie Shaft 15 m depth

Douglas Partners Geotechnics / Environment / Groundwater	**Photographs - Rose Marie Shaft** Shaft Condition Assessment Reids Ridge Abandoned Mine Site, WA	Project No.:	224768.0
		Photo Plate No.:	14
		Revision:	0
	CLIENT: DEMIRS	Date:	Aug-24

Photograph 15: Rose Marie Shaft 20 m depth

Douglas Partners Geotechnics / Environment / Groundwater	**Photographs - Rose Marie Shaft** Shaft Condition Assessment Reids Ridge Abandoned Mine Site, WA	Project No.:	224768.0
		Photo Plate No.:	15
		Revision:	0
	CLIENT: DEMIRS	Date:	Aug-24

Photograph 16:Northern face of Northern Stope

Photograph 17: Feature Lateral working from Northern Face of Northern Stope

Douglas Partners Geotechnics / Environment / Groundwater	**Photographs - Northern Stope**	Project No.:	224768.0
	Shaft Condition Assessment	Photo Plate No.:	16
	Reids Ridge Abandoned Mine Site, WA	Revision:	0
	CLIENT: DEMIRS	Date:	Aug-24

Photograph 18: Main Shaft Collar

Photograph 19: Main Shaft Collar

Douglas Partners Geotechnics / Environment / Groundwater	**Photographs - Main Shaft at Surface** Shaft Condition Assessment Reids Ridge Abandoned Mine Site, WA	Project No.: Photo Plate No.: Revision:	224768.0 17 0
	CLIENT: DEMIRS	Date:	Aug-24

Photograph 20: Trench across southern stope in progress

Photograph 21: Trench exposing natural ground either edge of subsidence envelope

Douglas Partners Geotechnics / Environment / Groundwater	**Photographs - Southern Stope** Shaft Condition Assessment Reids Ridge Abandoned Mine Site, WA	Project No.: Photo Plate No.: Revision:	224768.0 18 0
	CLIENT: DEMIRS	Date:	Aug-24

Photograph 22: Rose Marie Shaft during investigaiton

Photograph 23: Rose Marie Shaft Post Investigation - facing northwest

Douglas Partners Geotechnics / Environment / Groundwater	**Photographs - Rose Marie Shaft** Shaft Condition Assessment Reids Ridge Abandoned Mine Site, WA	Project No.: Photo Plate No.: Revision:	224768.0 19 0
	CLIENT: DEMIRS	Date:	Aug-24

Appendix D

GBG Group Geophysical Survey Results

GBGGROUP

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REPORT

Geophysical Subsurface Investigation for Abandoned Mine Features

Reids Ridge, WA

Date: 28 May 2024

Project Number: 3105

PROJECT DETAILS

Project Number	3105
Document Title	Geophysical Subsurface Investigation for Abandoned Mine Features
Site Address	Reids Ridge, Western Australia
Client	Damian Jagoe-Banks Associate Geotechnical Engineer Douglas Partners

COMPANY DETAILS

Registered Name	GB Geotechnics (Australia) Pty Ltd
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DOCUMENT HISTORY

Revision	Prepared by	Reviewed by	Date issued
0	Andrew Spyrou	-	28 May 2024

TABLE OF CONTENTS

1 INTRODUCTION

At the request of Douglas Partners, GBG Group carried out a geophysical investigation as part of the Geotechnical Engineering Services for the Reids Ridge abandoned mine site within the Karara Rangeland Park, Shire of Yalgoo Western Australia.

During the investigation, Ground Penetrating Radar (GPR) and Electrical Resistivity Tomography (ERT) datasets were acquired as a series of transects at accessible locations and extending around the perimeter of recorded abandoned surface mine features. The acquired GPR data was processed to obtain high resolution subsurface reflection imagery to a maximum target depth of 10m Below Ground Level (BGL). The acquired ERT data was processed to obtain subsurface electrical resistivity models to a maximum target depth of 15mBGL. The processed data was subsequently analysed for the detection and mapping of potential underground mine workings emanating from the identified surface mine features.

The results of the geophysical investigation forms part of a broader scope geotechnical study commissioned by the Department of Mines, Industry Regulation and Safety for the Abandoned Mines Program. The aim of the study is to support the assessment and rehabilitation of the shafts, mine subsidence and subsidence risk zones within the abandoned mine site.

2 INVESTIGATION SITE

The geophysical investigation was carried out 3 sites located from south to north Reids Ridge, Commodore and Reids North. An overview map of the sites with associated MINEDEX mine and mineral deposits is presented in Figure 3.

At each site, surface mine shafts have been identified including the main Reids Ridge Mine shaft, Rose Marie shaft and 3 smaller shafts at Reids Ridge, 13 shafts at Commodore, and 5 shafts at Reids North. The identified shafts are shown in drawings 3105-01 to 3105-03 and classified according to estimated depth either less than 1m depth (yellow), 1 to 5m depth (orange), or greater than 5m depth (red).

Surface conditions at the sites were suitable for geophysical data acquisition and included sparse to moderate vegetation with low trees and open areas with remnant mining infrastructure. Photographs showing the typical site conditions are presented in Figures 1 and 2.

Figure 1: Ground surface conditions at Reids Ridge.

Figure 2: Ground surface conditions at Commodore.

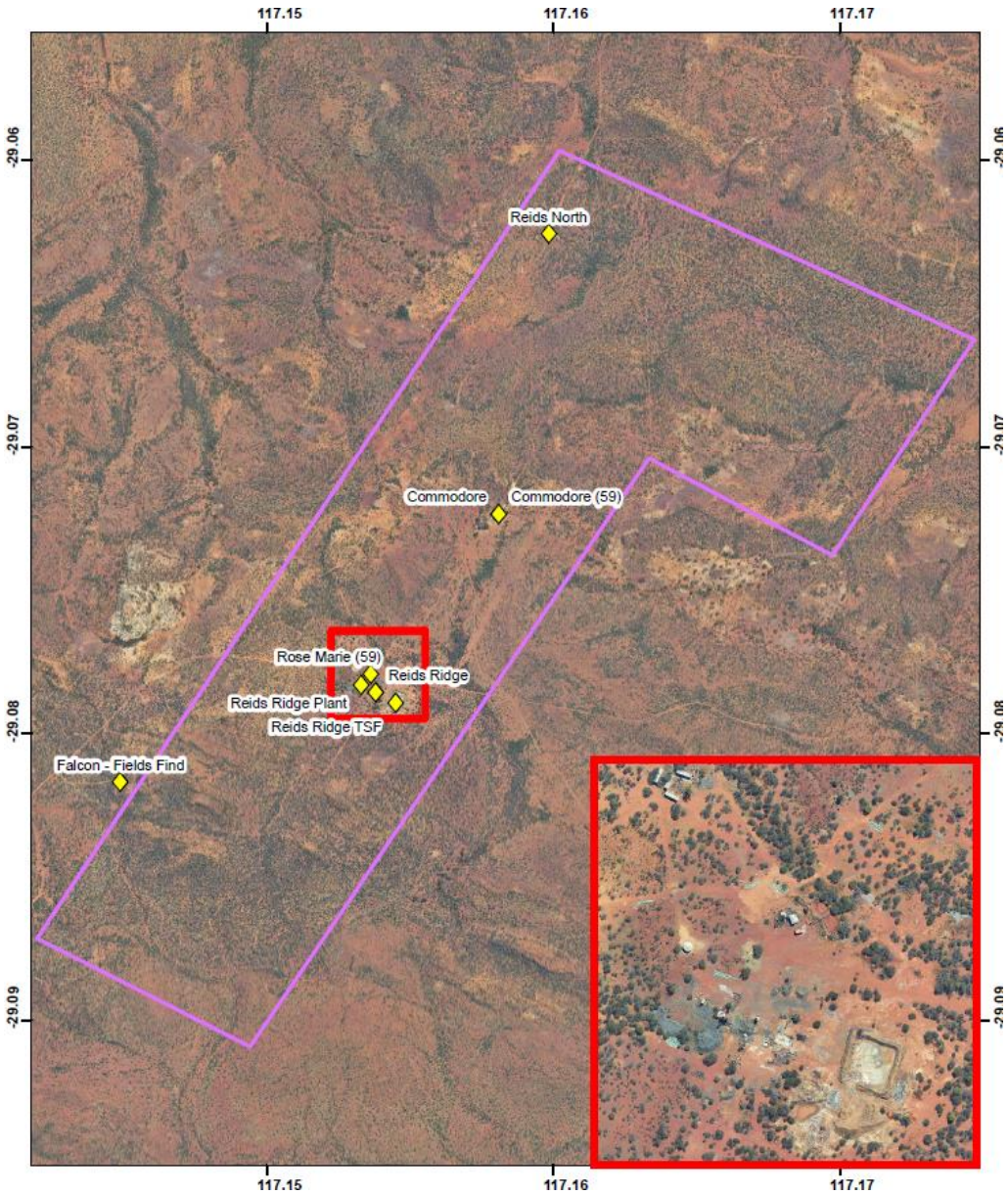


Figure 3: Site map of Reids Ridge, Commodore and Reids North. Drawing from DMIRS, 22 Feb 2023.

3 GEOPHYSICAL DATA ACQUISITION & PROCESSING

3.1 SITE WORK LOGISTICS

The geophysical investigation site work was carried out over 4 days from the 15 to 18 April 2024 by a two-person team from GBG Group including a qualified geophysicist and field assistant.

A total of 186 GPR transects were acquired using multiple antenna frequencies along accessible areas around the identified surface mine shafts. The GPR dataset was analysed in order to detect potential shallow lateral mine workings emanating from the shafts. The extents of the acquired GPR transects are shown as dark blue lines for the 300MHz antenna and light blue lines for the 80MHz antenna in drawings 3105-01, -02 and -03.

A total of 7 ERT transects were acquired parallel and offset to the interpreted strike of the geological feature in which the surface shafts were founded. The ERT dataset was analysed in order to assess the overall shallow geology at the sites and potential areas of ground disturbance. The extents of the acquired ERT transects are shown as green lines in drawings 3105-01, -02 and -03.

3.2 GROUND PENETRATING RADAR

GPR data was acquired using 2 systems including a GSSI Instruments DF with a 300MHz ground coupled antenna, and a MALA Ground Explorer GX HDR with an 80MHz ground coupled antenna. Data acquisition involved moving the GPR systems along the ground surface over accessible areas of the sites with both the 300MHz and 80MHz antennas used at Reids Ridge, and the 80MHz antenna used at Commodore and Reids North. Acquisition parameters for both GPR systems are provided in Table 1.

The acquired GPR data was processed and analysed using ReflexW (Sandmeier Software, 2022). Data processing steps included surface correction, manual gain function, 1D bandpass filtering, and 2D background removal and running average filtering.

The subsurface responses were identified in the processed radar-grams and compared across the entire dataset. Identified responses interpreted to be related to shallow subsurface features such as potential mine workings and previously excavated material were digitised and exported with their corresponding easting and northing coordinates. Example radar-grams from this investigation are shown in Figures 4 to 7.

Table 1: GPR Acquisition Parameters

Parameter	GSSI	MALA
Antenna centre frequency	300MHz	80MHz
Two-way travel time	100ns	300ns
Uncalibrated imaging depth	6m	18m
Scans per metre	100	50
Sample number	512	542
Sample rate	32 bit	32 bit

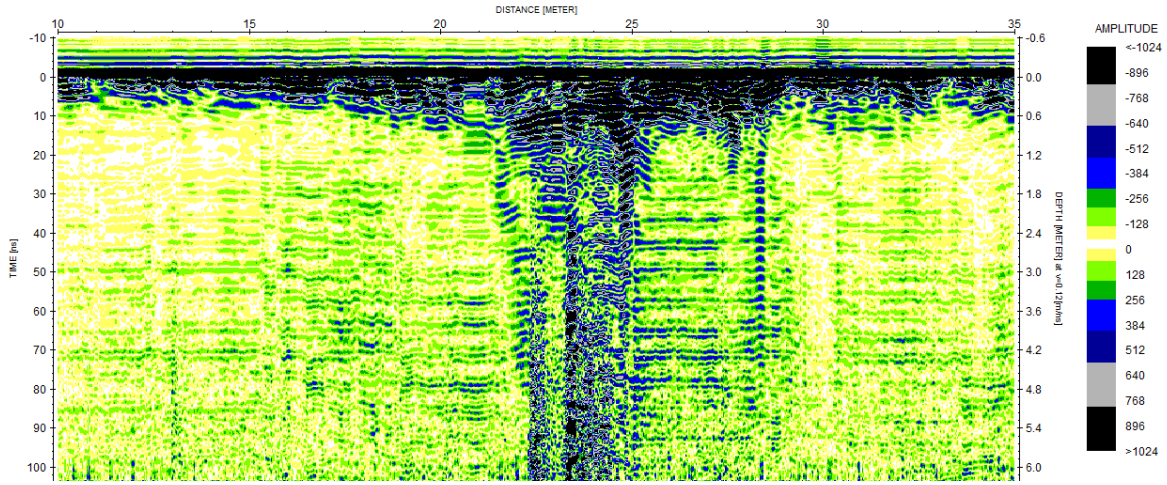


Figure 4: GPR radar-gram (300MHz antenna) with identified near surface anomaly at x=22-26m interpreted as excavated and infilled ground.

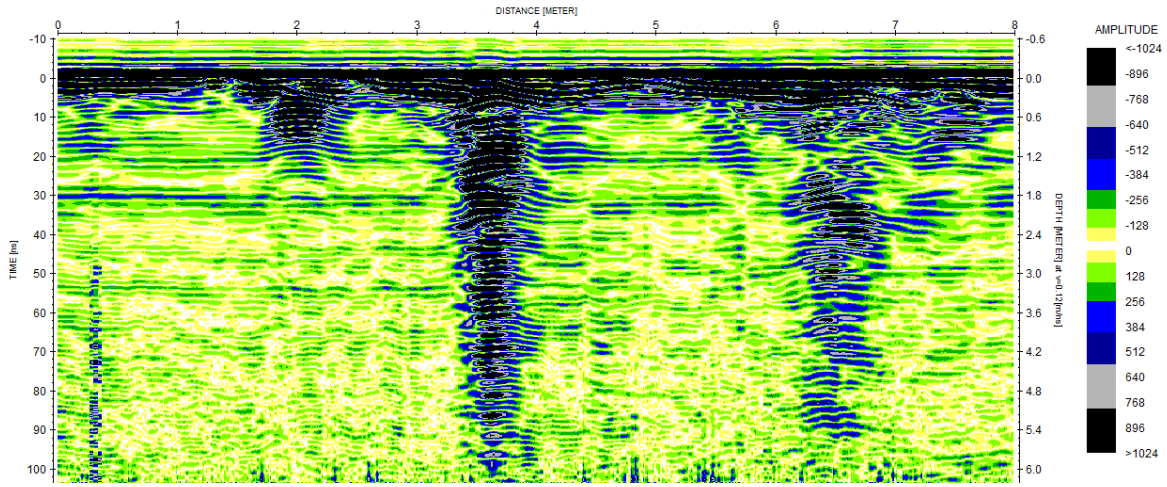


Figure 5: GPR radar-gram (300MHz antenna) with identified near surface anomalies at x=2m, x=3.5m and x=6.5m interpreted as shallow buried metal and pipes.

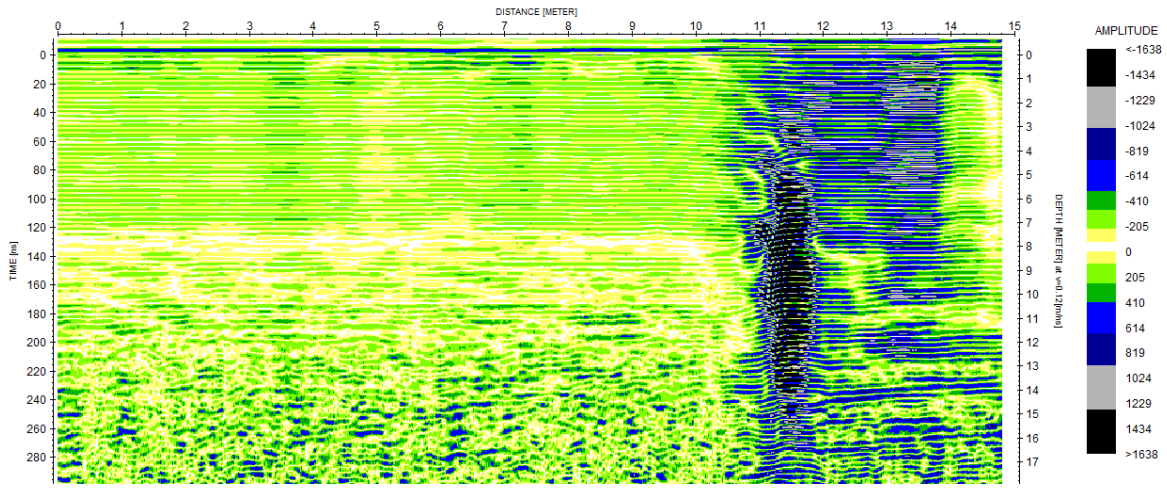


Figure 6: GPR radar-gram (80MHz antenna) with identified near surface anomaly at x=11m interpreted as a potential mine working.

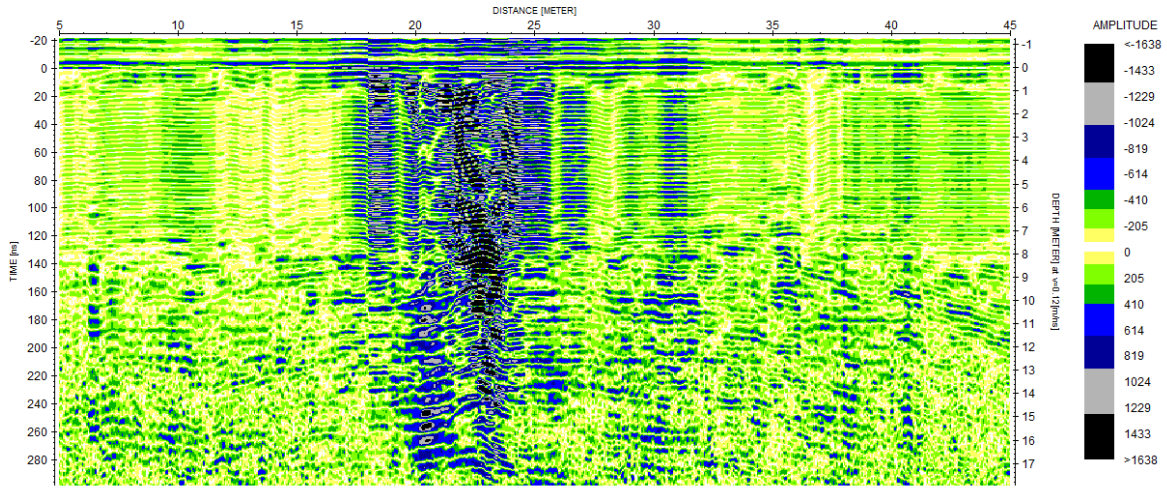


Figure 7: GPR radar-gram (80MHz antenna) with identified near surface anomaly at x=22m interpreted as a potential mine working.

3.3 ELECTRICAL RESISTIVITY TOMOGRAPHY

ERT data was acquired using a Syscal KID (IRIS Instruments) resistivity receiver. Data acquisition involved hammering 24 electrodes into the ground along the transects at 5m increments for a total maximum array length of 115m and connecting these to the control unit situated at the centre of the array via multicore cables. Resistivity measurements were made using a Dipole-Dipole array type providing both high vertical resolution and sensitivity to lateral variations. Acquisition parameters for ERT are provided in Table 2.

The ERT data was processed using EarthImager 2D (AGI Software). The inverted resistivity models were gridded with Surfer (Golden Software) to produce contoured cross-sections showing the variation in electrical resistivity of the subsurface material in Ohm metres (plotted as log base 10) laterally along each of the transects and with elevation.

Table 2: ERT Acquisition Parameters

Parameter	Value
Max no. electrodes	24
Electrode spacing	5 m
Max array length	115 m
Array type	Dipole-Dipole
Injection on/off time	500 ms
Injection voltage	200 mV
Number of stacks	5
Quality factor	2%
Roll-along (number of electrodes)	12
Quadripoles (full spread / roll-along)	153 / 108

3.4 SPATIAL POSITIONING

Spatial positioning of the acquired geophysical transects was achieved using a Reach 2 (Emlid) GNSS receiver with an expected accuracy of +/-0.5m for both vertical and horizontal components. Note a reduction in accuracy is expected in areas where dense tree cover was present.

Coordinates have been provided in GDA2020, MGA zone 50 for horizontal component and Australian Height Datum (mAHD) for vertical component.

4 RESULTS AND INTERPRETATION

The results of the geophysical investigation carried out at Reids Ridge, Commodore and Reids North are presented in Appendix A of this report as follows:

- **3105-01** – Reids Ridge investigation site map
- **3105-02** – Commodore investigation site map
- **3105-03** – Reids North investigation site map
- **3105-04** – Electrical resistivity sections

4.1 GROUND PENETRATING RADAR

Analysis of the processed GPR dataset has identified shallow subsurface anomalies within the Reids Ridge site, details of which are provided in Table 3. No such anomalies were detected at Commodore or Reids North sites. The lateral extent of the identified features are shown in drawing 3105-01.

Table 3: Reids Ridge GPR Anomaly Details

Feature ID	Easting (GDA2020)	Northing (GDA2020)	Depth (m)	Description
RR-01	514918.1	6783313.4	2	Region of fill material related to nearby excavation
RR-02	514917.2	6783323.4	4	Linear feature potentially from Reids Ridge Main shaft
RR-03	514918.3	6783335.4	5	Linear feature potentially from Reids Ridge Main shaft
RR-04	514924.1	6783345.1	1	Linear feature potentially from Reids Ridge Main shaft
RR-05	514954.2	6783365.0	1	Small feature potentially related to Rose Marie shaft
RR-06	514953.4	6783370.0	7	Small feature potentially related to Rose Marie shaft
RR-07	514949.9	6783371.9	6	Small feature potentially related to Rose Marie shaft
RR-08	514937.8	6783319.0	7	Region of fill material related to Reids Ridge Main shaft and adjacent processing site
RR-09	514941.3	6783328.3	1	Small feature potentially related to Reids Ridge Main shaft
RR-10	514942.1	6783334.3	1	Small feature potentially related to Reids Ridge Main shaft
RR-11	514972.6	6783365.4	2	Small feature unrelated to mine workings
RR-12	514991.0	6783374.4	7	Small feature unrelated to mine workings

4.2 ELECTRICAL RESISTIVITY TOMOGRAPHY

The sections presented for each ERT transect show the variation in modelled electrical resistivity of the subsurface material in Ohm metres (Ω.m). Dominant factors affecting the bulk electric resistivity of soil or rock are:

- Porosity and permeability including the presence of voids and cavities
- Degree of saturation – the fraction of pore space/fractures filled with fluid
- Fluid type, including salt content – the composition of the fluid filling the pore spaces/fractures
- Presence of clays with moderate to high cation exchange capacity (CEC)

For this type of investigation, high resistivity responses (typically greater than 1500 Ω.m [>3.2 Log10 Ω.m]) over background would be considered as potential open and air-filled subsurface mine workings, noting that resistivity may reduce slightly if the mine working has been partially or entirely collapsed and infilled with local material. The above assumes that the subsurface material sits above the local water table, and as such where present mine workings will have little to no water content.

The presence of groundwater within voided or loose ground will alter the interpretation with water-filled mine workings either open or, partially or entirely collapsed tending to have a low resistivity (high conductivity) response over background.

Analysis of the electrical resistivity sections indicates that no highly resistive anomalous features are present beneath the ERT transects. A low resistivity (conductive) feature was observed on Transect 4 which is likely to be related to an edge effect from the Rose Marie Shaft.

5 PROJECT SUMMARY

A geophysical subsurface investigation has been carried out as part the Geotechnical Engineering Services for Abandoned Mine Features at Reids Ridge, Commodore and Reids North, Western Australia. During the investigation, GPR and ERT datasets were acquired as a series of transects extending around the perimeter of recorded abandoned surface mine features.

The acquired GPR dataset was processed and analysed for features relating to shallow mine workings with a number of features being identified and relating to near surface previously worked ground at the Reids Ridge site, with no such features being identified at the Commodore or Reids North sites.

The acquired ERT dataset was inverted to model the electrical resistivity distribution of the subsurface material along the transects. The electrical resistivity sections were analysed for high resistivity responses over background which would indicate the presence of potential open mine workings of which none were identified at all sites.

The methods used during the investigation are geophysical and as such the results are based on indirect measurements and the processing and interpretation of electrical wave signals. At the time of the investigation, calibration of the geophysical results with intrusive geotechnical testing has not been carried out. The findings in this report represent the professional opinions of the authors, based on experience gained during previous similar investigations.

We trust that this report and the attached drawings provide you with the information required. If you require clarification on any points arising from this geophysical investigation, please do not hesitate to contact the undersigned on 08 9354 6300.

For and on behalf of
GBG GEOTECHNICS (AUSTRALIA)

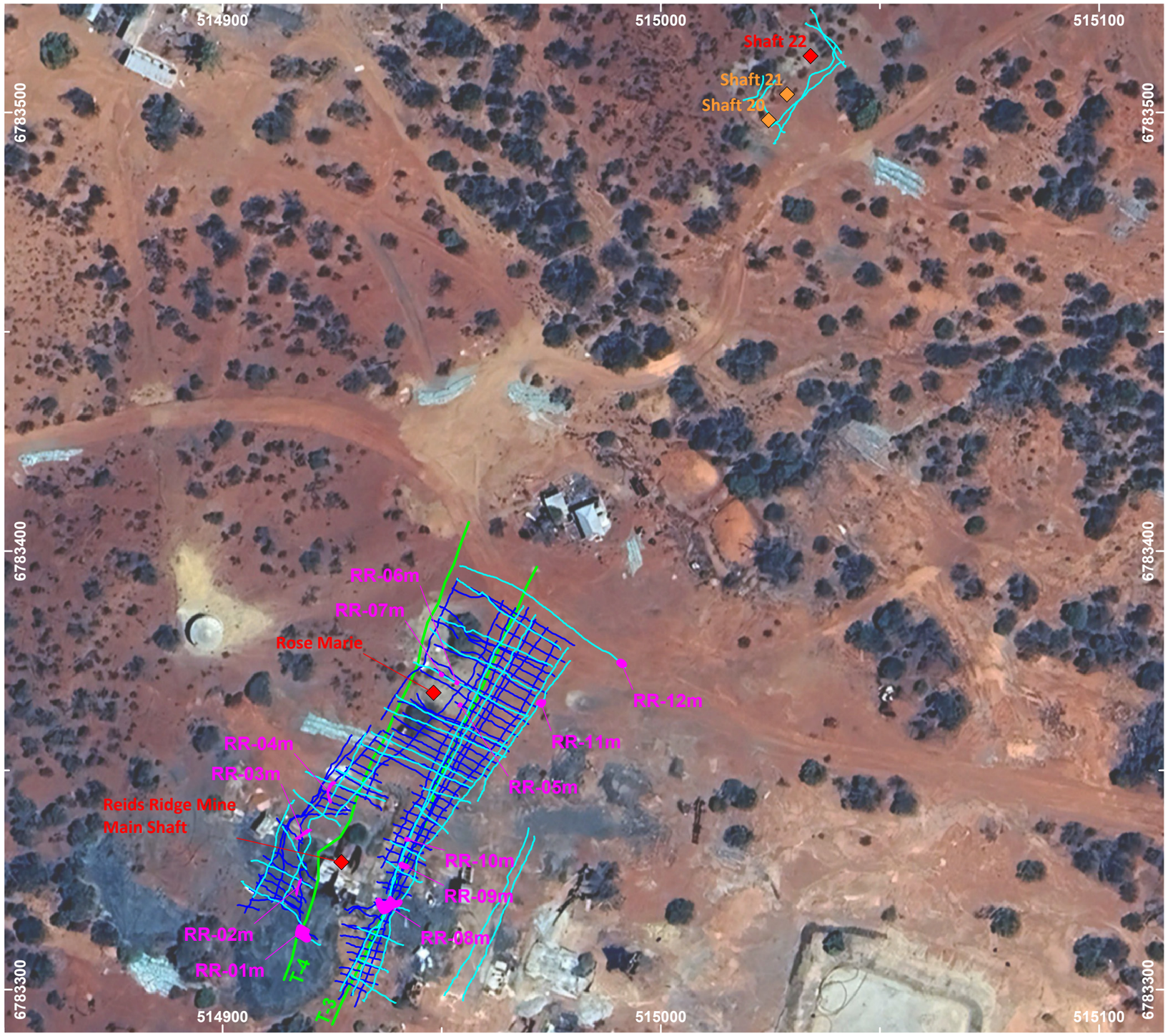
ANDREW SPYROU
Operations Manager, Western Australia / Senior Geophysicist

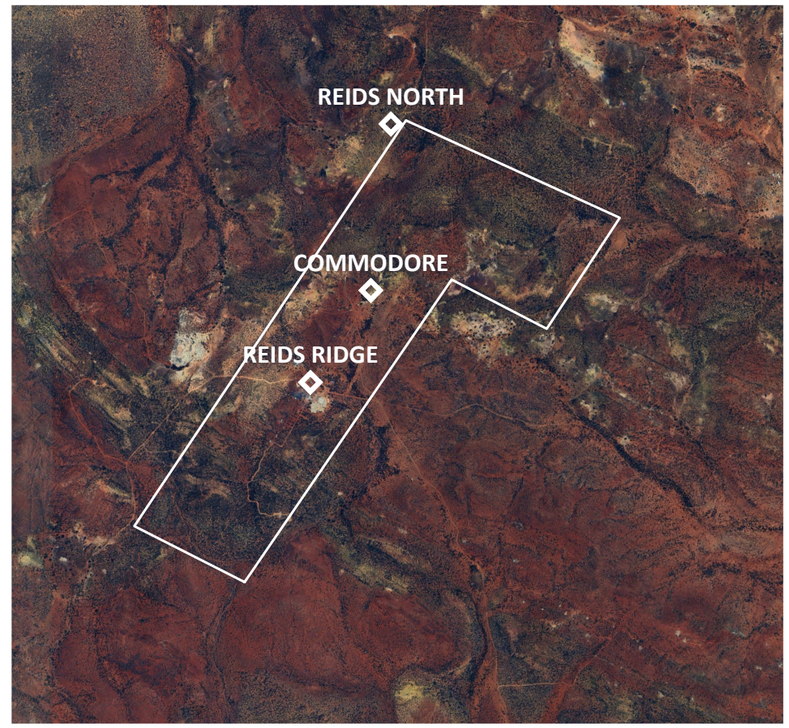
APPENDIX A – INVESTIGATION RESULTS

GBGGROUP

GEOPHYSICAL INVESTIGATION FOR ABANDONED MINE FEATURES, SHIRE OF YALGOO WESTERN AUSTRALIA.

REIDS RIDGE INVESTIGATION SITE MAP





Legend

Abandoned surface mine feature

- Shallow shaft (up to 1m below surface)
- Moderate depth shaft (1m to 5m below surface)
- Deep shaft (greater than 1m below surface)

Geophysical Testing

- 300MHz Ground Penetrating Radar (GPR) transect
- 80MHz Ground Penetrating Radar (GPR) transect
- Electrical Resistivity Tomography (ERT) transect
- Identified subsurface feature (potential mine working)
- RR-01 Feature ID (refer to report for details)

NOTES

Drawing to be used in conjunction with Report 3105.
Map Projection GDA2020 MGA Zone 50.
Aerial image from Google Earth Pro.

0 10 20 30 40 50
Distance (metres)

N

CLIENT	DOUGLAS PARTNERS	Date	5 March 2024	Paper Size	A3
	GEOPHYSICAL INVESTIGATION FOR ABANDONED MINE FEATURES SHIRE OF YALGOO WESTERN AUSTRALIA	Scale	1:1000	Drawn	AHWS
		Drawing	3105-01	Revision	0

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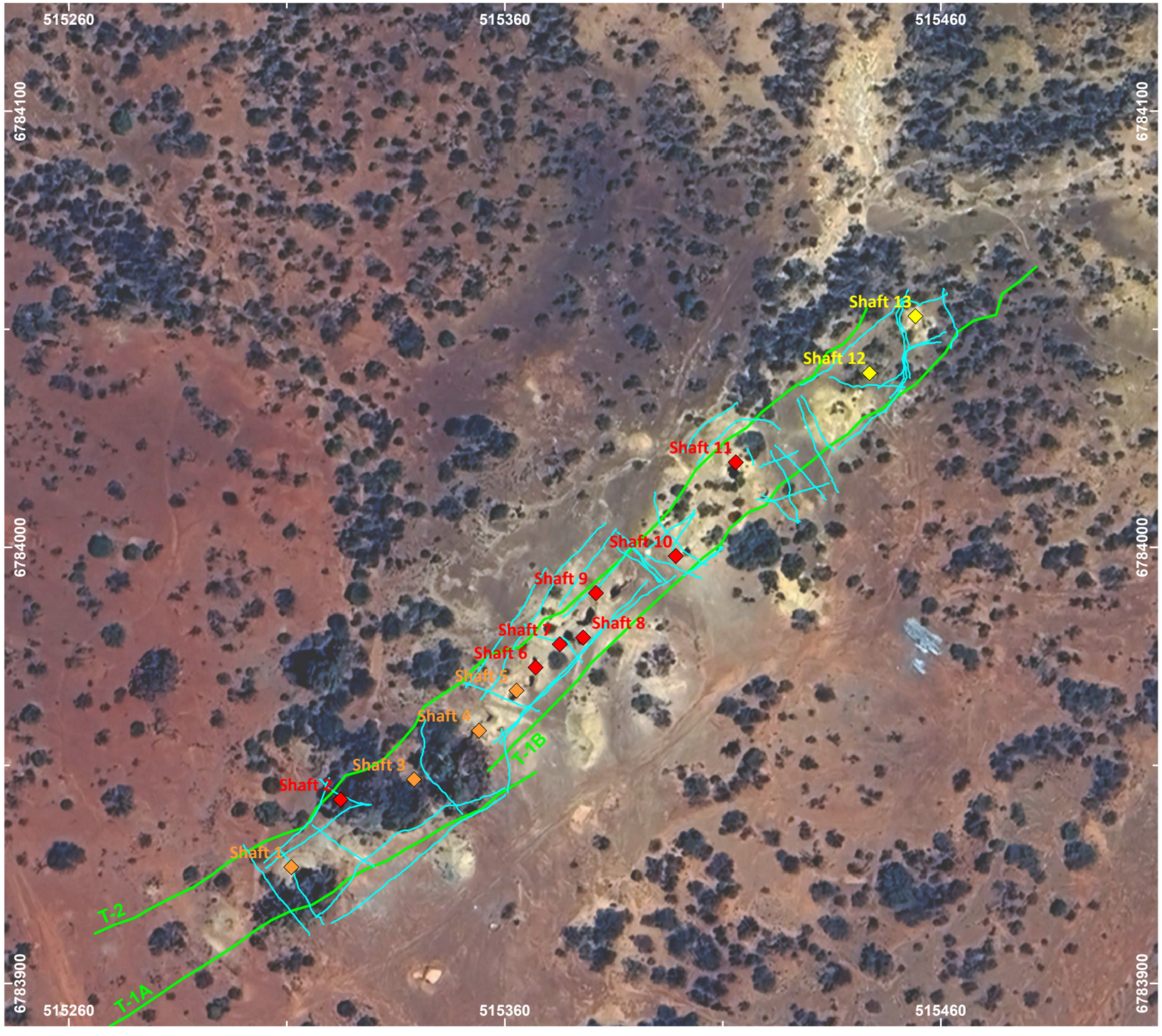
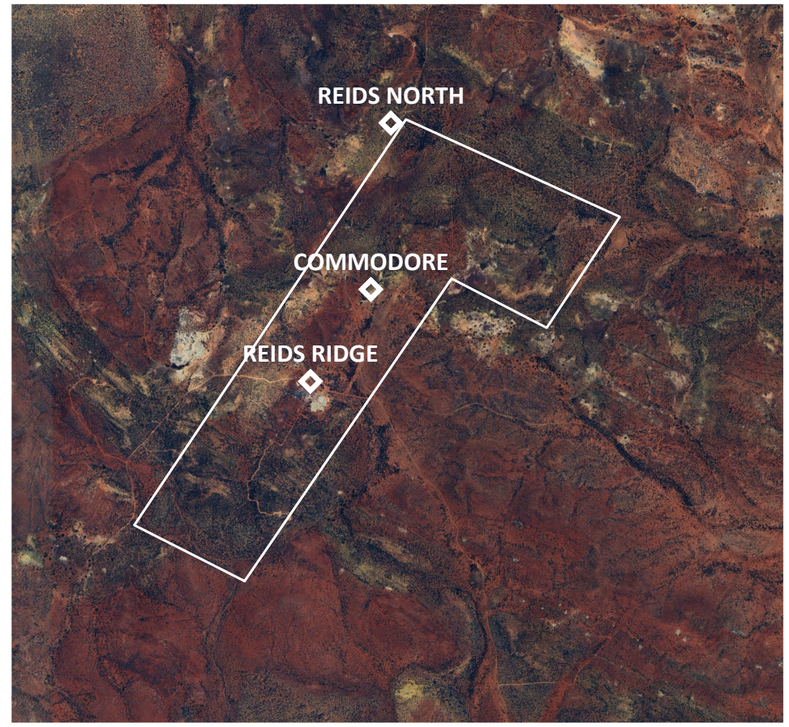
GBGGROUP

GEOPHYSICAL INVESTIGATION FOR ABANDONED MINE FEATURES, SHIRE OF YALGOO WESTERN AUSTRALIA.

COMMODORE INVESTIGATION SITE MAP





Legend

Abandoned surface mine feature

- Shallow shaft (up to 1m below surface)
- Moderate depth shaft (1m to 5m below surface)
- Deep shaft (greater than 1m below surface)

Geophysical Testing

- 300MHz Ground Penetrating Radar (GPR) transect
- 80MHz Ground Penetrating Radar (GPR) transect
- Electrical Resistivity Tomography (ERT) transect
- Identified subsurface feature (potential mine working)
- 3m — Depth to top of feature

NOTES

Drawing to be used in conjunction with Report 3105.
Map Projection GDA2020 MGA Zone 50.
Aerial image from Google Earth Pro.

0 10 20 30 40 50
Distance (metres)

N

CLIENT	DOUGLAS PARTNERS	Date	5 March 2024	Paper Size	A3
	GEOPHYSICAL INVESTIGATION FOR ABANDONED MINE FEATURES SHIRE OF YALGOO WESTERN AUSTRALIA	Scale	1:1000	Drawn	AHWS
		Drawing	3105-02	Revision	0

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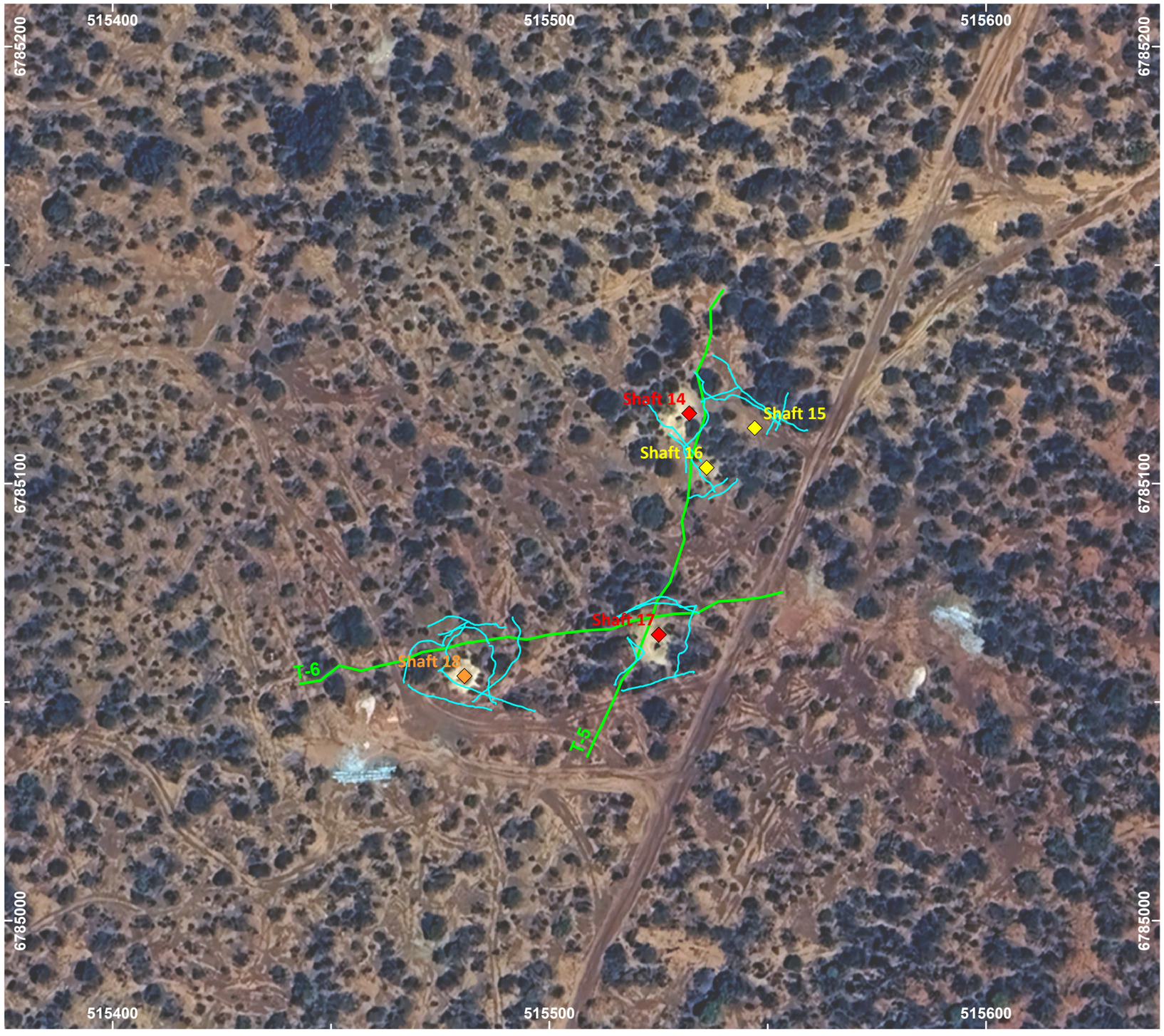
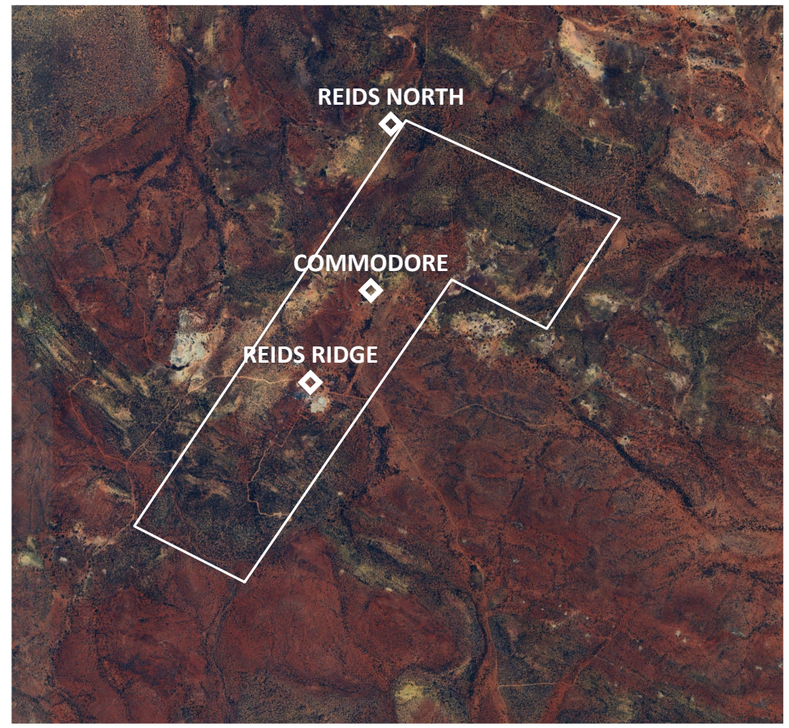
GEOPHYSICAL INVESTIGATION FOR ABANDONED MINE FEATURES, SHIRE OF YALGOO WESTERN AUSTRALIA.

REIDS NORTH INVESTIGATION SITE MAP





Legend

Abandoned surface mine feature

- Shallow shaft (up to 1m below surface)
- Moderate depth shaft (1m to 5m below surface)
- Deep shaft (greater than 1m below surface)

Geophysical Testing

- 300MHz Ground Penetrating Radar (GPR) transect
- 80MHz Ground Penetrating Radar (GPR) transect
- Electrical Resistivity Tomography (ERT) transect
- Identified subsurface feature (potential mine working)
- 3m — Depth to top of feature

NOTES

Drawing to be used in conjunction with Report 3105.
Map Projection GDA2020 MGA Zone 50.
Aerial image from Google Earth Pro.

0 10 20 30 40 50
Distance (metres)

N

CLIENT	DOUGLAS PARTNERS	Date	5 March 2024	Paper Size	A3
	GEOPHYSICAL INVESTIGATION FOR ABANDONED MINE FEATURES SHIRE OF YALGOO WESTERN AUSTRALIA	Scale	1:1000	Drawn	AHWS
		Drawing	3105-03	Revision	0

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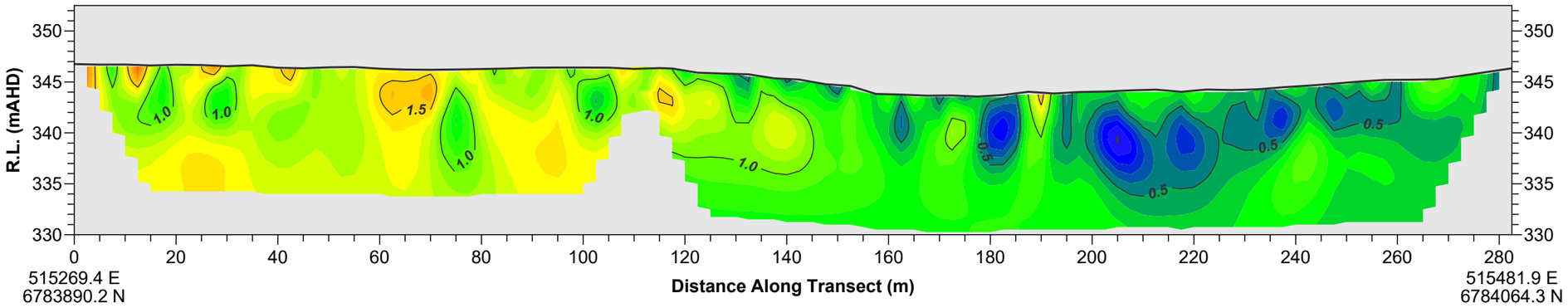
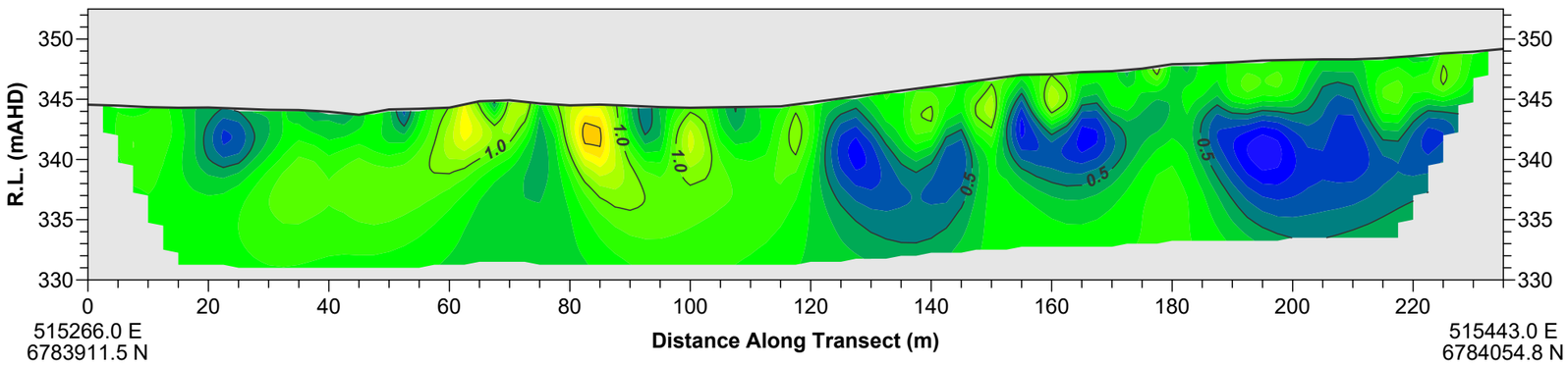
GEOPHYSICAL INVESTIGATION FOR ABANDONED MINE FEATURES, SHIRE OF YALGOO WESTERN AUSTRALIA.

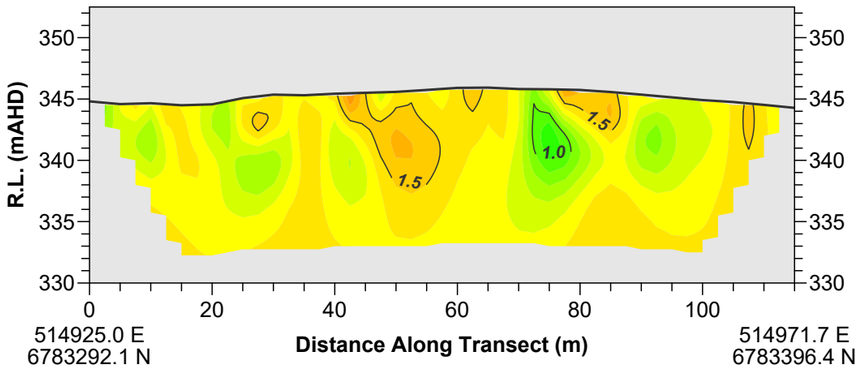
TRANSECT 1 - ELECTRICAL RESISTIVITY SECTION



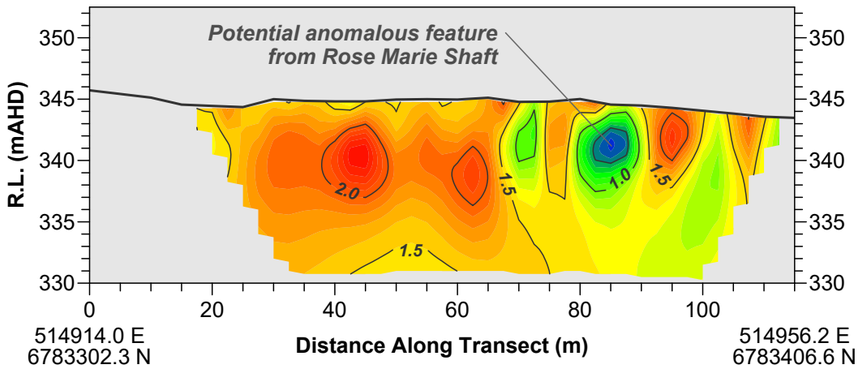
TRANSECT 2 - ELECTRICAL RESISTIVITY SECTION

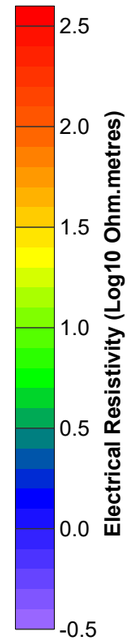


TRANSECT 3 - ELECTRICAL RESISTIVITY SECTION



TRANSECT 4 - ELECTRICAL RESISTIVITY SECTION





NOTES

Drawing to be used in conjunction with Report 3105.
Map Projection GDA2020 MGA Zone 50.
Aerial image from Google Earth Pro.

N

CLIENT	DOUGLAS PARTNERS	Date	22 May 2024	Paper Size	A3
	GEOPHYSICAL INVESTIGATION FOR ABANDONED MINE FEATURES SHIRE OF YALGOO WESTERN AUSTRALIA	Scale	1:1000(H), 1:500(V)	Drawn	AHWS
		Drawing	3105-04	Revision	0

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