

GNM Response to RFI

1	2.7 - Hydrogeology	Section 2.7 states that the groundwater levels on Subera vary around 35m below ground level. Information is not provided about the groundwater levels relating to the 'Scrub Lead' leases (ML70285 and ML70286). Detailed information on the occurrence of groundwater across Subera is not available, and the 'variation' in groundwater levels across the site is not detailed. There is no information provided about future mining depth or intersection with groundwater in the future.	a) Provide details of the groundwater occurrence for Subera and Scrub lead. b) Explain variation in GW levels for Subera, including potential reasons of the variation and water level monitoring data showing the variation. c) Clarify if the future maximum depth of economic mining during the expected mine life of 30 years, intercepts the projected ground water level and any considerations provided to impacts of groundwater level on rehabilitation.
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a) See attached report *JBT01-087-001-Fura Gems Groundwater Data Review.pdf*. The PRCP will be updated to reflect this report.

The Quaternary alluvium appears to be a productive aquifer. Groundwater within the alluvium is of relatively low EC, generally < 1,000 µg/L. The bedrock aquifers (Fork Lagoons beds, Devonian granite) tend to record higher EC groundwater, generally >5,000 µg/L and in some cases >10,000 µg/L. At the margins of the alluvium the EC of alluvial groundwater is closer to the EC of the bedrock aquifers, indicating that inflow from the bedrock aquifers to the alluvium occurs at the marginal contacts. Recharge to the alluvium is via direct rainfall recharge, or via downward seepage from the various ephemeral creeks when they are in flow. The groundwater flow direction honours topography, with flow generally from west to east.

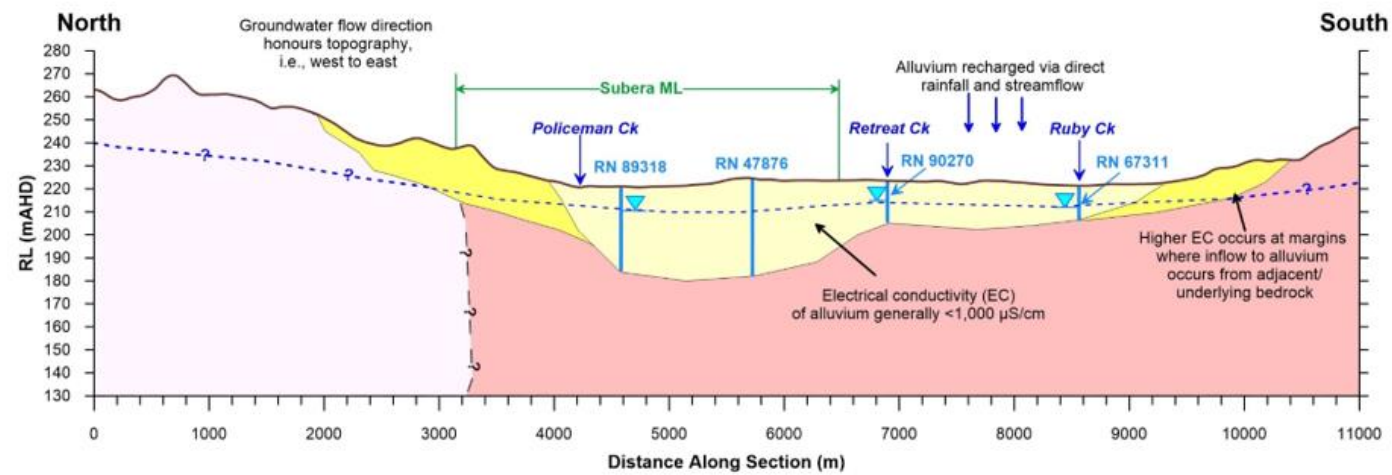


Figure 1: Conceptual Groundwater Model

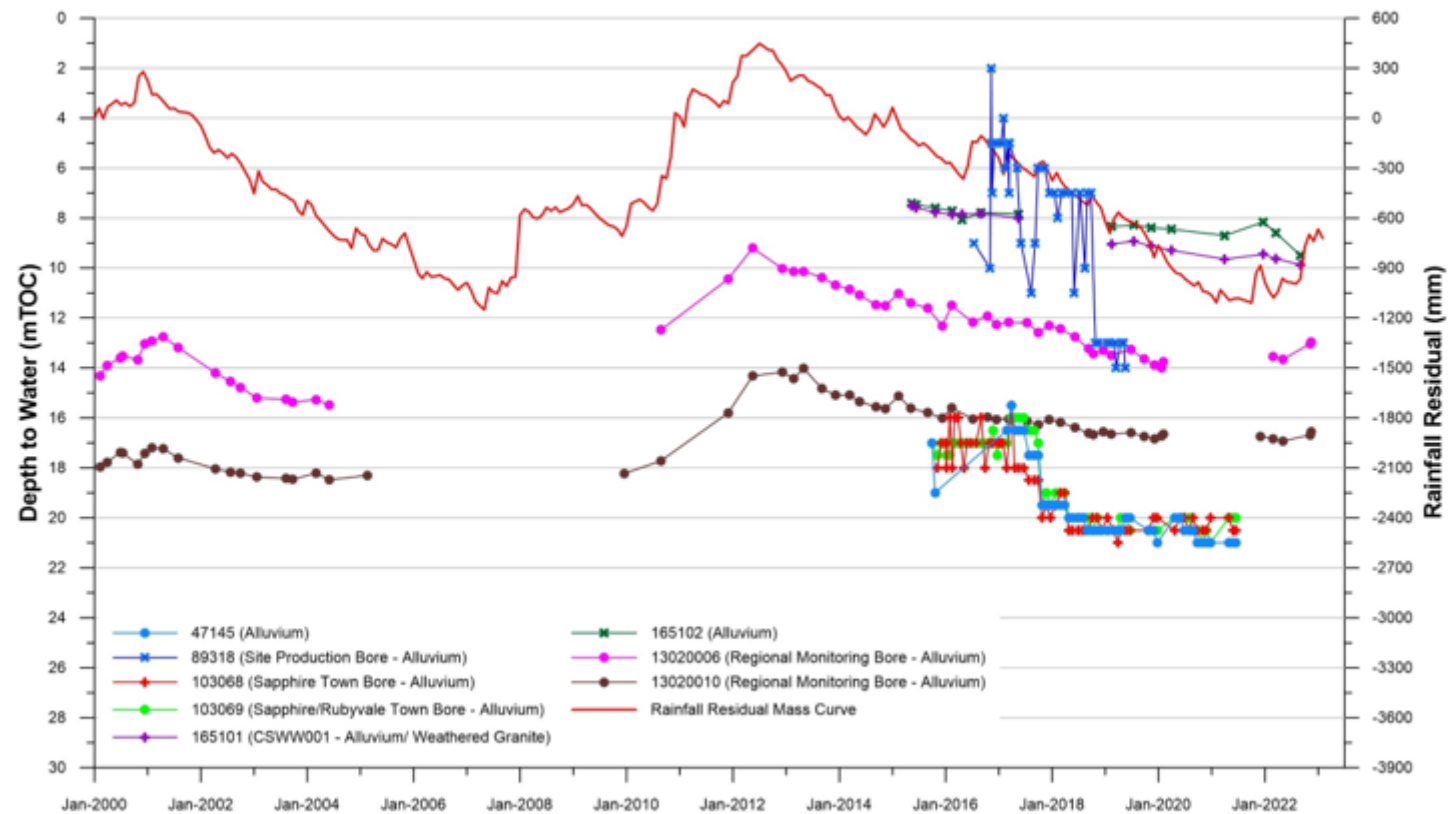


Figure 2: Bore Hydrographs

- b) No water level monitoring occurs.
- c) The current maximum depth of economic mining is 12 metres. The maximum depth of future mining is expected to remain around the current depth. Mining to date is not impacted by groundwater make. Mining has occurred from north to south and west to east on the “Subera” mining leases. Future mining will be interspersed within the current disturbance with no anticipated change in groundwater

make in mining pits which will all be backfilled to +/-2 m of the original ground level. Worked water collected in the pits can be attributed to rainfall.

2	2.10 – Land Stability	Section 2.10 in relation to the Subera leases states that GNM (Great Northern Mine) has no control over the background landholders management practices. This poses a potential risk to the achievement of rehabilitation timeframes and outcomes if the rehabilitated areas will be grazed prior to completion of rehabilitation under the PRCP schedule and/or surrender. Section 2.10 in relation to the Scrub lead leases describes that the leases are exposed to ongoing erosion, depressions holding water and an elevated overburden dump which is traversed by a power line.	a) For Subera • In relation to the risks raised at Subera, details should be provided in the risk assessment of the potential risk to establishing rehabilitation and achieving the PMLU milestones and criteria. • If land is proposed to be available to the landholder for grazing during rehabilitation, with no period of grazing exclusion while establishing a rehabilitated landform, provide further details on how these risks will be managed.
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			b) For Scrub Lead, provide: • A risk assessment demonstrating that the elevated overburden dump feature can meet stable condition and any works required to ensure the feature meets safe, stable, non-polluting criteria. • Information on slope stability, erosional stability and how the rehabilitation methodology ensures lease area is safe, stable non-polluting. • Provide information on ponding such as the estimated volumes of water captured, whether the ponding is ephemeral and whether rehabilitation of the features is planned.
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“Subera”

Fura Gems has no control over the landholders management practices other than the terms and conditions of the compensation agreement. The current agreements with the landholder are on a per hectare basis. The mining area has never been excluded from grazing for the last 24 years being the life of the current operation. All previously mined areas were progressively rehabilitated in the ongoing mining program since 2003. Two tranches of certified rehabilitation have been accepted during this time. To date mining and grazing have cohabitated the area successively. There is no reason to date that this will change but the risk remains. Wet tails in the process of being rehabilitated is fenced to exclude stock from the area as there is a risk of cattle becoming bogged.

Section 9 Risk Assessment has been revised with the inclusion adaptative management (see Table 1). Please note that monitoring is not a control but is included for completeness.

Table 1: Table 20 Rick Register PRCP

	Overview of Current Controls, Measures & Actions In Place	Maximum Probable Outcome (With Current Control Measures)		
Risk / Threat (Aspect)		CONSEQCE	LIKELIH'D	CURRENT RISK
Inadequate topsoil to rehabilitate discrete disturbance domain to depth equal to original topsoil depth	Topsoil Management Plan	4 Significant	2 Unlikely	Moderate
Water logging leads to subsidence of rehabilitated area making area unsafe	Maintenance & Monitoring Program e.g. backfill subsided areas if unsafe	4 Significant	2 Unlikely	Moderate
Settlement of tails is greater than planned making area unsafe	Maintenance & Monitoring Program - Redoze area to remove subsidence or cart in additional fill	3 Moderate	2 Unlikely	Moderate
Poor establishment of pasture preventing domain achieving criteria set out in RM6	Maintenance & Monitoring Program - Rip and seed area again	3 Moderate	2 Unlikely	Moderate

Overburden or topsoil changes across the project area preventing disturbance domains achieving RM6	Maintenance & Monitoring Program - Not occurred to date or expected in future; stockpiled topsoil will be inspected annually	3 Moderate	1 Rare	Low
External factors beyond the control of the Operator reduce the opportunity to achieve RM6 within the nominated PRCP schedule period e.g. climate change, critical pasture species not flourishing in area, property management changed resulting in a decline in property pasture productivity/ land condition.	Maintenance & Monitoring Program -internal review of annual monitoring program for any differences in soil types or management practices that highlight identified changes -reactive management of discussing observed alteration of pasture cover and condition with landholder - negotiation compensation for exclusion of select areas -Negotiation of amendment of completion criteria with background landholder and the Department	5 Major	3 Possible	High
Insufficient fill to create desired landform or cover wet tails in TSF	Oversize or dry tails carted from current Plant Area to negate volume deficit prior to reaching RM1	3 Moderate	1 Rare	Low
Rainfall accumulated in void slowing rehabilitation process.	Pump accumulated water to Plant Area for use	3 Moderate	1 Rare	Low
Wet weather prevents mining areas declared available in June being completed by December next year	Nominated timing gives the biggest window of dry weather in a yearly cycle; disturbed areas mining areas progress around polygon allowing progressive reshaping as part of the mining process	2 Minor	3 Possible	Moderate

Weather unfavourable limiting pasture development preventing domain reaching Rehabilitation Milestone 6 in nominated timeframe of 10 yrs	PRCP schedule nominates a period of 10 years between RM5 and RM7 to leave sufficient time for favourable weather conditions to progress pasture development. Annual monitoring will track progress and trigger maintenance as required	3 Moderate	3 Possible	Moderate
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Scrub Lead

See item 4 for an explanation on the Scrub Lead MLs disturbance and the disturbed area that Fura Gems is responsible to rehabilitate. Ponds and the elevated waste dump are outside the area mined by Fura Gems. The reshaped landform on the portion mined by Fura Gems is consistent with the surrounding landscape on the Scrub Lead.

3	2.13 Properties and Productivity	Details on the land capability framework used to assess the land capability of 'Subera' cattle grazing land is not provided.	Confirm which land capability framework/ methodology has been used to assess the 'Subera' property as Class V1.
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Reference - A Land Capability Classification for Agricultural Purposes by J Rosser, GL Swartz, NM Dawson and HS Briggs Division of Land Utilisation Technical Bulletin No 14 May 1974.

4	4.6 Existing rehab	Section 4.6 indicates that Great Northern Mining Pty Ltd has committed to rehabilitating all historical disturbance on the mining leases. The historical disturbance areas are shown in Figures 24 and 25. Figure 27 shows all current disturbance and rehabilitation at Great Northern Mine. The areas of ML70285 and ML70286 identified as rehabilitated to milestone RM5 in Figure 27 do not match the historical disturbance shown in Figures 24 and 25.	a) Clarify the total area of historical disturbance that was inherited with the grant of ML70285 and ML70286 and total area of completed rehabilitation of the historical disturbance. b) Provide an explanation of the different mapping of the areas.
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Fura Gems accepts that as EA holder the company is responsible for any disturbance created under the authority of the current tenure and/or pre-requisite tenure. On “Subera” the rehabilitation of the disturbance left by the previous owner of the tenure has been rehabilitated over time. The current lease holder is not responsible to historical disturbance i.e., disturbance that occurred prior to the grant of the current tenure.

Scrub Lead

ML 70285 and ML 70286 on the Scrub Lead were granted to Daryl Mosely on 30/10/2001 and subsequently transferred to GNM on 5/11/2009. Records of the area disturbed during the period of the tenure have been kept by Fura Gems and are shown in the following figures. This area has been ripped and seeded with Fura Gems responsible for progressing this ripped and seeded rehabilitation through to the status of certified rehabilitation. Fura Gems is not responsible for the historical disturbance existing at the time of lease grant. This approach is reflected in the ERC where there is no historical disturbance on the Scrub Lead leases recorded as disturbed area. Figures 1 to 4 display the disturbance on the mining leases at lease grant and the present. Figure 5 shows past and present leases.



Figure 3: ML 72085 prior to grant



Figure 4: ML 72085 2022



Figure 5: ML 72086 prior to grant



Figure 6: ML 72086 2022

The elevated overburden dump is outside the area mined by GMN Fura Gems. The current landform in the mined area of ML 70285 and ML 70286 has slopes of $< 5\%$. Erosion rills are present in the rocky subsoil present on these leases. A shrub layer has established on ML 70285 with ground cover species establishing under the shrub cover. A similar process is expected in ML 70286. The company expects to obtain a rehabilitation standard equating to analogue sites on adjacent areas of the Scrub Lead an area that continues to be disturbed by mining.

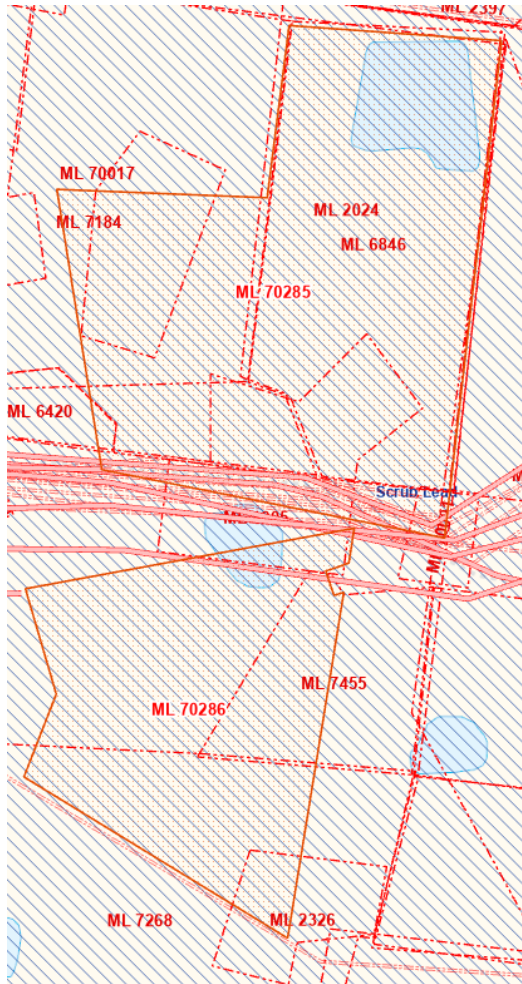


Figure 7: MLs over area over time

Subera

Historical disturbance on “Subera” is shown in Figure 8 to Figure 10. Leases on Subera in an area to the east that is not covered by current mining leases in Figure 8 and Figure 9 were owned by Eddy Vella. The disturbance of this mining extends into the current leases. Access to these mining areas can be observed to the west demonstrating that it was mined by others with a separate access. Figure 9 indicates that by 2002 the disturbance has been rehabilitated prior to relinquishment. Figure 10 is of a breached dam south of the industrial area. No records exist as to the timing of construction or the responsible party for the dam. Spatial data of the historical disturbance has been recorded from the 2001 mosaic in Qld Globe and from the current Google Earth image (see Figure 11).



Figure 8: Historical Disturbance 2001 - Others

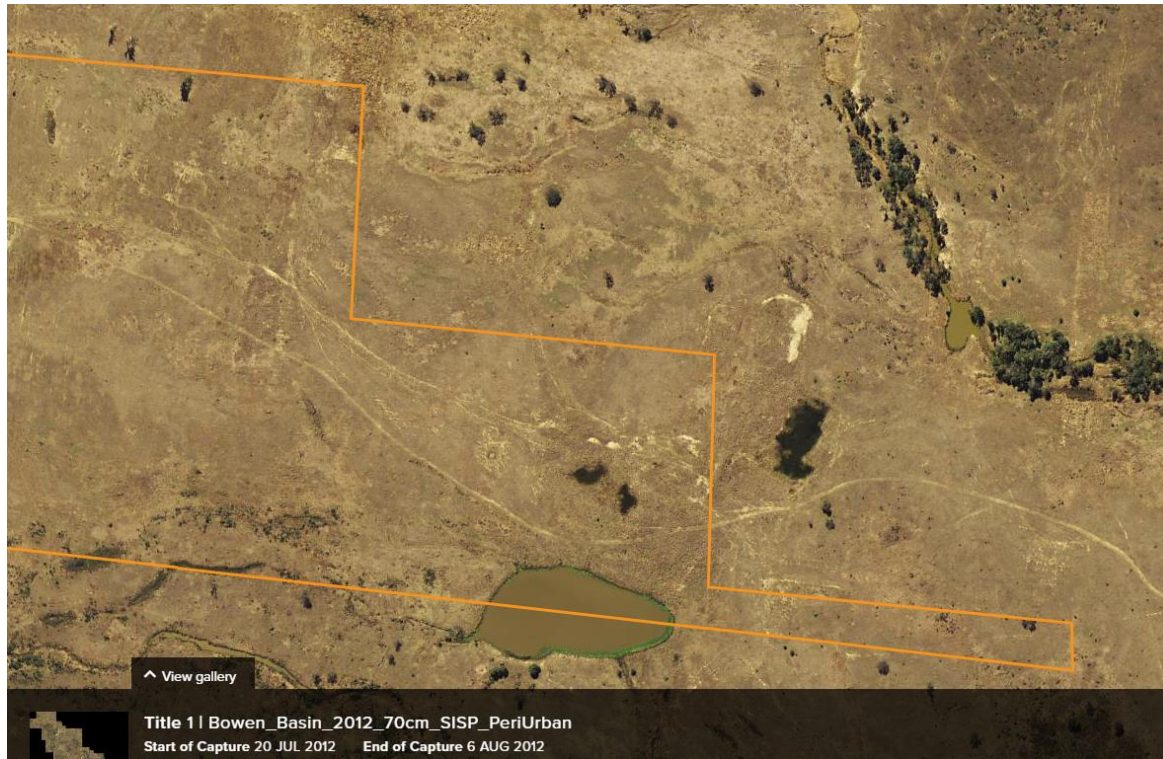


Figure 9: Historical Disturbance 2012- Others



Figure 10: Breached Dam – Others

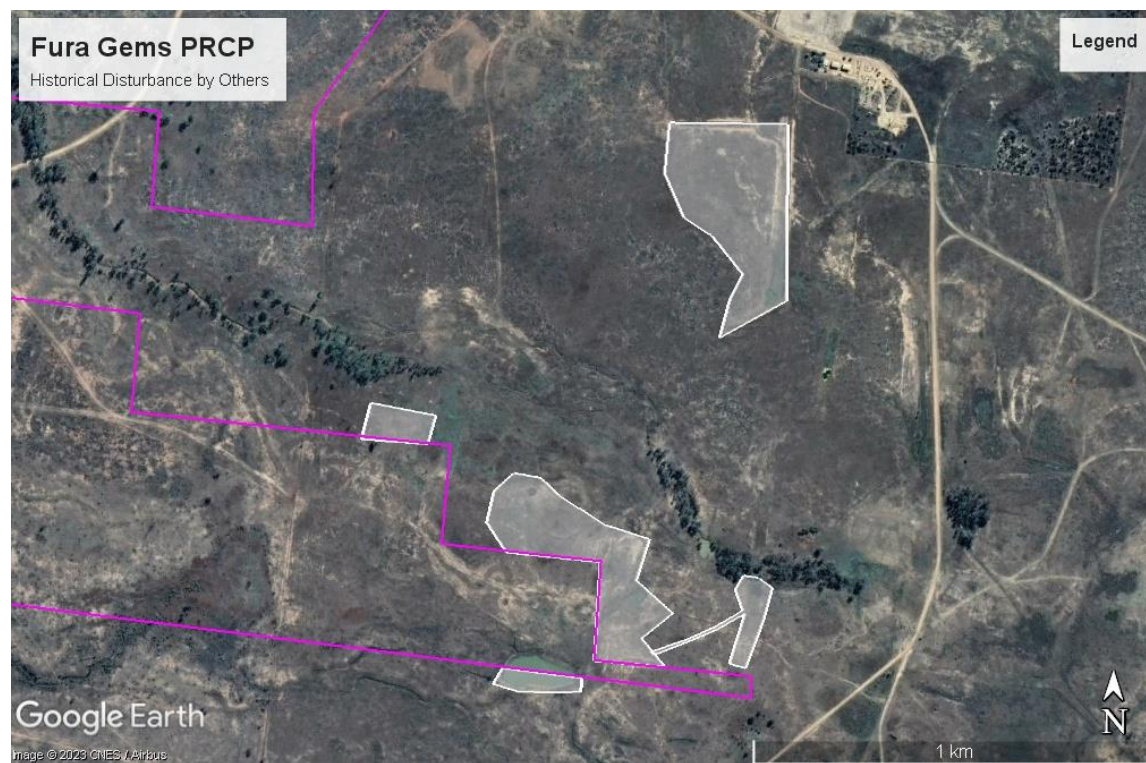


Figure 11: Historical Disturbance Spatial Data

5	4.9 Mining Sequence	Section 4.9 describes that previously certified rehabilitation has been re-disturbed in order to fully exhaust the resource. The areas that have been re-disturbed are not identified in Appendix A or excised from Tables 7, 8 and 9 which appear to be representative of the original	a) Provide information to identify the total areas of re-disturbed certified rehabilitation. This includes: - the total areas disturbed (in ha) - the mining domain in which the disturbance occurred - description of the disturbance - description of planned rehabilitation activities
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		certified areas. These areas can no longer be considered as certified rehabilitation.	b) The areas should also be separately identified in Tables 7, 8 and 9.
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The areas/disturbance type of each domain has been reported in the Annual Returns and is reflected in the ERC calculations. All categories including rehabilitation and certified rehabilitation are reported.

Status of Certified Rehabilitation

Rehabilitation certified in 2014 is listed in the following table along with the area listed in the application and the area submitted in the spatial data. There is a discrepancy between the application form area and the spatial data for Lois Land and South Pit.

Area	Area in Application (ha)	Area in Spatial Data
Eastern Creek	12.6	12.6
Lois Lane	7.9	6.4
ML7175	1.9	1.9
Nunan	2.4	2.4
Old Laneway	13.0	13.3
South Pit	7.9	7.4
Tryangle (1,2 & 3)	7.6	$6.4+0.21+1.0 = 7.6$

Rehabilitation certified in 2020 is listed in the following table along with the area listed in the application and the area submitted in the spatial data. There is a discrepancy between the application form area and the spatial data for Pointsetta and Rejects Hill.

Area	Area in Application (ha)	Area in Spatial Data
Laneway West	2.0	1.99
Nardoo South	2.0	2.1
North Pit East	3.1	3.0
Pointsetta	4.15	3.73
Rejects Hill	10.5	11.9

Impact of Mining on Certified Areas

The only certified rehabilitation that has been impacted by mining adjacent to the certified area Tryangle namely Tryangle 1 and 3. Areas of each were amended in the Annual Return as listed in the following table to reflect the reduction in the area. Tryangle 1 was impacted by the mining operation of the adjacent Tryangle West and Tryangle 3 by Tryangle East. Tryangle East is targeted as a future Plant area. Further exploration will be conducted in the proximity of the Plant Area to identify all potential mining areas in the close proximity of the Plant. This may result in further areas of Tryangle 3 being disturbed to completely exhaust the gem bearing wash in the immediate area. Tryangle East and Tryangle West will be rehabilitated according to the rehabilitation milestones described in the PRCP.

Date	1	2	3
2014	6.4	0.2	1.0
Jan 2019	6.4	0.2	1.0
Jan 2021	5.0 ¹	0.2	0.6 ²
Jan 2022	4.9 ³	0.2	0.5 ⁴
Jan 2023	4.9	0.2	0.5

¹ Impacted by Tryangle West disturbance

² Impacted by Tryangle East disturbance

³ Impacted by Tryangle West disturbance

⁴ Impacted by Tryangle East disturbance

Comparison of Disturbance for Certified Areas against historical imagery from Qld Globe.

Rejects Hill

The area nominated in the application for certification for Rejects Hill was prepared manually from GPS co-ordinates plotted on graph paper. Disturbance to the east and south of the nominated area can be observed in 2001 imagery (Figure 12).



Figure 12: Rejects Hill Rehabilitation

Old Laneway

The 2001 imagery shows disturbance to the east of the plotted disturbance which could be included in the Old Laneway rehabilitation (Figure 13). The area to the west is New Laneway.



Figure 13: Old Laneway over 2001 Imagery

Mine management are willing to review these discrepancies with the disturbance shown in historical images in Qld Globe with DES with a view to resolve the area differences between the Qld Globe disturbance, area stated in applications and the submitted spatial data.

Rehabilitated domains of Vella Pit, Nardoo, Just Looking, Promised Land 1, Lagoon and Just Looking have been disturbed by new mining pits. Areas are adjusted accordingly with the area of the rehabilitated domains decreased and the disturbance credited to the new mining area.

6	4.10 Area available for mining, Figure 31	Figure 31 indicates that every area across the mining lease comprising the Great Northern Mine is available for mining. Areas that have been progressively rehabilitated and received certification have not been excised from areas available for mining. Areas that have received progressive rehabilitation certification and not been re-disturbed again should be excluded from areas available for mining.	a) Exclude the certified rehabilitation area from the land/area available for mining category and; b) In the PRCP schedule provide a separate rehabilitation area (RA) for the same.
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Areas of certified rehabilitation or rehabilitation may be disturbed to some extent if a minable resource is identified adjacent to an area of certification and will not be excluded for the area available for mining with the exception of Reject's Hill. Reject's Hill will not be disturbed if an adjacent area is planned for mining as the stripping depth due to the height of the certified rehabilitation makes disturbance uneconomical. All disturbed areas will be rehabilitated. The legislation and guidelines for certification of mine disturbed rehabilitation must allow for the fact that future mining techniques or the net returns from mining may make the disturbance of areas certified economical.

Rehabilitated domains of Vella Pit, Nardoo, Just Looking, Promised Land 1, Lagoon and Just Looking have been disturbed by new mining pits. Areas are adjusted accordingly with the area of the rehabilitated domains decreased and the disturbance credited to the new mining area.

Rejects Hill has been placed in RA5.

7	6. Post Mining Land Use	Section 6 describes that the land covered by ML's 70285 and 70286 will be administered under the <i>Qld Fossicking Regulation 1994</i> on relinquishment. It is stated that the land at lease relinquishment will be 'Fit for Purpose'. There are no further details to describe what 'Fit for Purpose' entails as a post mining land use or how the land will be considered safe, stable and non-polluting.	For the fossicking land within the Scrub lead area, provide detailed characteristics of the area that will be reinstated through the rehabilitation.
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ML 70285 and ML 70286 are designed at RA1. The schedule states that RA1 will achieve rehabilitation milestones 1 through to 5 and RM9. Milestone criteria achieved at RM9 are listed as:

- Total projective cover, slope and erosion similar to analogue transects. Analogue transects will be located in ML or adjacent to ML on Scrub Lead.
- Domain inspected and signed off by SQEP as safe and stable.

- Feedback from community consultation documented.

RM9 criteria will demonstrate that the PMLU is achieved e.g. land is in a similar condition to the remainder of the two MLs not disturbed by Fura Gems and the remainder of the Scrub Lease mined area.

8	6. Post Mining land uses	Section 6 of the PRC plan states that Great Northern Mining hold written agreement with the landholder for the transfer of the industrial area, water storages, certain roads and tracks and poly pipelines at lease relinquishment. These written agreements have not been provided to support the PRCP. Further, Table F1 of EA EPML00439113 provides for 6.5ha of road and tracks to remain as landholder access. The PRCP schedule provides for 6.7ha to be returned to the land holder as RA3. This appears to be an inconsistency between the area proposed in the PRCP schedule and the area authorised by the EA.	a) Provide a copy of the written agreements between Great Northern Mining Pty Ltd and the Landholder for the retention of the named infrastructure. b) Ensure that the infrastructure proposed to be retained by the landholder is consistent with the authorisation for retained infrastructure in accordance with the EA, and c) Include details of rehabilitation necessary for any additional infrastructure areas beyond 6.5ha.
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- a) Copies of agreements are attached.

Please note that both Fura Gems and the landholder recognise that the location of roads and tracks under the 2002 agreement may change with the mutual consent of the landholder and the miner or that new or amended agreements may occur anytime up until lease relinquishment. The 2002 agreement on transfer of roads/tracks to the landholder at lease relinquishment does not state specific roads or the areas of these roads. However, there is an area relating to this agreement in the EA. The nominated area is first listed in the EA dated November 2006 at 12ha, March 2016 EA at 12 ha and current EA at 6.5ha. I don't know of the justification for the reduction in the last EA.

The spatial data has the area of roads to be retained at 4.6ha based on 6 metre width. The transfer of assets is governed by the agreements between the landholder and the company. Fura Gems will be negotiating for this area to be removed from the EA at a future opportunity.

- b) The infrastructure to be retained is informed by the agreements between the landholder and Fura Gems. The land within the compound containing the sheds will be retained by the landholder. The laydown area outside the fence will be rehabilitated.
- c) Roads, tracks and additional infrastructure areas not returned to the landholder are covered by RA2 and will achieve the rehabilitation milestones and rehabilitation criteria for RA2.

9	8.2 Flooding, Appendix A – Rehabilitated GMN Domains	A review of Basin 1% AEP flood levels, and shapefiles provided with the application indicates that there are areas within the mining leases that may be subject to flooding. Limited information is provided in the application relating to flood susceptibility and influence, particularly as it relates to the flooding risk profile of the final landform. Section 8.2 describes that the leases on the town common (Scrub Lead) ML70285 and ML70286 were not rehabilitated with ponded water remaining in low lying areas. The plan states that mining is planned over a limited area of the two leases with rehabilitation planned to maintain the existing landform. Appendix A describes that ponding in low lying areas prevents the establishment of pasture grasses at 'Nardoo pit'. Nardoo is indicated as being at RM6 stage ie. Ready for ripping and seeding in Table 7. Land outcome documents relevant to EA EPML00439113 do not appear to allow for ponded areas to remain on site, and ponded areas may not support the post mining land uses of grazing or fossicking. Rehabilitation methods for correcting ponded areas are not described in the schedule or plan.	a) Provide further information about flooding susceptibility and influence across the site in accordance with section 3.6.1 of the PRCP guideline. b) Explain how ponded areas that are not associated with plant areas or tailings ponds will be rehabilitated. c) Include criteria for rehabilitation in the PRCP schedule for the rehabilitation of ponding areas onsite, which are not associated with the plant operation areas.
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- a) The flooding risk profile of the final landform will not change from the flooding or inundation risk of the pre-mining landform as the final landform is not changed from the pre-mine landform. Low-lying areas of the "Subera" MLs will suffer the same incidence of inundation, and Policeman's Creek will extend beyond the low flow channel just as it has done for centuries. Flow upstream and downstream will not be altered. No voids will be left at mine closure. Fura Gems did not conduct any flood modelling as the modelling will not change the risk profile or the consequences of flooding or inundation of any rehabilitated domains. The only information that the modelling will provide is an estimate of the RL of various rainfall percentiles. A visual inspection of the vegetation on the leases will provide similar

information as to the extents of past floods providing evidence as to the eventual pasture/vegetation expected on rehabilitated disturbed domains. The native vegetation returns to the low lying areas quickly enough to deliver RM6 as committed in the schedule.

- b) Ponds on the two Scrub Lead leases are ponds constructed by others prior to Fura Gems or its predecessors being granted the mining leases. Wash from the Scrub Lead leases was carted to “Subera” for processing. No voids have been left in the rehabilitated landform on the Scrub Lead leases. If further mining is proposed on the Scrub Lead leases the final mining void will be backfilled.

No voids are proposed in the final landform on “Subera”. Low lying areas currently inundated by overland flow will be restored to a similar RL in the mined final landform to maintain the drainage patterns on “Subera”. Low lying areas are located across “Subera” in RA 2 and will be rehabilitated to meet the milestones outlined for RA2.

Criteria for stock water storages are described in RM7 of the schedule.

- c) The PRCP and the PRCP schedule contained criteria for native vegetation in RM7. A revision of the Schedule for clarity is included. The PMLU for “Subera” is to return rehabilitated areas on the MLs to the landholder who operates the property as commercial cattle grazing operation. The PMLU was changed from “grazing property” reluctantly to just *grazing* on insistence from DES. Low-lying areas with limited pasture achieve the stated PMLU in returning the land to the local native grasses, sedges and nardoo with sparse patches of exotic pasture grasses. This is no different from the pasture available in the current landform. The previous EA dated 16 March 2016 has a disturbance type of Policemen’s Creek riparian and drainage lines. This omission from the current EA is regretful with extracts from this omitted section of the previous EA included in the milestones for RA2.

Table F1 (Final Land Use and Rehabilitation Schedule)

	Disturbance type					
	Tailings dam	Oversize dump	Infrastructure and camp(s)	Road(s) and track(s)	General excavations	Policeman Creek Riparian areas & drainage lines
Tenure ID	ML 7181 and various leases where mobile plant is established	ML 7181	Various mining leases	Various mining leases	Various mining leases	ML 7162, 7155, 7156, 7157, 7158, 7159
Projective surface area (ha)	10	2	Workshop admin – 0.5 Dams - 12	12	200	12
Post mine land use	Native vegetation	Light intensity grazing	Light intensity grazing	Light intensity grazing	Light intensity grazing	Native habitat & riparian vegetation
Post mine land description	Slightly elevated with gentle slopes	Raised knoll	Flat revegetated land	Flat revegetated land	Flat revegetated land	Drainage line, low lying & riparian areas
Post mine land capability classification	VI	VII	VI	VI	VI	
Projective cover range(%)	30-50 Weediness is no greater than 5% higher than adjacent background landholders groundcover ¹	30-50 Weediness is no greater than 5% higher than adjacent background landholders groundcover ¹	30-50 Weediness is no greater than 5% higher than adjacent background landholders groundcover ¹	30-50 Weediness is no greater than 5% higher than adjacent background landholders groundcover ¹	30-50 Weediness is no greater than 5% higher than adjacent background landholders groundcover ¹	30-50 Weediness is no greater than 5% higher than adjacent background landholders groundcover ¹
Species mix	Appropriate native vegetation	Native vegetation and buffel	Buffel and other pasture mixtures	Buffel and other pasture mixtures	Buffel and other pasture mixtures	Native vegetation

10	8.3 Soil and Capping	Section 8.3.1 describes that the topsoil on 'Subera' is of varying quality. There is no further explanation provided about the need for fertilisers or amelioration of topsoil to ensure the topsoil is a viable growth media.	a) Provide more detail about the quality of topsoil across the 'Subera' property identifying whether the soil has any qualities which require action to ensure suitable growth media is established that will achieve the PMLU (e.g. dispersive soils or nutrient deficiencies that may need to be addressed). b) Provide more detail about the application of topsoil including application depth and the requirement for any further ameliorants or fertiliser.
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- a) The soil across “Subera” supports the pasture currently being grazed. The landform will not change (± 2 m from pre-mine contours) with the topsoil replaced. This technique of “replacement of stripped topsoil back onto the domain” practice has achieved certified rehabilitation. All domains submitted in the first tranche of certified rehabilitation were legacy sites with limited topsoil reserves available to GNM at each site. See figures demonstrating the scarcity of topsoil at Main Dam Site/Rejects Hill and New Laneway. Rejects Hill have been declared certified rehabilitation.



Figure 14: Main Dam Site/Rejects Hill 2001 – note absence of topsoil stockpiles

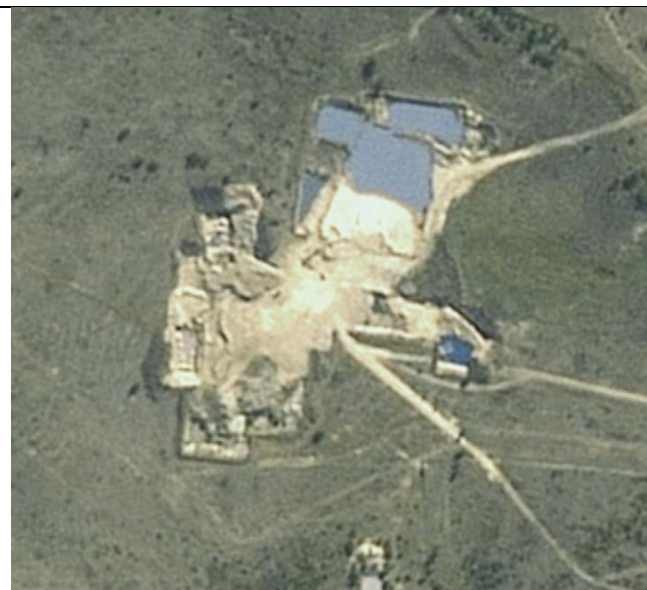


Figure 15 New Laneway 2009 – topsoil stockpiles in west and north

Topsoil Variability

Fura Gems has included a milestone criteria (RM6) in RA2 of soil testing selected domains both rehabilitation and reference sites to understand the relationship between soil nutrients, soil structure and vegetation performance. Fura Gems will review the soils database annually. Any identified relationship between soil properties and inferior pasture performance will be identified and additional controls including fertilizers and ameliorants proposed.

- b) The practice is “Topsoil i.e. the top 100 -200mm of the profile is stripped from each domain, stockpiled on the perimeter of the disturbed area and redistributed evenly across the disturbed area once the desired landform has been formed.” This practice reduces the topsoil variability by mixing during stripping and subsequent placement. Each disturbance domain is discrete with topsoil stockpiles easily identified. Topsoil depth or topsoil volume are not recorded as this information is not required to ensure successful topsoil management. What was there is replaced. A practice that is simple and practical and producing the desired result of successful rehabilitation. No fertilizer or ameliorants have been applied to the topsoil in the past or is proposed in the future.

11	8.3 Soil and Capping	There is conflicting information provided in the PRC plan regarding whether drainage lines are available for mining, and will be mined in the future, and what the rehabilitation outcome will be. Section 2.13 describes that pasture species have limited success along drainage lines, and that the native grasses and sedges present in low lying areas are not palatable for grazing. More information is required to understand if drainage lines and low lying areas are part of the the grazing post mining land use outcome, or will be undisturbed by mining.	a) Confirm if the drainage lines will be subject to mining or will remain undisturbed. b) If drainage lines are planned to be mined provide additional information on the intent of the rehabilitation strategy either to return the land to grazing with pasture grasses or re-establish the native vegetation of the pre-mine landscape. c) A final site design figure should demonstrate the areas of undisturbed area within the lease boundaries and identify the pre-mine use.
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Drainage lines have been mined and will be mined in future. Current domains which include low lying areas or areas or the flood plain of Policeman’s Creek include:

- Nardoo South
- Pig Pit
- ML 7157
- Eastern Creek
- South Pit East
- Creek View
- Lois Lane
- Old Laneway
- Lagoon
- BOT

- Heartbreak
- Banana
- Tryangle East
- Retreat
- PL2; and
- North Pit Areas 2 and 3.

a) The disturbed low-lying land will be returned to grazing along with the drained landscape where improved pasture will establish just as the pre-mine land use is grazing. The post mining vegetation being a mixture of improved pasture on drained area with native vegetation on the low-lying areas. The rehabilitation technique will be as stated in RM 1 to RM6. The ponding will kill pasture species except for Bambatsii with the native vegetation developing over time. Whilst this process of natural evolution will be slower than establishing a pasture of exotic species the grazing pressure is less. History shows that RM6 can be achieved in the nominated 10 year period due to favourable conditions i.e. a profile retaining moisture for a longer period with surrounding vegetation spreading seed onto the final landform.

The following two figures show the development of native grasses in the low-lying ponded area in Tryangle West. This vegetation has established in the last 12 months.



Figure 16: Native Vegetation establishment



Figure 17: Native Grasses in drainage line

12	PRCP Schedule – timeframes	Limited information is included to support the timeframes allocated to rehabilitation in the PRCP schedule.	a) Provide information on the availability and location of probable resources across the mining leases. b) Link this information to the proposed duration of the mining operation being 30 years, and to the timeframes for achievement of rehabilitation milestones.
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(a) Figure 29 in the PRCP shows the available land for the Scrub Lead leases. With the extensive mining on the Scrub Lead leases, whilst all the land is available there is likely to be limited resources on the remainder of the lease. No exploration has occurred outside the area mined by Fura Gems to understand the extent of resources.

Figure 31 in the PRCP shows the “Available Land” on “Subera”. This available land is the location of probable resources. Exploration is only weeks to months ahead of the mining. All the available land on “Subera” is considered to possibly contain probable resources. In relation to “Subera”, the total lease area is approximately 1,500 hectares. Area mined at January 2022 is 232 ha. Estimated disturbance rate is approximately 15ha/yr or 450ha in next 30 years less than the 1,268ha of available land and probable resources. There is a variation in gem size and quality across “Subera” but the majority of exploration holes indicate mineable reserves i.e. the majority of the “available land” may be mined.

The company would have to double or triple its exploration program to identify specific areas of mineable resources. Even if the exploration program has drilled out the remainder of the available land on “Subera” and all areas of future mining identified, the economics of the mining operation is strongly influenced by the customer demand for certain gems. Mining areas will change to meet customer demand. Mining Pits rehabilitated to date have ranged from 0.8 to 6 ha. Plant Areas range from 10 to 16 ha to accommodate the footprint of stockpile and wash plant, wet and dry tails. Each mining pit is a discrete operation with rehabilitation completed within 12 months of the extraction of the final load of wash see Figure 27 of PRCP. Smaller pits will typically be rehabilitated within 6 months of mining commencement.

Fura Gems operate under an EA which sets a maximum disturbance for unrehabilitated mine disturbance. Fura Gems’ operation incorporates the rehabilitation into the mining operation to ensure that the disturbance remains under this demanding limit on total area. Is not the aim of the PRCP legislation to ensure that a mining operation delivers on its commitment to ongoing rehabilitation. The current EA condition of maximum disturbance for Fura Gems gives DES the leverage to ensure this happens. Nominating the exact areas which will be rehabilitated at certain dates over the next 30 years for a mine which disturbs discrete areas from 1 to 12 ha is size is not practical having the potential to make gem mining uneconomic.

- (b) The proposed duration of 30 years of mining is an estimate only. If 75% of the unmined 1,268ha of “Subera” is mined at 15ha/yr then mining will continue for 60 years. Timeframes for achievement of rehabilitation to a certification standard has been taken to be 10 years after RM5 has been achieved. This figure is based on experience and the knowledge that for rehabilitation success at least one good wet period is required. Estimates are that a good wet period should occur at least once in 10 years. 2 years has been allowed to achieve RM5 once mining has been completed and 5 years after the Plant completed washing on a Plant Area/TSF. This timing and the requirement to limit disturbance to ensure compliance with the EA drives the schedule’s commitment to delivering rehabilitation hectares at specific dates that achieves certified rehabilitation status i.e. RM7.

Fura Gem’s mine plan extends out 12 months for mining areas at best with changes even taking place within that time frame as exploration continues. It is only practical to link actual disturbance to the timeframes and areas nominated in the Schedule. This fact was raised in the initial meeting with DES over the PRCP. Mine management is keen to work with DES as to how Fura Gems may be able to meet the legislative requirement for the Schedule with this limited knowledge. Even an amendment of the Schedule nominating the location of current mining every 6 months may not guarantee compliance of the schedule with the location and rate of mining on site. The schedule assumes a constant rate of mining for 30 years. History would indicate that this futuristic prediction will prove inaccurate. The nominated timeframe of 30 years of consistent mining for the PRCP schedule is nominated to allow the development of a schedule of delivery of the nominated hectares of rehabilitation achieving the status of RM7. The mining company has goals of being

a long term miner but no entity being an individual, company or government has a track record of successfully predicting the next 12 months let alone 30 years.

13	PRCP Schedule	Milestone criteria can be further improved to meet SMART principles.	a) RM2: Topsoil placed - nominate a per/ha application rate for topsoil. b) RM5: Area seeded with desired seed mix - nominate the species mix that will be applied in the seed mix to ensure it is appropriate for pasture productivity. c) RM6: Achievement of PMLU - state an acceptable EC level which must be achieved to ensure water quality is suitable for stock consumption.
----	---------------	--	--

a) RM2 - Topsoil stripped from each domain and stockpiled on the perimeter of the disturbed area will be redistributed evenly across the post-mining landform. This is a SMART objective. All topsoil is stripped, and all topsoil is spread evenly across the disturbed footprint.

b) Page 33 section 8.7

Rehabilitation Milestone 5 – Area seeded with desired seed mix

A drum seeder towed behind the grader spreads the pasture seed on top of the ripped ground. The weight of the seed and subsequent rainfall sows the seed into the ground permitting germination.

The seed mix may change from time to time based on availability of cultivars, feedback from the landholder and pasture species on “Subera”. Current seed mix is 35% buffel grass, 35% rhodes and 30% bambatsi panic with a targeted rate of 10kg/ha. The seed mix is purchased from an Emerald business that supplies pasture seed to the grazing industry. The cultivars of buffel and rhodes included will depend on availability at time of purchase. Biloela or Gayandah are the preferred buffel cultivars. A diploid and a tetraploid rhodes grass cultivar is preferred in equal portions. Indian bluegrass (*Bothriochloa pertusa*) is endemic to the region. Areas of pasture on “Subera” are dominated by Indian bluegrass. At no time has the landholder indicated that they wanted these areas to be returned to native species.

c) Stock water quality in Stock Water Storages– meets ANZECC water quality guideline (see Figure 18) for beef cattle i.e. <4,000mg/L TDS or <6,000 µS/cm. Most of the catchment of the stock water storages and landowner dams on the property is undisturbed ground

(see Figure 19 and Figure 20). What is achieved by measuring a suite of parameters recording natural catchment variation on the property with no background data?

Table 4.3.1 Tolerances of livestock to total dissolved solids (salinity) in drinking water^a

Livestock	Total dissolved solids (mg/L)		
	No adverse effects on animals expected	Animals may have initial reluctance to drink or there may be some scouring, but stock should adapt without loss of production	Loss of production and a decline in animal condition and health would be expected. Stock may tolerate these levels for short periods if introduced gradually
Beef cattle	0–4000	4000–5000	5000–10 000
Dairy cattle	0–2500	2500–4000	4000–7000
Sheep	0–5000	5000–10 000	10 000–13 000 ^b
Horses	0–4000	4000–6000	6000–7000
Pigs	0–4000	4000–6000	6000–8000
Poultry	0–2000	2000–3000	3000–4000

a From ANZECC (1992), adapted to incorporate more recent information

b Sheep on lush green feed may tolerate up to 13 000 mg/L TDS without loss of condition or production

Total dissolved solids (TDS) is a measure of all inorganic salts dissolved in water and is a guide to water quality. For convenience, TDS is often estimated from electrical conductivity (EC). An approximate conversion of EC to TDS is:

$$\text{EC (dS/m)} \times 670 = \text{TDS (mg/L)} \text{ or,} \quad (4.5)$$

$$\text{EC (}\mu\text{S/cm)} \times 0.67 = \text{TDS (mg/L)} \quad (4.6)$$

Salinity is used as a convenient guide to the suitability of water for livestock watering. If a water has purgative or toxic effects, especially if the TDS concentration is above 2400 mg/L, the water should be analysed to determine the concentrations of specific ions.

Figure 18: ANZECC guideline

Figure 19 demonstrates that Pointsetta catchment is off “Subera” draining a mined area of “Gemsetter” and pasture on “Fork Lagoon”.

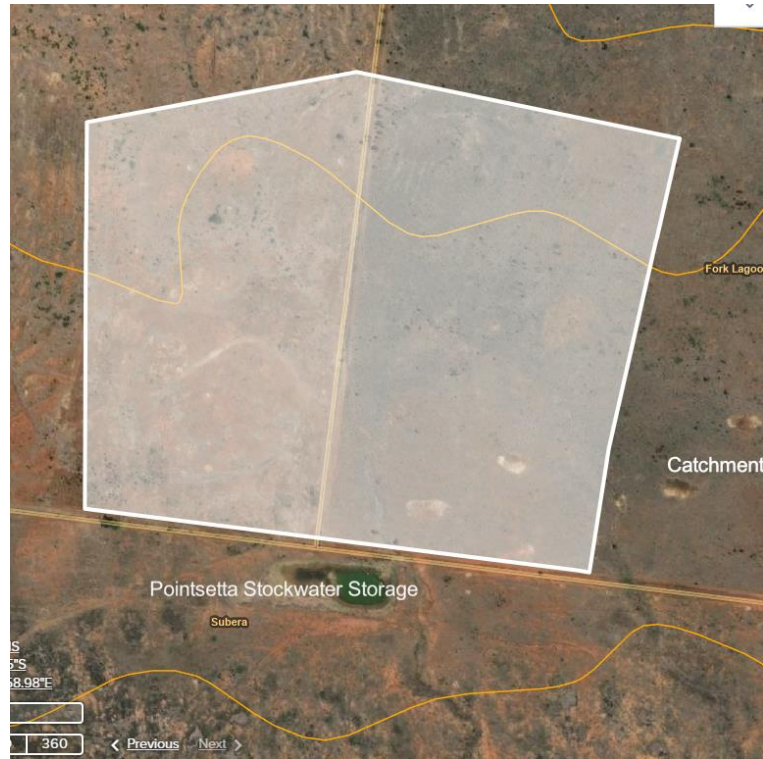


Figure 19: Pointsetta Storage

Figure 20 shows the approximate area of catchment for Laneway West Stock Water Storage being undisturbed by mining. Other storage catchments contain a portion of mining disturbance. These storages e.g. North Retreat and Old Laneway are in the catchment of Policeman’s Creek. The head of this catchment is the Scrub Lead and Rubyvale.

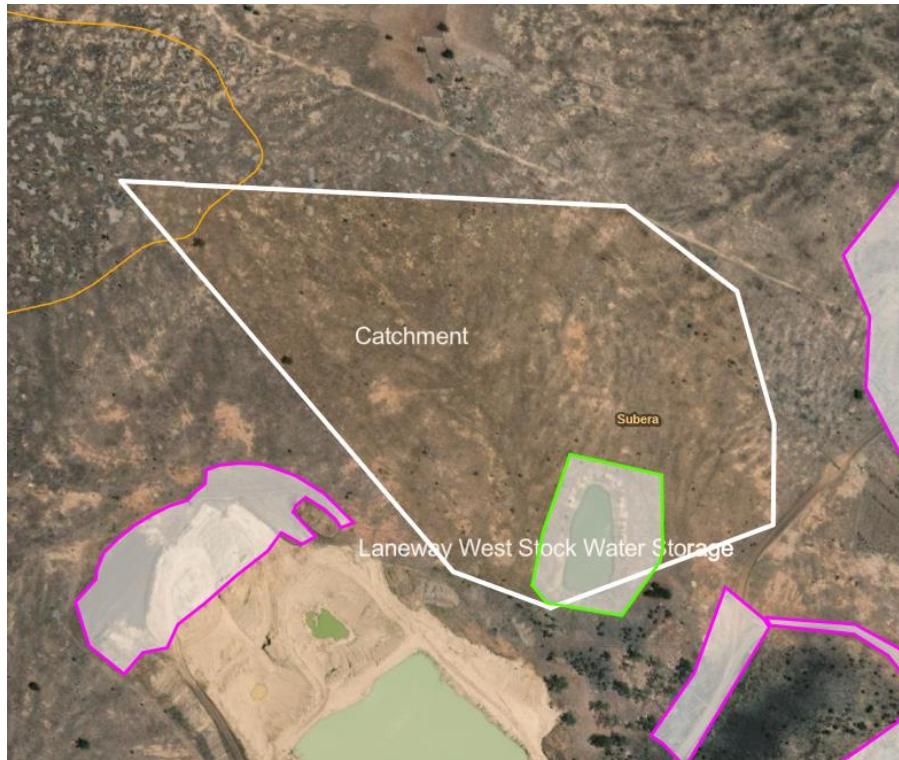


Figure 20: Laneway West Catchment

The Schedule has been revised accordingly.

14	Shapefiles	There is some ambiguity in the shapefiles regarding the post mining land uses for certain polygons, with some areas being overlayed with polygons describing different PMLU's. For example 'RA2 area 10' and	a) Provide an explanation of the configuration of the shapefiles. b) Remove ambiguity with overlapping polygons where possible.
----	------------	--	--

		'available area 10' overlay ML70286. The PMLU for these shapefiles is grazing, and the existing rehabilitation is classified as grazing. However, in the PRC plan and schedule it is understood that ML70286 comprises part of the Scrub Lead fossicking area and that the PMLU for this area is not grazing.	
--	--	--	--

- a) Agree with confusion. The spatial data will be revised to remove ambiguity where possible. The number of polygons result from generation of the shapefiles in Google Earth. The area of the grazing PMLU has been amended to include all of "Subera" within the MLs whether mining is permitted or not as this is a less complicated polygon to generate.

Revised spatial data is attached.

Shane & Patricia Benney
P.O. Box 67
Clermont Qld 4721
ph 0437 630 414

To Whom it May Concern

RE: Great Northern Mining on "Subera" Property (Lot 9 PT203)

I wish to confirm that I have requested Great Northern Mining provide me with permanent stock water storage developed from mining voids at the following sites as part of the final rehabilitation of the sites.

1. Laneway West site (Laneway West Stock Water Storage)– constructed on MLs 6868 and 6869
2. Promised Land site (Retreat Stock Water Storage) – constructed on ML 6892

The Laneway West Stock Water Storage was reshaped from a mining void and the surrounds were rehabilitated during Dec 2011. A similar mining void was reshaped and the sides rehabilitated to form the Retreat Stock Water Storage during Oct 2018. After rain events the initial water entry gullies are rock lined for stability. The locations of these stock water storages are shown on the accompanying plans and on the following photos.

We are very satisfied with these water storages and may request further voids on other mining sites be developed for stock water storage in the future.

I also wish to acknowledge, in keeping with the compensation agreement for the site, that I have requested that the rehabilitation of the Main Dam tailings site, Rejects Hill and other processing/tailings sites across the Great Northern leases on Subera be rehabilitated for light intensity grazing with buffel and other pasture grasses only, without native vegetation.

Yours sincerely,

Shane and Patricia Benney



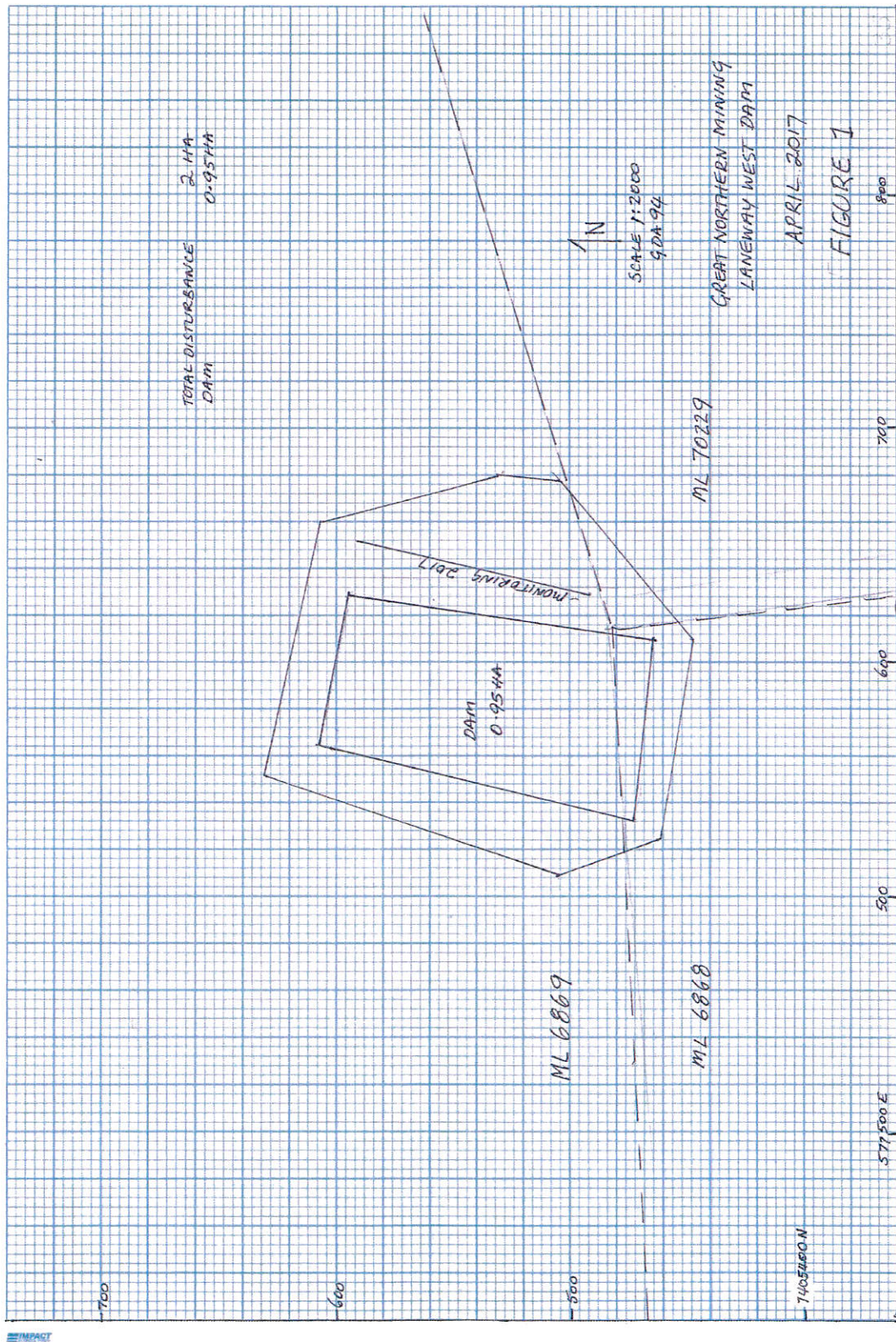
Date: 8/3/19

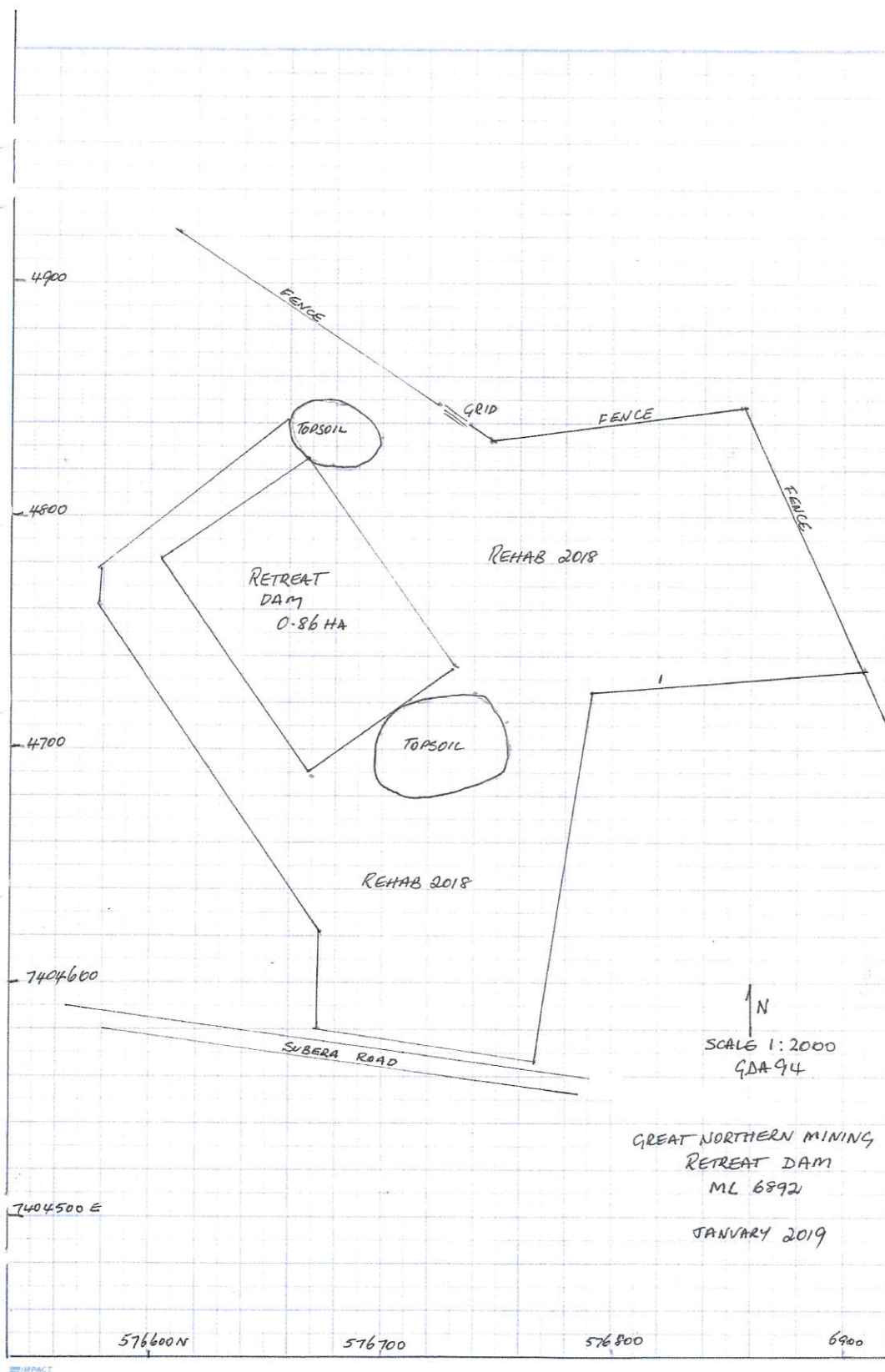


Laneway West Stock Water Storage - Photo April 2017



Retreat Stock Water Storage – Photo January 2019





574597.37E 7407810.59N (Zone 55)

579269.57E 7407786.16N (Zone 55)



 Laneway West Dam

 Retreat Dam



574573.80E 7403165.48N (Zone 55)

579244.53E 7403141.02N (Zone 55)

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 Queensland Globe



500 metres

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**Fura Gems
Groundwater Data Review**

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LIST OF ATTACHMENTS

Attachment A Bore Reports

1.0 INTRODUCTION

1.1 Background

Fura Gems Incorporated undertake mining of sapphires within a number of leases that are located in the Anakie gemfields west of Emerald and north of Anakie (Figure 1-1), where sapphires have been mined commercially for more than 100 years (Jell, 2013). JBT Consulting Pty Ltd (JBT) have been commissioned by Bilyarra Consulting to undertake a desk-top study of regional and site groundwater conditions. The scope of the study is outlined below in Section 1.2.

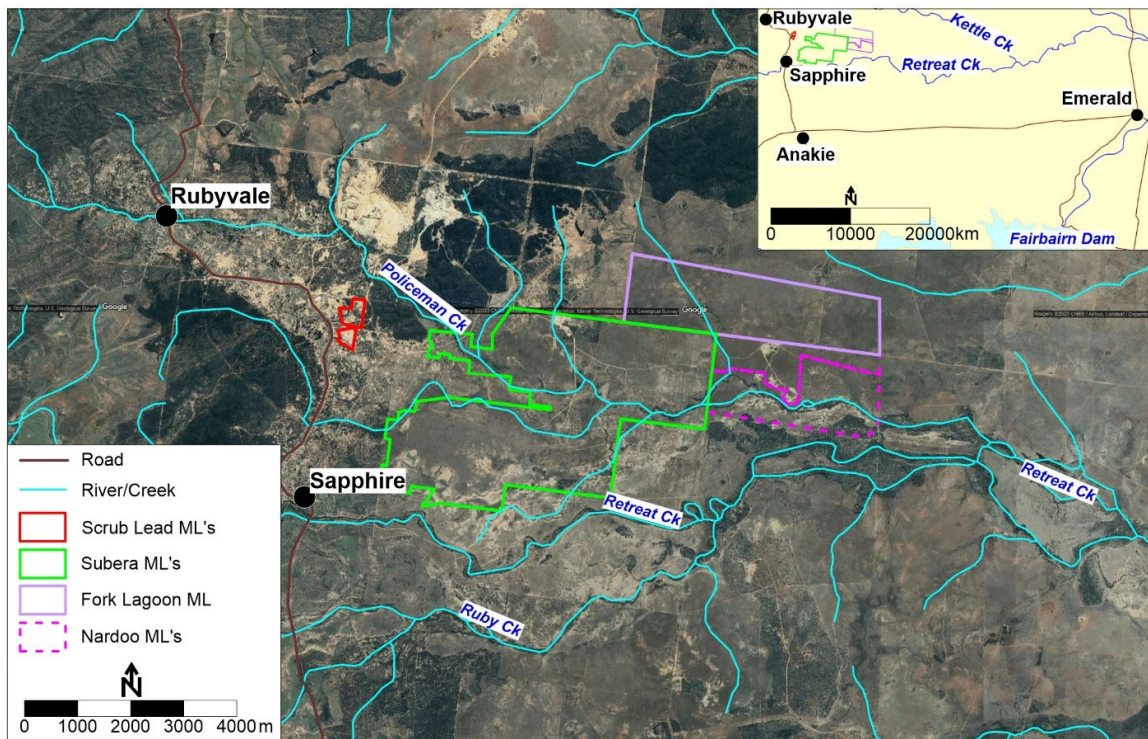


Figure 1-1: Site Location

1.2 Scope of this Study

This report presents and discusses:

- Available climate data (rainfall, evaporation etc.) for the project area (Section 2);
- Regional topography and surface drainage (Section 3);
- The regional and local geology (Section 4);
- Groundwater data is discussed in Section 5, including:
 - Groundwater occurrence and use
 - groundwater level data;
 - groundwater quality data;
 - Available data on groundwater yields and hydraulic properties.

1.3 Available Data

Data available for this study includes:

- Published geological mapping, including:
 - 1:100,000 scale surface geology; and,

- Bowen Basin solid geology at 1:500,000 scale (Sliwa et al. 2008)
- Climate data from the SILO data drill for the project area;
- Groundwater data for bores within the Queensland Government Groundwater Database, which includes (for some but not all sites) bore location and construction data, the groundwater unit accessed by the bore, groundwater level data, groundwater quality data and hydraulic data from pumping tests. Data used for this report is current to January 2023.
- Water level, water quality and pumping history data from a number of bores located within the project mining leases.

2.0 CLIMATE

2.1 Rainfall Data

Monthly rainfall data for the Rubyvale/Sapphire area has been obtained from the Queensland Department of Resources (DoR) SILO Data Drill (Jeffrey et al. 2001). The Data Drill accesses grids of climate data available from surrounding BoM point observations and then creates interpolated climate values for the requested location. Monthly rainfall data for the period from January 2000 to December 2022 is presented in Figure 2-1. The data has been analysed to provide a rainfall residual mass (RRM) curve, which is also plotted on Figure 2-1. The RRM is calculated by subtracting the long-term average monthly rainfall from the actual monthly rainfall, to provide a monthly “departure” from average conditions. If the monthly rainfall is above average the resulting rainfall departure number is positive, whereas if rainfall is below average, the number is negative. The monthly rainfall departures are summed cumulatively to provide the RRM. A number of below-average rainfall months will result in a falling RRM curve, while a number of above average rainfall months will result in a rising RRM curve. The RRM curve is used extensively in groundwater investigations due to the strong correlation at many locations between the RRM and groundwater level trends, especially for areas where groundwater recharge is occurring due to rainfall.

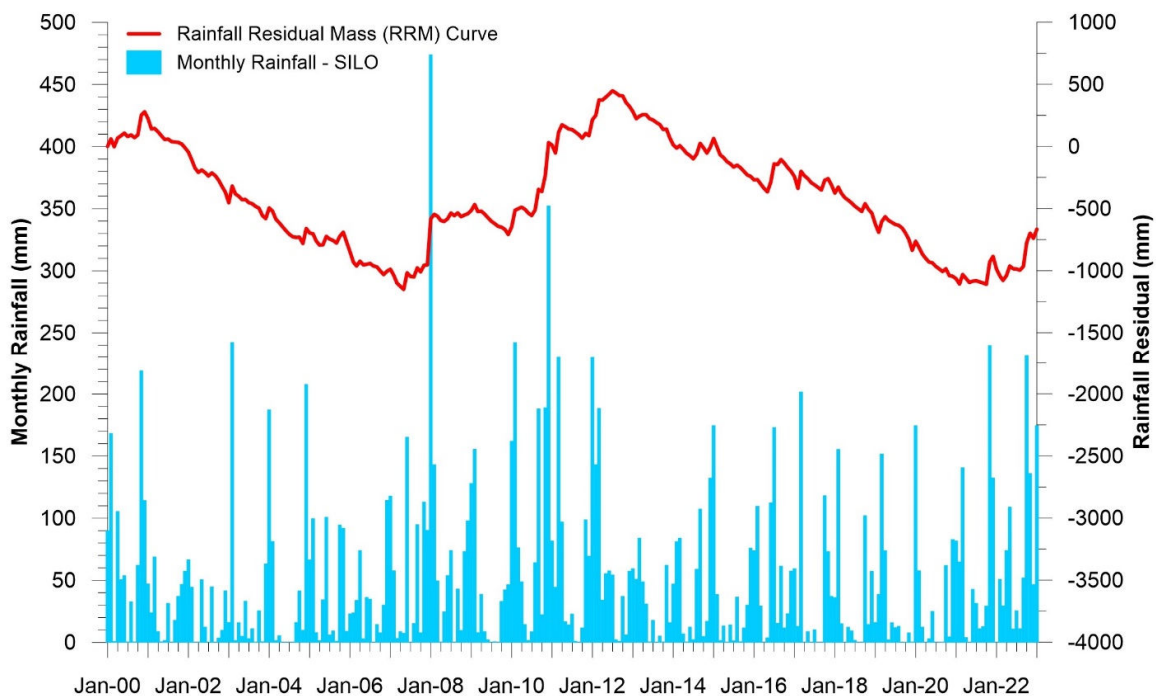


Figure 2-1: Monthly Rainfall Data and Rainfall Residual Mass Curve

2.2 Climograph

The climatic description of the region in which the Fura Gems projects are located has been compiled using data from the SILO Data Drill (Jeffrey et al. 2001). Summary data for rainfall and evaporation is shown in Table 2-1 and indicates that:

- Mean annual rainfall for the model area is approximately 630 mm; and,
- Mean annual evaporation is approximately 2,137 mm and exceeds rainfall for every month of the year.

The data has been utilised to produce a climograph for the area (Figure 2-2), which shows that:

- rainfall is highly seasonal, with the dry season from April to September-October, and a wet season from October-November through to March;
- evaporation is highest in summer and lowest in winter, with the greatest differential between rainfall and evaporation (i.e., when rainfall is less than 20% of evaporation) occurring between the months of August and October;
- The coldest month of the year is July, with a mean minimum temperature of 6.8 °C and a mean maximum temperature of 22.7 °C; and,
- The hottest month of the year is January, with a mean minimum temperature of 21.4 °C and a mean maximum temperature of 34.4 °C.

Table 2-1: Average Monthly Rainfall and Evaporation*

Month	Average Rainfall (mm)	Average Evaporation (mm)
January	102.0	241.0
February	107.5	192.3
March	64.4	198.2
April	35.5	154.8
May	31.8	117.6
June	32.4	92.3
July	27.8	102.1
August	20.4	135.5
September	21.5	180.6
October	39.9	227.1
November	60.1	239.1
December	87.3	256.9
Total	630.7	2137.4

* SILO Data – data for the period 1900 to 2022

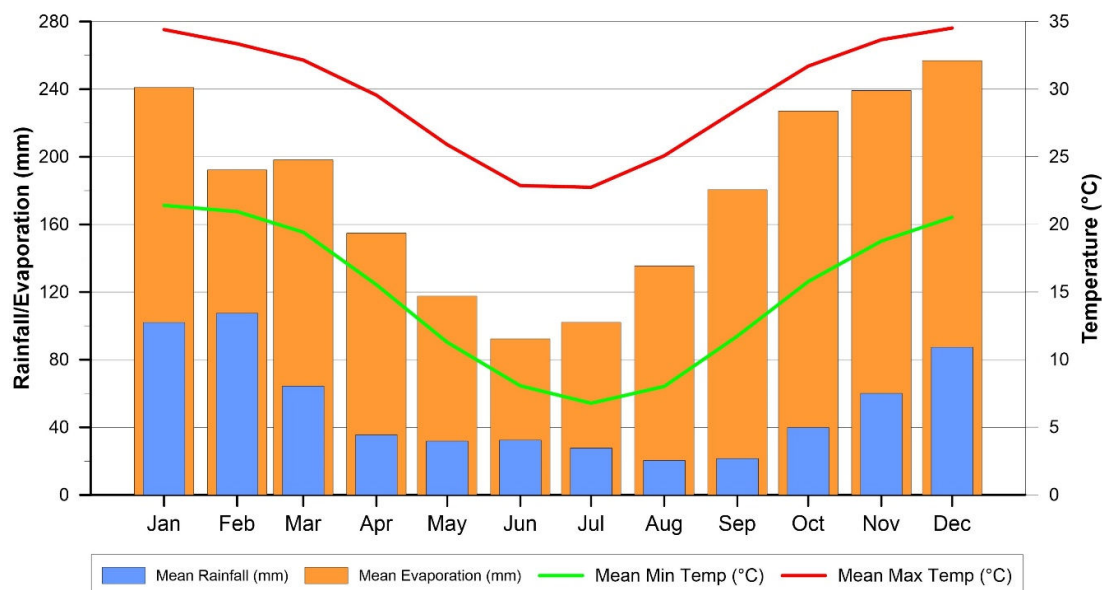


Figure 2-2: Climograph for the Project Area

3.0 TOPOGRAPHY AND HYDROLOGY

The topography of the project area is shown below in Figure 3-1, based on data available from the 1-second SRTM hydrologically enforced digital elevation model (Gallant et al. 2011). The topography is elevated to the west and south of the mining lease areas, within areas that correspond to the outcrop areas of Neoproterozoic metamorphics, Ordovician quartz arenites and Permian sandstone/conglomerates (Section 0, Figure 4-1 and Figure 4-2). The topography is generally flatter in the areas where the various creeks in the area are developed, and where relatively thick deposits of alluvium (e.g., ~53 m depth of alluvium recorded at bore RN47403, located within the Policemen Creek alluvium approximately 2 km north of Sapphire) have infilled the landscape.

The region drains from west to east, via ephemeral creeks such as Ruby Creek, Policeman Creek, Retreat Creek and Kettle Creek, with these creeks draining to Theresa Creek north of Emerald, approximately 25 km east of the map limit shown in Figure 3-1.

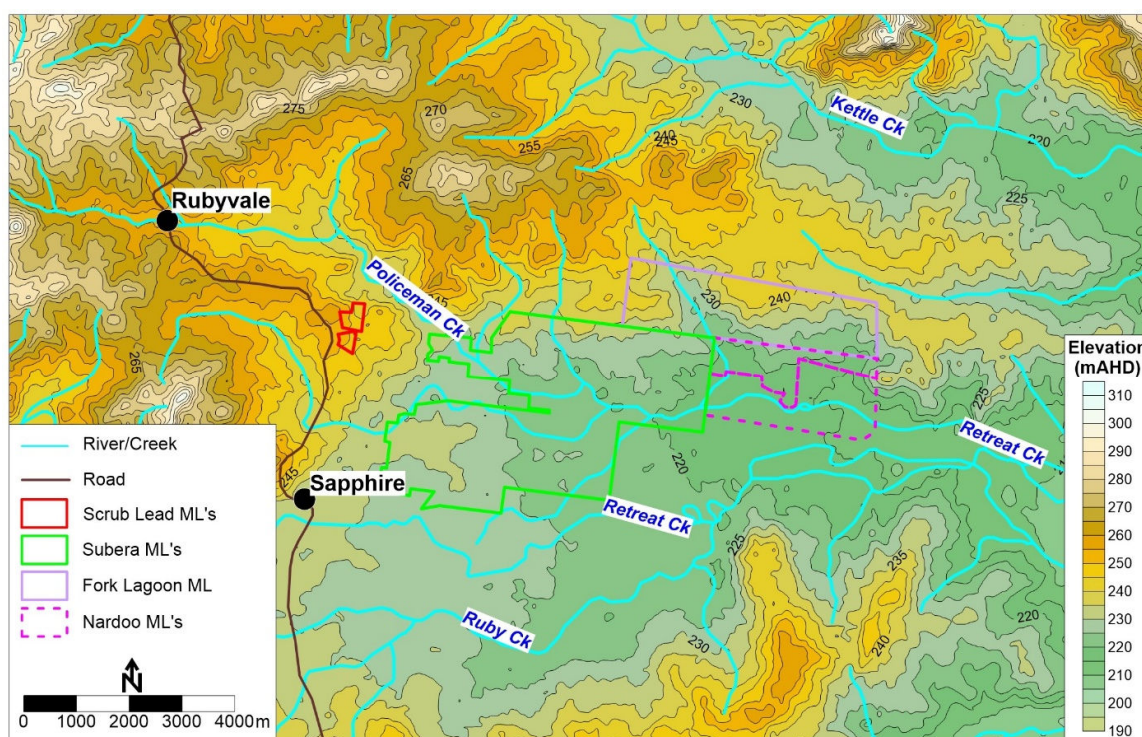


Figure 3-1: Topography and Surface Drainage

4.0 GEOLOGY

The project is located within the southern Anakie Inlier, where the main geological units include the early Palaeozoic Anakie Metamorphic Group and late Ordovician Fork Lagoons beds, which have been intruded by granitoids of the middle Devonian Retreat Batholith (Fergusson & Green 1995). The rocks of the Anakie Inlier are unconformably overlain by Permian Bowen Basin sediments of the Aldebaran Sandstone and Kettle Conglomerate. The solid geology of the project area (i.e., the geology with the overlying unconsolidated sediments removed, based on the Bowen Basin Solid Geology mapping of Sliwa et al. 2008) is shown below in Figure 4-1.

Figure 4-2 shows the 1:100,000 scale surface geology, which highlights the extent of Cainozoic sedimentation (Tertiary/Quaternary alluvium) that is associated with the major surface drainage systems of the area. Based on available bore data from the Queensland Government groundwater database, the alluvium within the project area has a depth range of 9 to ~54 m, with a mean of 27 m. The main area where sapphire mining occurs is shown on Figure 4-2 as Holocene anthropogenic deposits, i.e., the area where the surface geology has been significantly re-worked by mining.

Figure 4-2 also shows the locations of remnant plugs of Tertiary basalt. These basalts are all assigned to the Hoy Basalt, which is thought to be the source rock for the sapphire and zircon deposits that occur in areas where the gems have been re-worked within the Cainozoic gravel sequence (Duffy, 1995).

Figure 4-3 shows a Landsat 7 enhance thematic mapper (ETM) image of the project area. The image is a “7,4,2 RGB” image, which means that information from spectral band 7 (short wave infrared) is coloured red, band 4 (near infrared) is coloured green, and band 2 (visible blue-green) is coloured blue. Therefore, with the exception of band 2, the image is based on infrared data. In summary:

- Band 7 is short-wave infrared, falsely coloured red. This band is sensitive to variations in moisture and is responsible for the reddish-brown colours on the image. The main area of reddish-brown is associated with the alluvium to the east of Sapphire (refer also Figure 4-2) and indicates the difference in moisture content in the silts/clays within the alluvium, relative to the surrounding geology. The gem fossicking areas (which correspond with the Holocene anthropogenic deposits of Figure 4-2) show up as distinct varied colour patches, probably due to the degree of disturbance of this ground.
- Band 4 is near-infrared (NIR), which is falsely coloured green and is targeted towards the reflection of near infra-red (NIR) from leafy vegetation. Irrigated crops tend to show as bright green, mature vegetation as duller green. The vegetation that is associated with the Fork Lagoons beds (Figure 4-1) is dark relative to the vegetation that is associated with the Anakie Metamorphics. The vegetation associated with the Tertiary Red Mountain Formation also differs from the vegetation that is associated with the surrounding Kettle Conglomerate. This data indicates that geology has some influence on land use in the area. This may be because soils that are associated with a particular geology are more amenable to cropping than soils that are associated with other rock types, but it is also noted that the areas that are more heavily forested tend to be the elevated areas that are less amenable to farming (refer Figure 4-3 relative to the topographic contours shown in Figure 3-1).
- Band 2 is falsely coloured blue. This band is sensitive to the visible blue-green that is associated with water and is used to delineate surface water bodies.

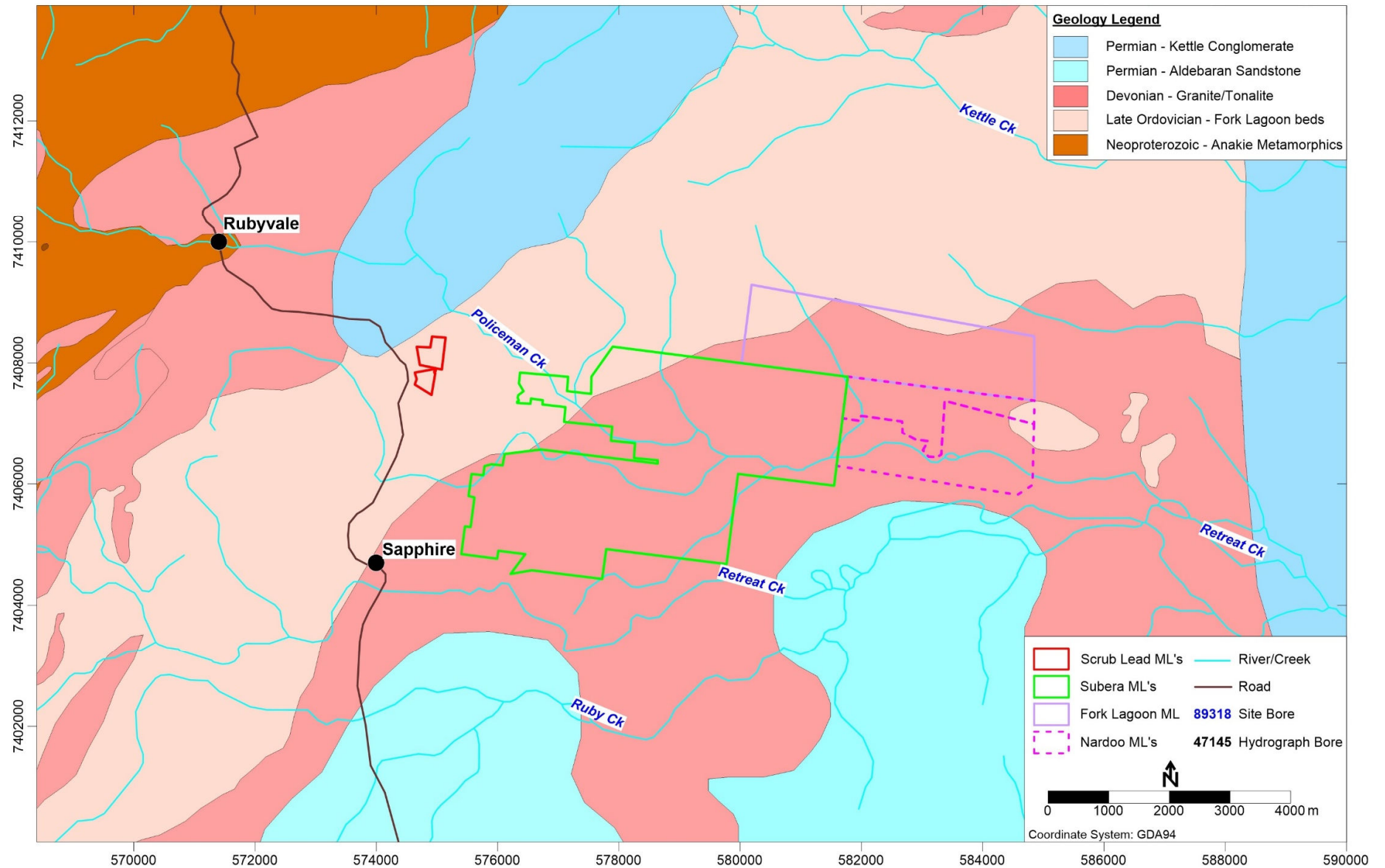


Figure 4-1: Solid Geology

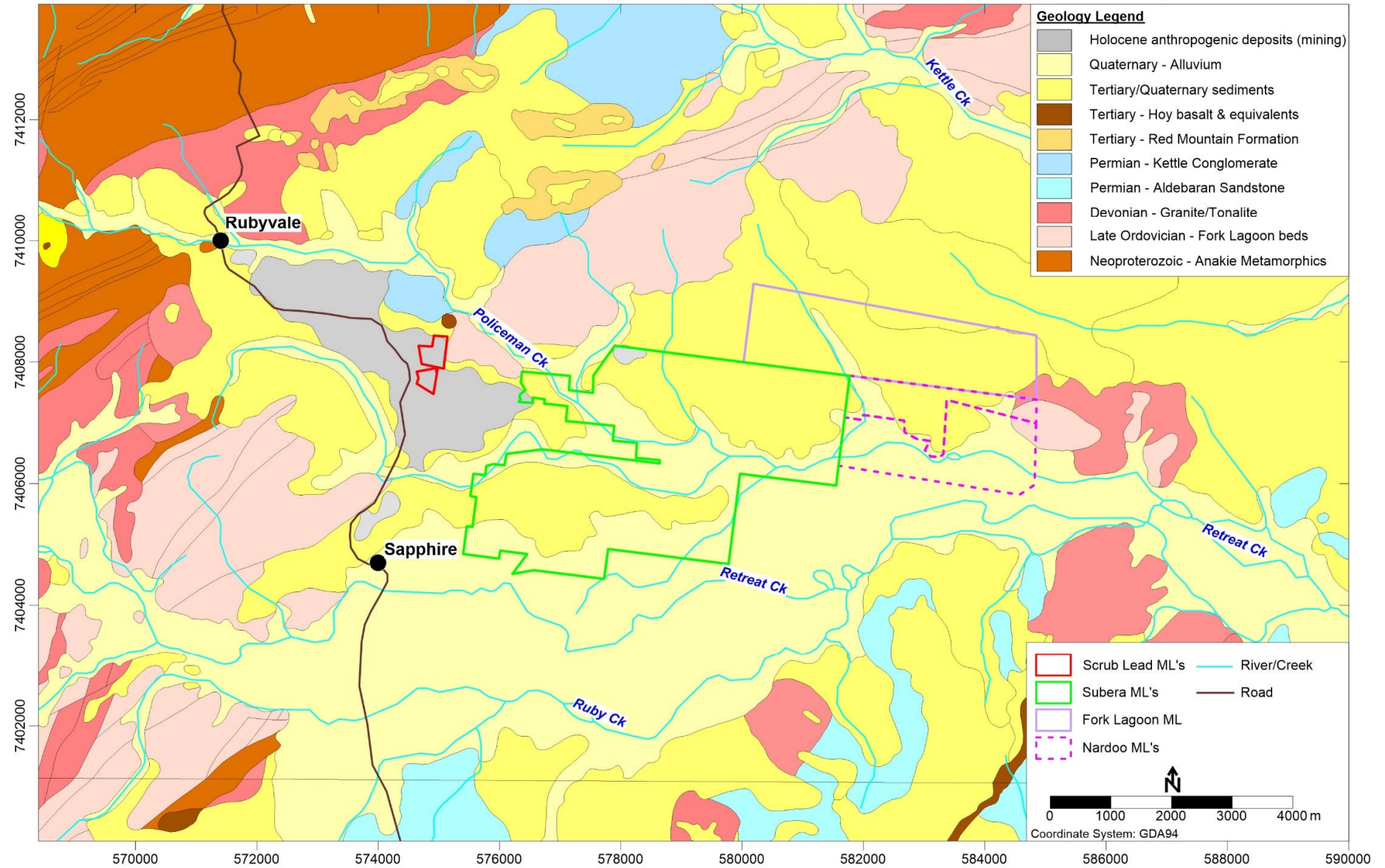


Figure 4-2: 1:100,000 Scale Surface Geology

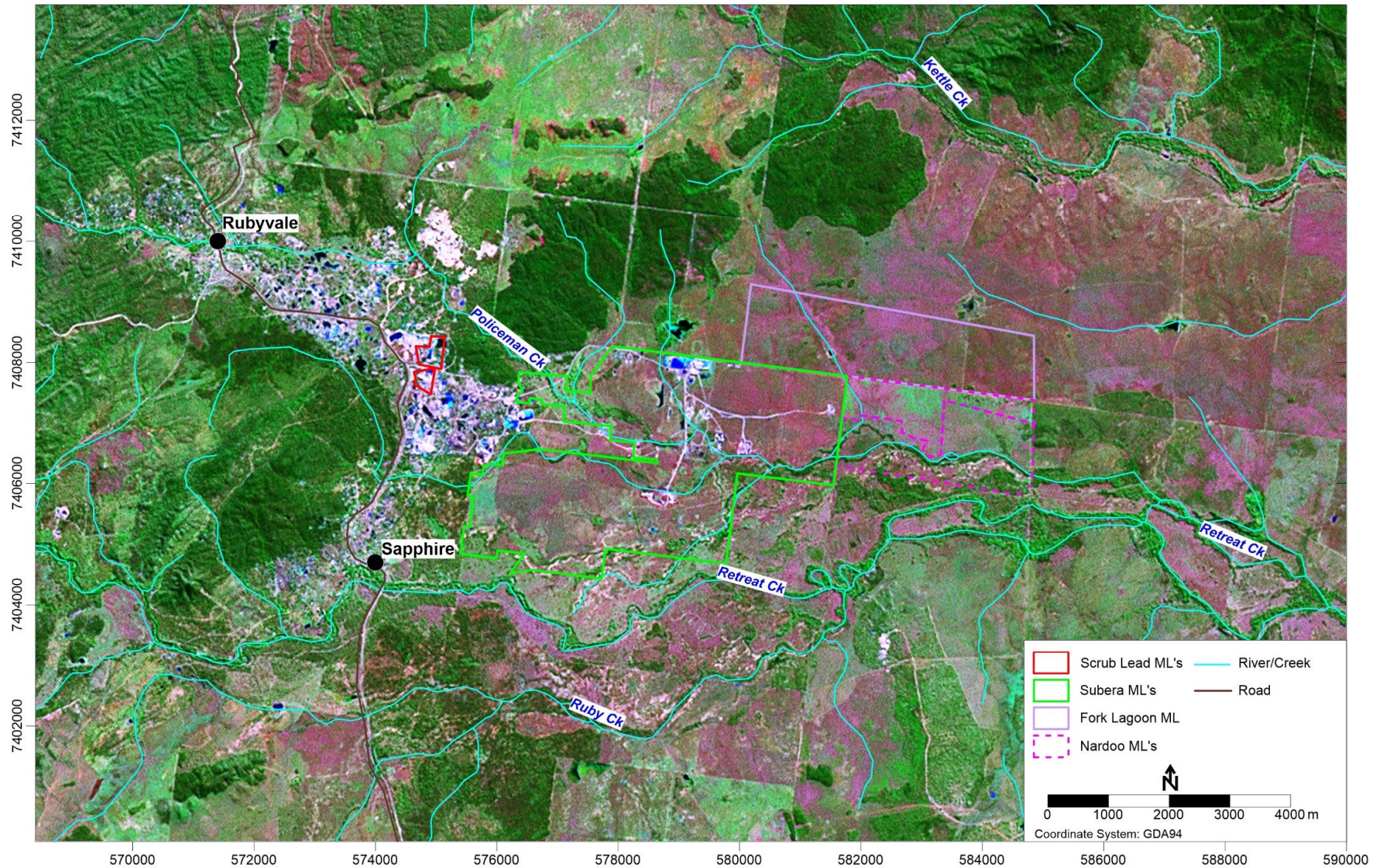


Figure 4-3: Landsat 7,4,2 RGB Image

5.0 GROUNDWATER DATA

5.1 Available Data

Groundwater data for the project area is available from:

- The Queensland Government Groundwater Database (GW database). The data used in this report is from a database download that was current to January 2023; and,
- Bores that are used within the mining lease area as either production bores (Bore 89318) or monitoring bores (165101 and 165102). Summary data for these bores is summarised below in Table 5-1.

Table 5-1: Summary Data for Site Groundwater Bores

Bore RN	Local Name	Easting (GDA94)	Northing (GDA94)	Depth (m)	Screened Interval (mbgl*)	Aquifer	SWL (mTOC**)	EC (µS/cm)	Sample Date
89318	Mining Bore	579307	7406644	35	32 - 35	Quaternary alluvium	-8.5	430	Apr-1994
165101	CSWW001	584590	7406124	20	11 - 17	Quaternary alluvium	-9.29	5370	Mar-2020
165102	CSWW002	581645	7406342	18	9 - 15	Quaternary alluvium	-8.45	1244	Mar-2020

* mbgl = metres below ground level

** mTOC = metres below top of casing

Bore reports for the bores listed in Table 5-1, which have been downloaded from the Queensland Globe website¹, are included in Attachment A to this report.

5.2 Groundwater Occurrence

A number of figures have been prepared to demonstrate the occurrence of groundwater in the project area. These figures are shown below, with each figure including:

- The locations of the Fura Gems mining leases;
- The locations of the groundwater bores that are associated with the project site (Table 5-1);
- The locations of registered bores (from the GW database), with the data for each site being colour-coded to show specific information as discussed below for each figure;
- The locations of bores that have sufficient water level data to generate bore hydrographs (graphs of water level over time). The data used for the bore hydrographs (discussed below for Figure 5-6) was sourced from the groundwater database, with the exception of data for bore 89318, which was obtained from site data.

The figures include:

- Figure 5-1, which shows the locations and current status (e.g., existing, abandoned etc.) of registered bores from the GW database. Visually, it is evident that the greatest number of bores are located along the drainage lines of Policeman Creek (near Rubyvale) and Retreat Creek (near Sapphire);
- Figure 5-2 shows the groundwater unit tapped by the bore. From the figure it is evident that many of the bores that are located along Policemen Creek near Rubyvale are listed in the GW database as being screened with granite. Given the location of these bores, it is interpreted that the bores likely be screened within the upper part of the granite in areas where the granite is directly recharged via downward flow from the overlying alluvium. These bores are in the upper reach of Policeman Creek where the alluvium is likely to be thinner and any groundwater occurrence is in the upper (weathered) portion of the underlying

¹ <https://www.business.qld.gov.au/industries/mining-energy-water/water/bores-and-groundwater/bore-reports>

granite. Along the broader alluvial plains to the east of Rubyvale and Sapphire, where the thickness of alluvium is greater, the bores access groundwater from the alluvial sediments;

- Figure 5-3 shows the most recently available electrical conductivity (EC) data for each bore, based on data from the GW database or from the project site. From Figure 5-3 it is evident that the highest EC groundwater occurs in bores that are near the rock outcrop areas, with lower EC groundwater associated with the thicker areas of alluvium in the central area of the figure. It is noted that bore 165101 (local name CSWW001) records a relatively high EC, generally $>5,000 \mu\text{S/cm}$. However, the water quality record for this site (refer the bore report in Attachment A) records two occurrences where the EC was $>15,000 \mu\text{S/cm}$. It is noted from the bore report that the bore is screened from 11 to 17 metres below ground level (mbgl), partially within alluvium but mostly within the underlying weathered granite. It is interpreted that the higher EC groundwater at this site is related to the granite, and that the instances of higher EC are related to periods when the water level in the bore was low, meaning that a higher percentage of water to the bore was sourced from the granite than from the alluvium.
- Figure 5-4 shows the depth range to groundwater at each bore where data is available. It is noted that the shallow groundwater tends to be associated with the upper part of the Retreat Creek/ Police Creek system (where the bores in as screened within metamorphics and granite), becoming progressively deeper in the central sapphire mining areas (likely related to groundwater extraction in these areas), and becoming shallower in the alluvium to the east (i.e., within the Subera and Nardoo ML areas)
- It is noted that the groundwater level data that is shown in Figure 5-4 tends to be available as a single data point that was taken at the time that the bore was drilled. Therefore, the date range of the water level data is significant, and the data should be used only for the purpose of making general observations. Figure 5-5 it is evident that data for bores in the Rubyvale/Sapphire area tends to be old (for the period 1970-1980), with more recent data available for the project bores (Table 5-1) and from bores that are used as ongoing monitoring bores where recent data is available (discussed below for Figure 5-6).
- Figure 5-6 shows hydrographs for bores where data extends from 2000 to more recent (i.e., excluding data for bores that have a number of data points but the data is quite old). This includes bores CSWW001 and CSWW002, where data is shown from the GW database as well as more recent data from site monitoring. Two alluvial bores (13020006 and 13020010) have data from ~1974 to present, with Figure 5-6 showing the available data from 2000 onwards. These are the only two bores that have data available for periods of both high and low average rainfall, and the rise and fall of water levels in these bores is consistent with the trend of the rainfall residual mass curve (RRMC). As would be expected, the water level in these bores, which are both screened within Quaternary alluvium is strongly correlated with climatic trends.

Data for site production bore 89318 is available within the bore report (Attachment A) from December 1992 (when the bore was drilled) and April 1994, with the depth to water being -7.62 metres below top of casing (mTOC) and -8.50 mTOC respectively.

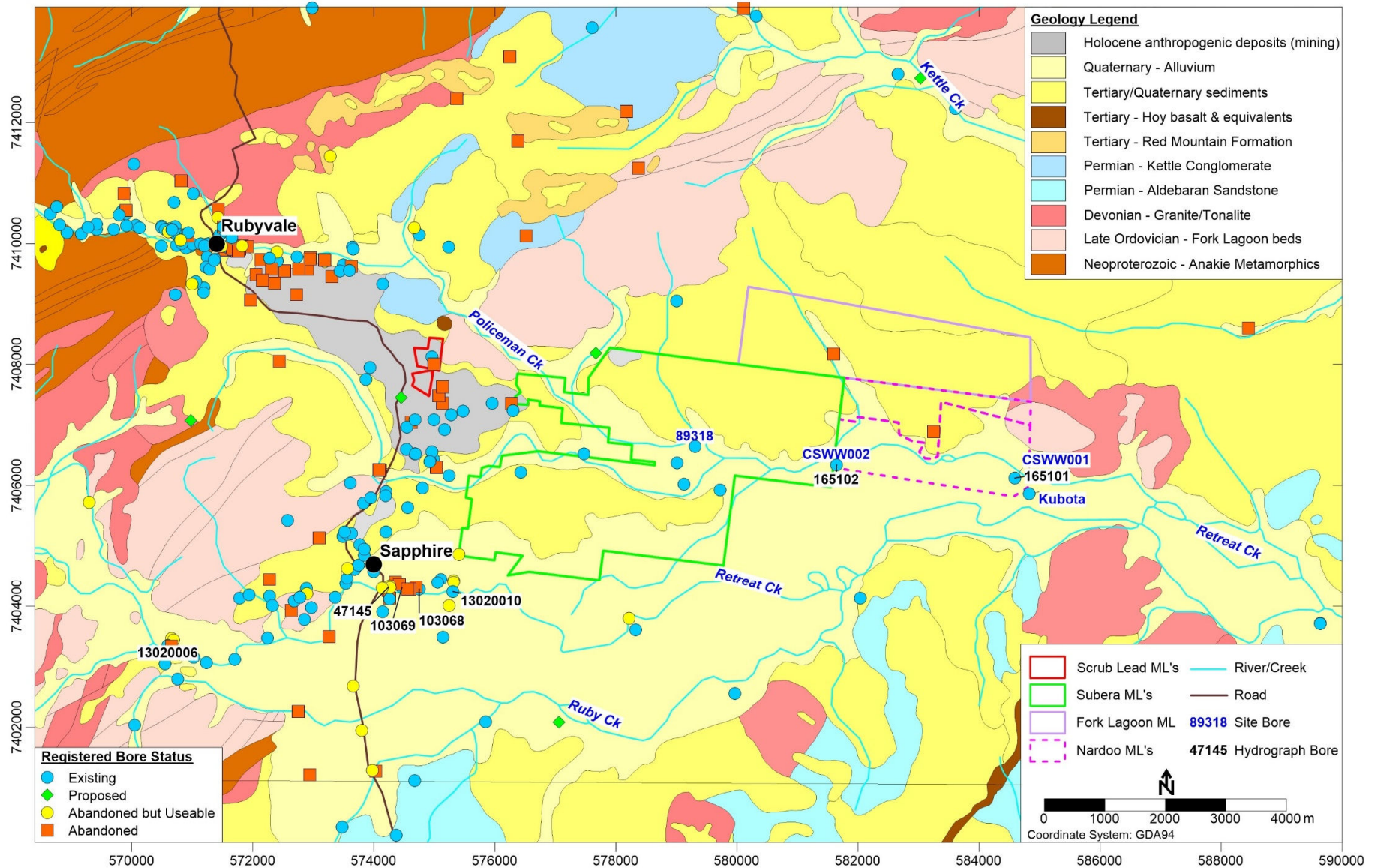


Figure 5-1: Registered Bore Location and Status

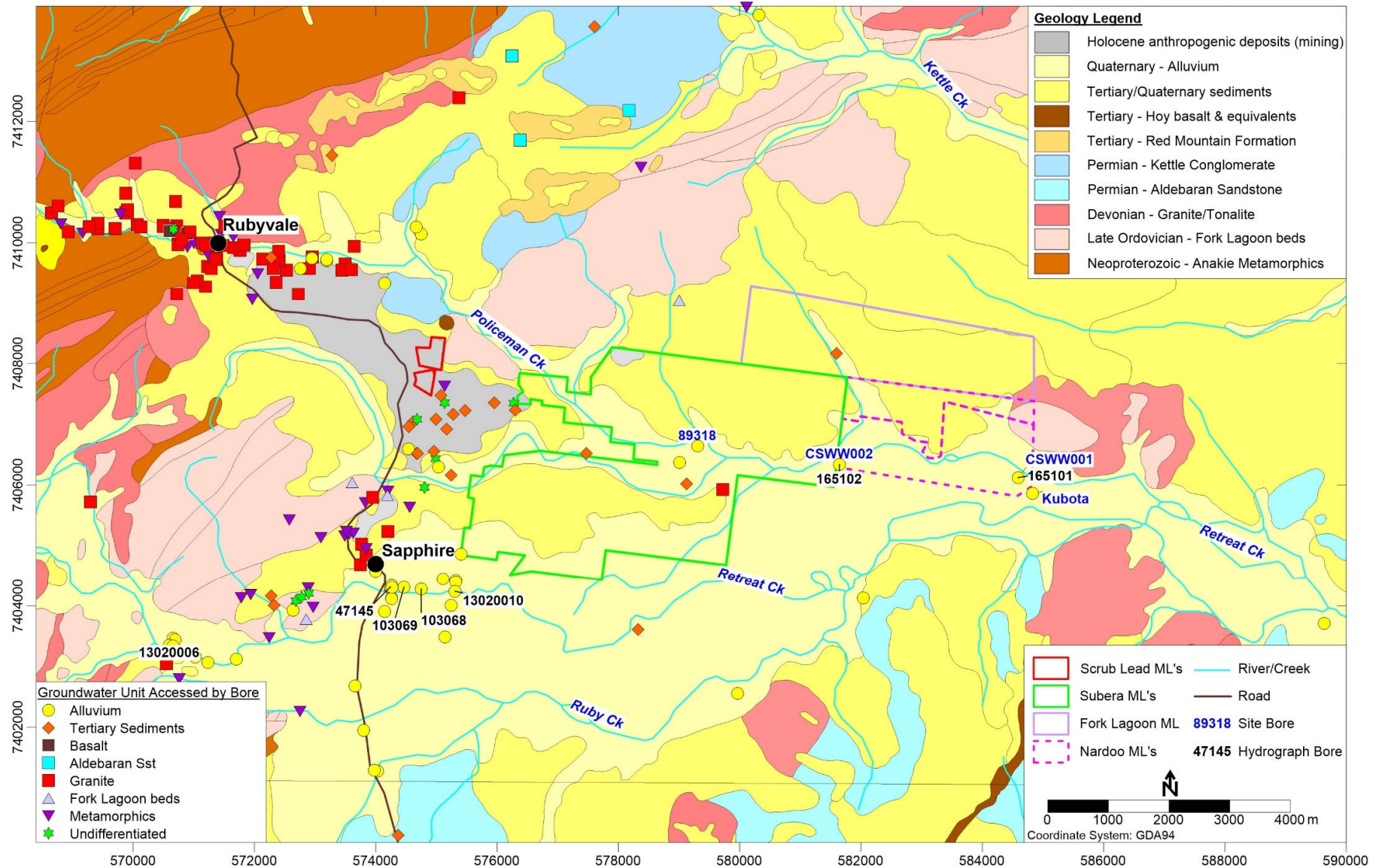


Figure 5-2: Groundwater Unit Accessed by Bore

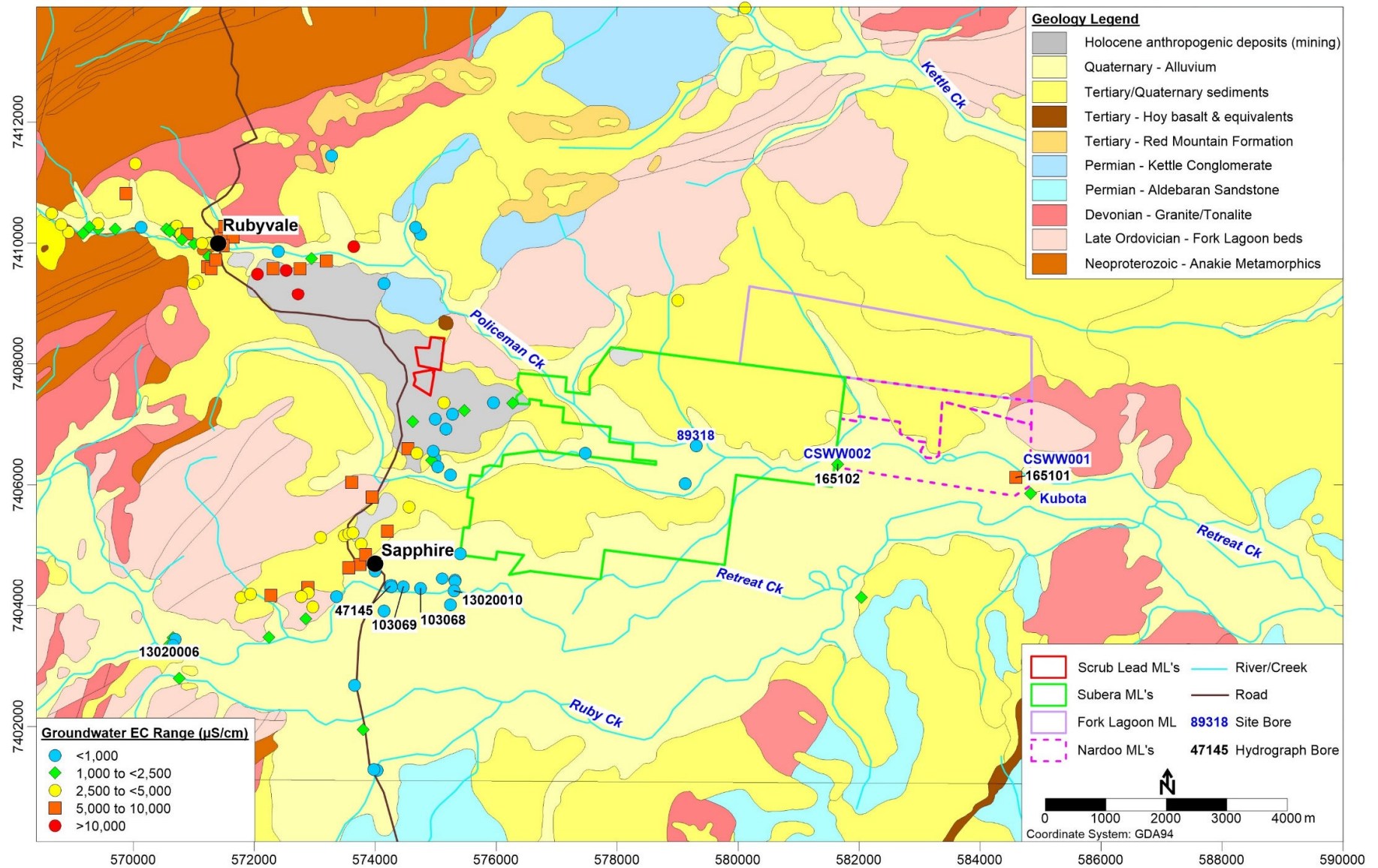


Figure 5-3: Groundwater Electrical Conductivity (EC) Range

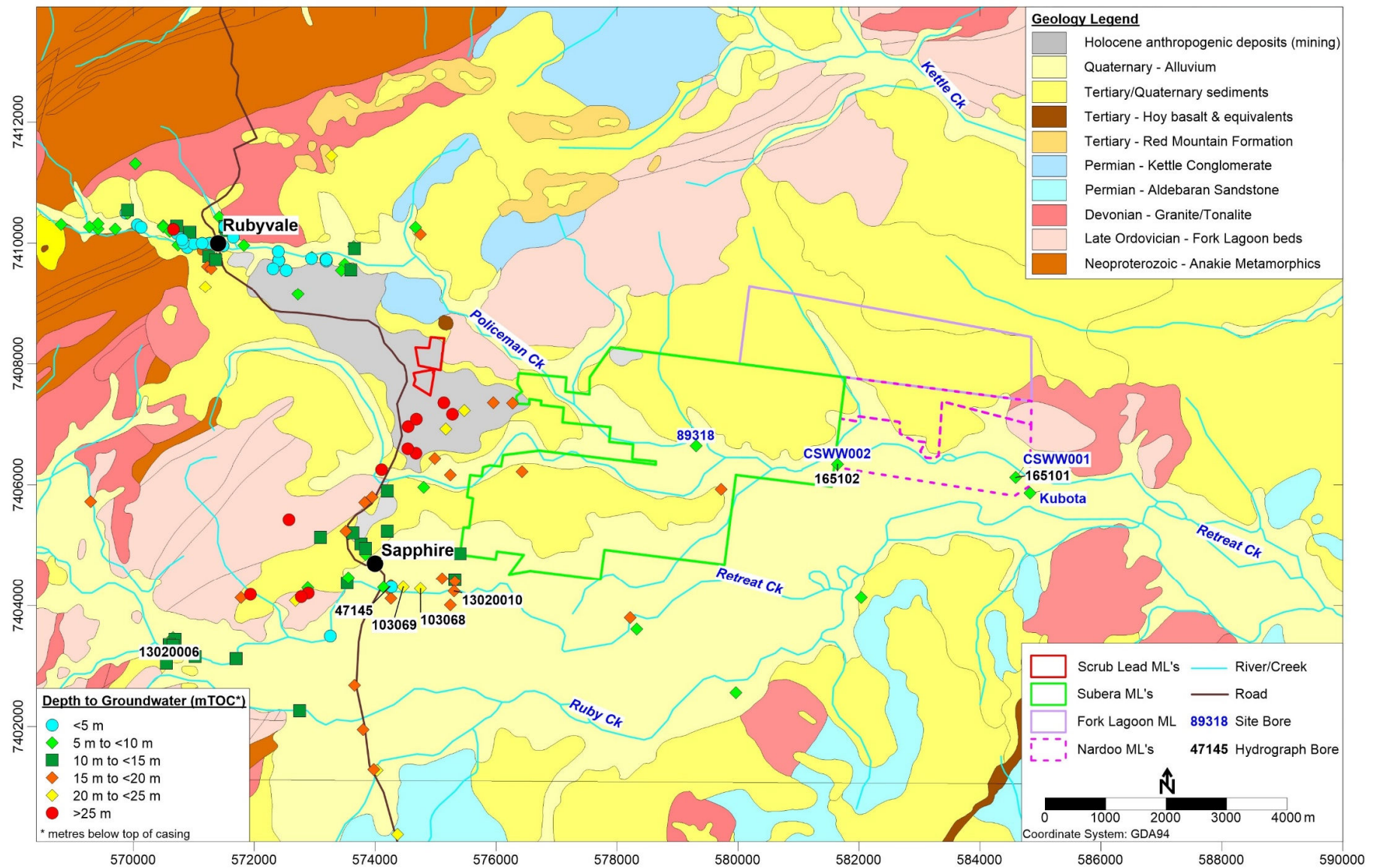


Figure 5-4: Depth to Groundwater

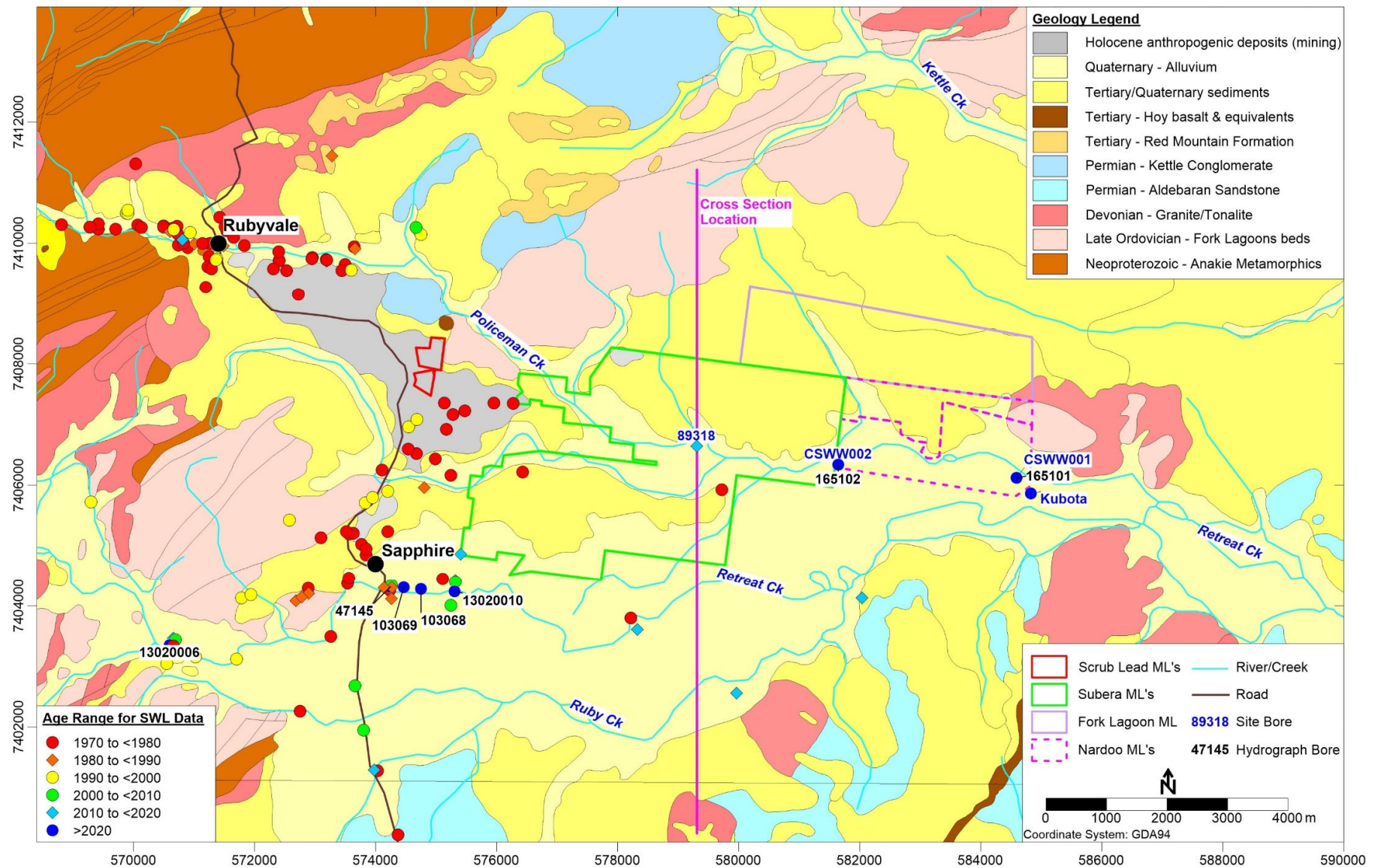


Figure 5-5: Groundwater Level Data - Age Range

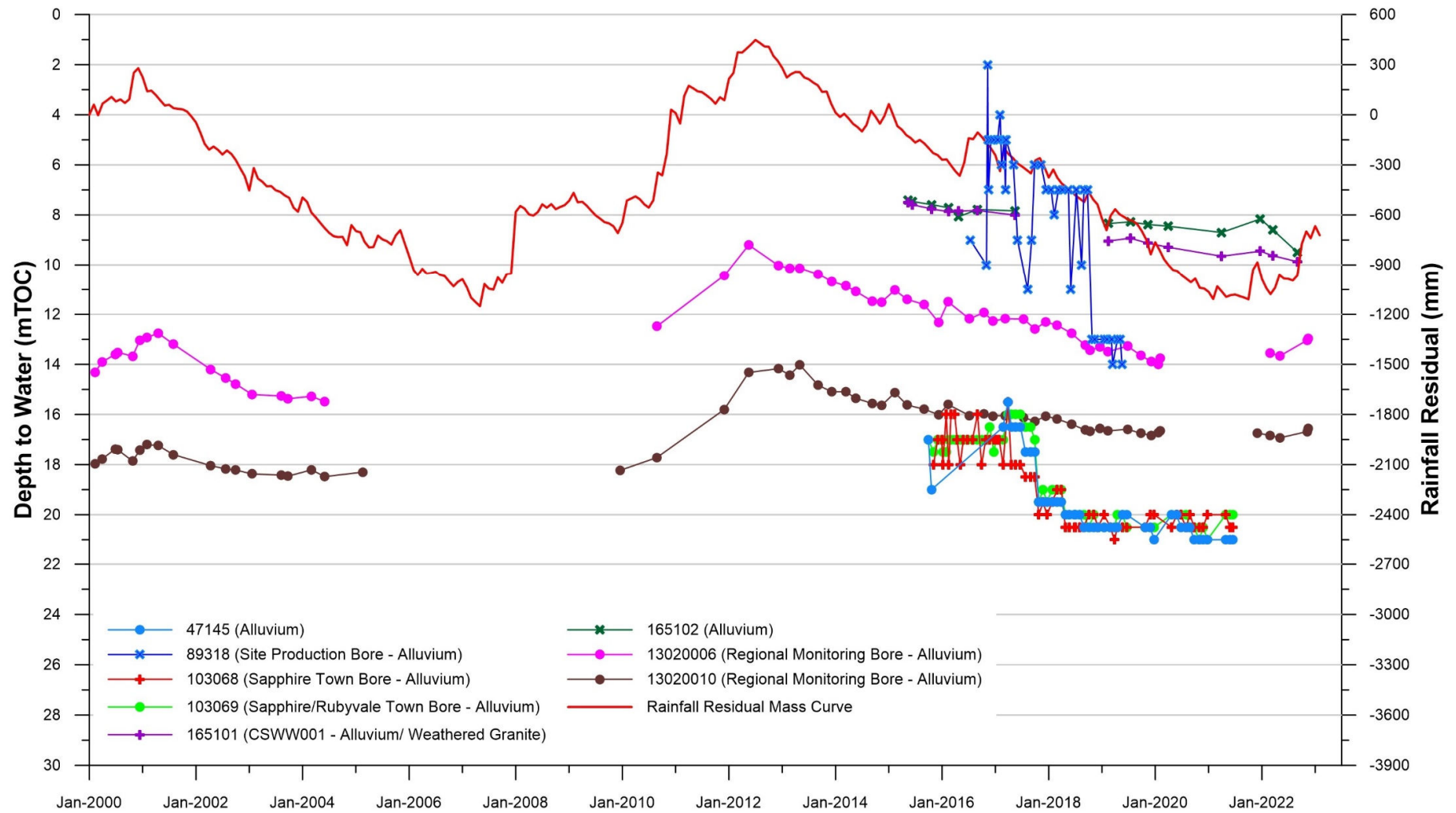


Figure 5-6: Bore Hydrographs

5.3 Groundwater Use

From the number of existing groundwater bores shown in Figure 5-1 it is evident that groundwater is an important resource in the Rubyvale/Sapphire area. A number of groundwater bores in the region also have water licence allocations; these bores (based on data available from the Queensland Government Open Data Portal¹) are shown below in Figure 5-7, with information on the water source, water use, and bore allocations shown below in Table 5-2.

Bore 89318 is the project water supply bore and has an annual allocation of 150 ML (Table 5-2).

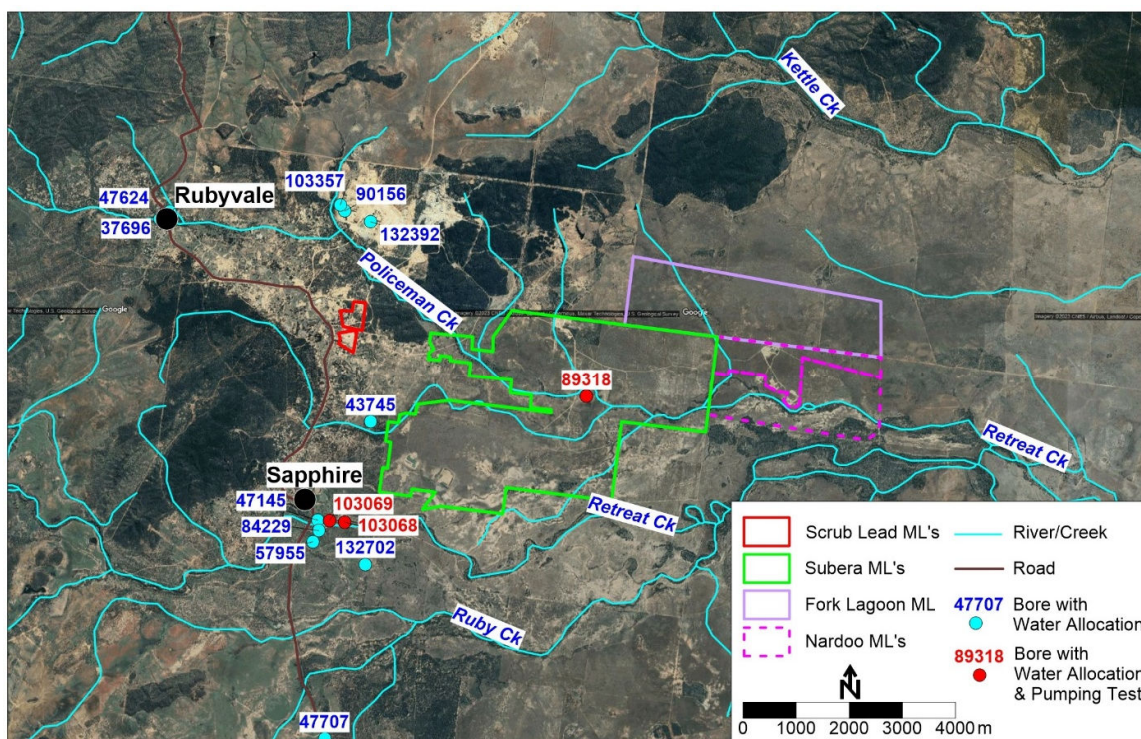


Figure 5-7: Locations of Water Allocation and Pumping Test Bores

5.4 Pumping Test Data

Of the bores that are shown in Figure 5-7, five bores have pumping test data (available from the GW database), with the available data summarised in Table 5-3. Four of the bores are water supply bores and the other bore is RN 89318, the project's production bore. All of the bores shown in Table 5-3 are screened within the alluvium, and it is evident from the data that the alluvium is relatively high-yielding, with maximum pumping test yields ranging from 9.38 L/s to 15.17 L/s, and design yields (i.e. long-term pumping yields) ranging from 5.44 L/s to 32 L/s.

¹ <https://www.data.qld.gov.au/dataset/water-entitlements>

Table 5-2: Water Allocation Data for Bores within Project Area

Bore Registered Number	Water Allocation Owner	Water Source	Authorised Purpose	Nominal Entitlement (ML/a)
89318	Great Northern Mining Pty Ltd	Sedimentary - Undiff.	Mining	150
132702	Private owners	Tertiary - Undefined	Irrigation	150
47106	Private owner	Retreat Granite	Mining; Stock	16
103068; 103069; 47145	Central Highlands Regional Council	Retreat Creek Alluvium	Any	650
47624	Vanwaratah Pty Ltd	Retreat Granite	Industrial	20
47707	Central Highlands Regional Council	Tertiary - Undefined	Urban	84
57955	Private owner	Retreat Creek Alluvium	Domestic Supply; Irrigation	75
84229	Private owner	Retreat Creek Alluvium	Aquaculture; Domestic Supply; Mining	25
103357; 132392; 90156	Lithmill Pty Ltd	Policeman Creek Alluvium	Industrial	20

Table 5-3: Summary Pumping Test Data

Bore	Test Date	Test Duration (mins)	Recovery Time (mins)	SWL at Start of Test (mTOC)	Residual DD (m)	Max Drawdown (DD) (m)	Pumping Rate at Max DD (L/s)	Design Yield (L/s)	Transmissivity (m ² /day)	Comment	Groundwater Unit
47145	9-Sep-1974	1440		-17.8			15.17	10.57	869	Central Highlands Regional Council Water Supply Bore	Alluvium
89318	26-Apr-1992	1440		-8.5	0.44	9.22	15	32	408	Site production bore	Alluvium
103068	31-Oct-1997	426	1074	-19.17	0.13	26.96	13.83			Sapphire Town Bore	Alluvium
	1-Nov-1997	4320	210	-19.3	0	26.42	11				
103069	6-Nov-1997	500	700	-19.14	0.03	27.86	15			Sapphire/Rubyvale Town Bore	Alluvium
	7-Nov-1997	4320	5760	-19.17	0.1	26.45	11.1				
47707	10-Apr-1978	4320	180	-22.7	0.48	10	9.38	5.44	490	Anakie Town Bore	Alluvium

5.5 Conceptual Groundwater Model

The conceptual groundwater model for the project area is shown below in Figure 5-8. Observations relevant to Figure 5-8 include:

- The section is a north-south section through the location of the Subera ML and site production bore 89318. The location of the section is shown in Figure 5-5;
- The topography for the section was generated from the digital elevation model that is shown in Figure 3-1; therefore, the representation and elevation of the topography in the section is accurate;
- The vertical exaggeration on the section is 20:1, in order to show detail within the relatively shallow alluvium;
- The limits of the surface geology (Tertiary and Quaternary alluvium) and underlying solid geology (Fork Lagoons beds and Devonian granite) is consistent with the data shown in the geological maps (Figure 4-1 and Figure 4-2)
- The depth of alluvium at the locations of a number of registered bores is shown on the cross section. In other areas the depth of alluvium has been estimated, but the extent of alluvium is consistent with published mapping, as described above;
- The depth to groundwater is shown for bores where data was available. Data for June 2017 was used, as this date was common to all three bores shown on the section for which water level data exists;
- The groundwater elevation (watertable) honours the available bore data, but is an estimate in all other areas.
- Essential elements of the conceptual groundwater model include:
 - The main aquifer in the region is developed within sediments of the Quaternary alluvium, which is up to 42 m thick in the section location, and up to ~53 m thick within the region;
 - The highest-yielding bores are developed within the alluvium, with the yield of a number of bores tested via pumping tests. The maximum pumping test yields ranging from 9.38 L/s to 15.17 L/s, and design yields (i.e., long-term pumping yields) ranging from 5.44 L/s to 32 L/s (Section 5.4);
 - In areas where bores are screened within the underlying bedrock aquifers, it is interpreted that this occurs in the headwaters of creeks where the alluvium is thin, and the weathered bedrock (e.g. granite) is recharged via downward drainage from the overlying creeks (refer discussion in Section 5.2);
 - Groundwater within the alluvium is of relatively low EC, generally < 1,000 µg/L. The bedrock aquifers (Fork Lagoons beds, Devonian granite) tend to record higher EC groundwater, generally >5,000 µg/L and in some cases >10,000 µg/L. At the margins of the alluvium the EC of alluvial groundwater is closer to the EC of the bedrock aquifers, indicating that inflow from the bedrock aquifers to the alluvium occurs at the marginal contacts;
 - Recharge to the alluvium is via direct rainfall recharge, or via downward seepage from the various ephemeral creeks when they are in flow; and,
 - The groundwater flow direction is generally from west to east and honours the regional topography.

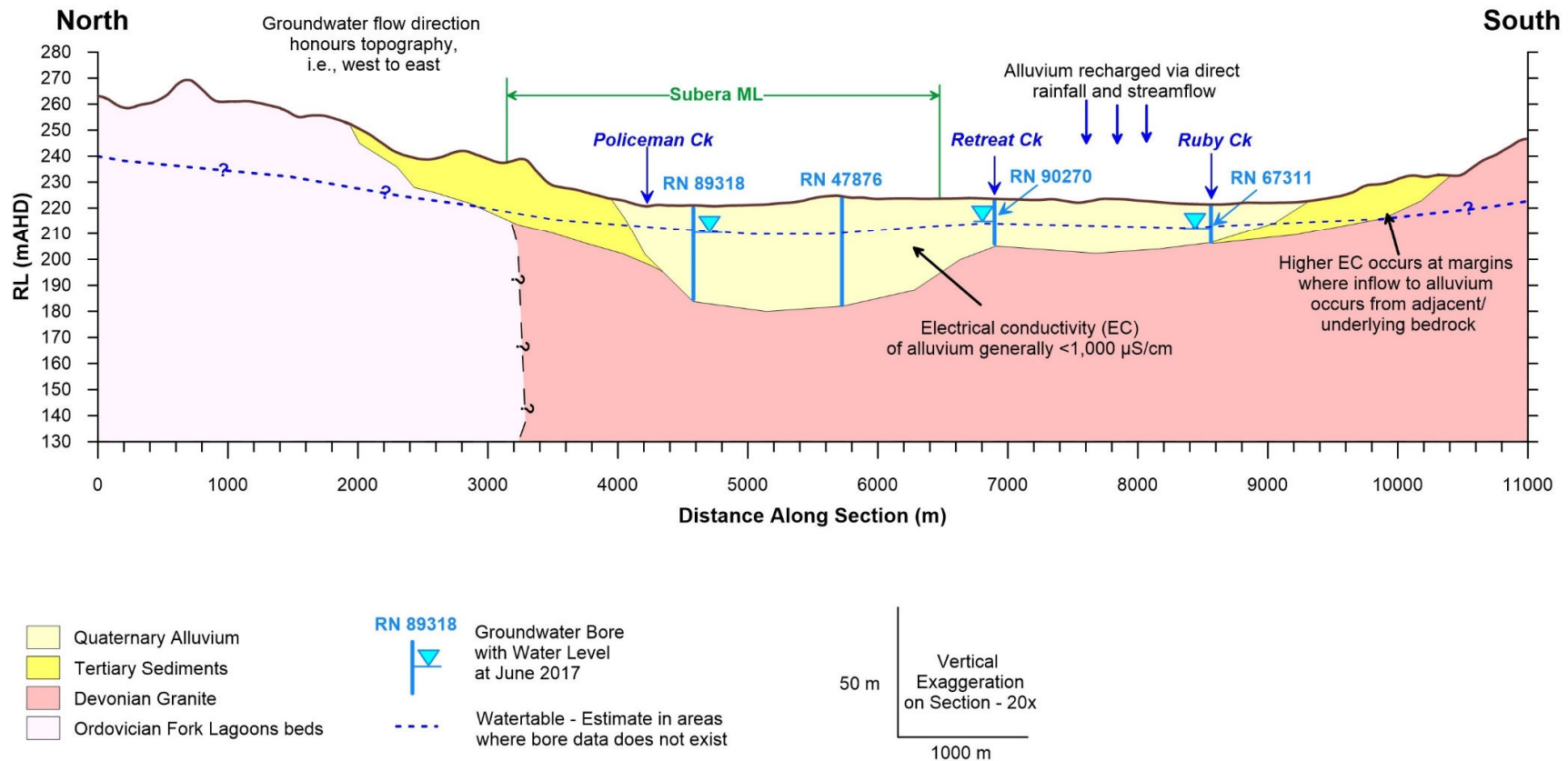


Figure 5-8: Conceptual Groundwater Model

6.0 SUMMARY AND CONCLUSIONS

The investigations undertaken for this report are summarised as follows:

- The project is located within the southern Anakie Inlier, where the main geological units include the early Palaeozoic Anakie Metamorphic Group and late Ordovician Fork Lagoons beds, which have been intruded by granitoids of the middle Devonian Retreat Batholith. The rocks of the Anakie Inlier are unconformably overlain by Permian Bowen Basin sediments of the Aldebaran Sandstone and Kettle Conglomerate. Tertiary and Quaternary alluvium, which is derived from the rock groups described above, are deposited within the alluvial plains of Policeman Creek, Retreat Creek and Ruby Creek, where alluvium thickness of up to ~53 m is recorded in the project area, with an average thickness in the order of 27 m.
- Groundwater use is predominantly from bores within the Tertiary/Quaternary sediments, though at the margins of the alluvium the bores tend to be screened within the underlying bedrock. These bores tend to be clustered around the creeks, suggesting that these bores are tapping the weathered bedrock aquifers at shallow depths where the unit is recharged via streamflow from the overlying alluvium.
- Bore 89318 is a Quaternary alluvium bore that is utilised for the project water supply via a 150 ML/a water licence allocation. Available water level data for the bore indicates that the depth to water in this bore is in the range of ~2 m to 14 mbgl, depending on the season and pumping history.
- The Quaternary alluvium appears to be a productive aquifer, with pumping tests on a number of water supply bores being undertaken at maximum pumping rates of between 9.38 L/s and 15.17 L/s, and with calculated design yields (i.e., long-term pumping yields) ranging from 5.44 L/s to 32 L/s.
- Groundwater within the alluvium is of relatively low EC, generally < 1,000 µg/L. The bedrock aquifers (Fork Lagoons beds, Devonian granite) tend to record higher EC groundwater, generally >5,000 µg/L and in some cases >10,000 µg/L. At the margins of the alluvium the EC of alluvial groundwater is closer to the EC of the bedrock aquifers, indicating that inflow from the bedrock aquifers to the alluvium occurs at the marginal contacts; and,
- Recharge to the alluvium is via direct rainfall recharge, or via downward seepage from the various ephemeral creeks when they are in flow. The groundwater flow direction honours topography, with flow generally from west to east.

JBT Consulting Pty Ltd



John Bradley
PRINCIPAL HYDROGEOLOGIST

7.0 REFERENCES

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ATTACHMENT A

Bore Reports

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
89318	Sub-Artesian Facility	Existing	13/12/1992	Emerald	2270 - CENTRAL HIGHLANDS REGIONAL
Details			Location		
Description	P9		Latitude	23-26-53	Basin1302
Parish	109 - ANAKIE		Longitude	147-46-35	Sub-area
Original Name	MINING BORE		GIS Latitude	-23.4482473	Lot9
			GIS Longitude	147.7764354	PlanPT203
			Easting	579307	
Driller Name	ROBERTS N		Northing	7406644	Map Scale104 - 1: 100 000
Drill Company	DEPCO		Zone	55	Map SeriesM - Metric Series
Const Method	ROTARY		Accuracy	UNKN	Map No8451
Bore Line			GPS Accuracy		Map NameRUBYVALE
D/O File No	50-0974	Polygon	Checked	Yes	Prog Section
R/O File No	500974	Equipment			
H/O File No		RN of Bore Replaced			
Log Received Date		Data Owner			
Roles	Water Supply				

Casing

3 records for RN 89318

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	13/12/1992	1	0.00	32.00	Plastic Casing			203
A	13/12/1992	2	32.00	35.00	Screen	1.520	AP - Aperture Size	203
A	13/12/1992	3	0.00	35.00	Gravel Pack	6.000	GR - Gravel Size	355

Strata Logs

4 records for RN 89318

Queensland Government
Groundwater Information
Bore Report

Page: 2 of 4
GWDB8250

Report Date: 27/04/2023 17:10

From Year:

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	7.90	TOPSOIL AND CLAY
2	7.90	11.80	GEM WASH
3	11.80	24.30	CLAY GRAVEL AND MUDSTONE
4	24.30	35.00	GRAVEYARD GRAVEL

Stratigraphies

1 records for RN 89318

Source	Rec	Top (m)	Bottom (m)	Strata Description
DNR	1			RETREAT CREEK ALLUVIUM

Aquifers

1 records for RN 89318

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	25.00	35.00	GRAV - Gravel	13/12/1992	-7.62	N	430US/CM	12.36	Y	UC	TERTIARY - UNDEFINED

Pump Tests Part 1

1 records for RN 89318

Pipe	Date	Rec	RN of Pumped Bore	Top (m)	Bottom (m)	Dist (m)	Meth	Test Types	Pump Type	Suction Set (m)	Q Prior to Test (l/s)	Dur of Q PR (mins)	Pres on Arriv (m)	Q on Arriv (l/s)
A	26/04/1994	1	89318	32.00	35.00		PUM	CQ	SUBMER SIBLE?	31.70				

Pump Tests Part 2

1 records for RN 89318

Pipe	Date	Rec	Test Dur (mins)	SWL(m)	Recov Time (mins)	Resid DD (m)	Max DD or P RED (m)	Q at Max DD (l/s)	Time to Max DD (mins)	Max Q (l/s)	Calc Stat HD (m)	Design Yield (l/s)	Design BP (m)	Suct. Set (m)	Tmsy (m2/Day)	Stor
A	26/04/1994	1	1440	-8.50	300	0.44	9.22	15.00				30.00	32.00	31.70	408	

Bore Conditions												0	records for RN	89318
Elevations												0	records for RN	89318
Water Analysis Part 1												0	records for RN	89318
Water Analysis Part 2												0	records for RN	89318
Water Levels												2	records for RN	89318
Pipe	Date	Time	Measure (m)	Meas	Point	Remark	Meas	Type	Coll Auth	Coll	Method	Project	Quality	
A	26/04/1994		-8.50	R	Reference Point		NR	Not Recorded	NR	NR	Not Recorded		130 Data is of unknown quality	
X	13/12/1992		-7.62	N	Natural Surface		NR	Not Recorded	NR	NR	Not Recorded		130 Data is of unknown quality	
Wire Line Logs												0	records for RN	89318
Field Measurements												0	records for RN	89318
Special Water Analysis												0	records for RN	89318

From Year:

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From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
165101	Sub-Artesian Facility	Existing	25/04/2015	Emerald	2270 - CENTRAL HIGHLANDS REGIONAL

Details			Location		
Description			Latitude	23-27-10	Basin 1302
Parish	109 - ANAKIE		Longitude	147-49-41	Sub-area
Original Name	CSWW001		GIS Latitude	-23.45267934	Lot 96
			GIS Longitude	147.82818472	Plan SP227975
			Easting	584590	
			Northing	7406124	Map Scale
Driller Name	LORGER, DANIEL PAUL		Zone	55	Map Series
Drill Company			Accuracy		Map No
Const Method	ROTARY AIR		GPS Accuracy		Map Name
Bore Line			Checked	Yes	Prog Section
D/O File No	TROC0022	Polygon			
R/O File No		Equipment			
H/O File No		RN of Bore Replaced			
Log Received Date	25/04/2015	Data Owner			
Roles	Mine Monitoring				

Casing

5 records for RN 165101

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	25/04/2015	1	0.00	20.00	Polyvinyl Chloride	2.600	WT - Wall Thickness	60
A	25/04/2015	2	11.00	17.00	Perforated or Slotted Casing	0.800	AP - Aperture Size	60
A	25/04/2015	3	6.00	20.00	Gravel Pack	3.000	GR - Gravel Size	115
X	25/04/2015	4	0.00	6.00	Grout			115
X	25/04/2015	5	6.00	6.20	Bentonite Seal			115

From Year:

Strata Logs 6 records for RN 165101

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	1.50	TOP SOIL
2	1.50	5.00	SAND, FINE
3	5.00	9.00	SAND, COARSE WITH MINOR CLAY
4	9.00	10.50	GRAVEL/CLAY MIX
5	10.50	11.00	CLAY SAND
6	11.00	20.00	WEATHERED GRANITE, CLAY MIX

Stratigraphies 0 records for RN 165101

Aquifers 1 records for RN 165101

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	15.00		XXXX - Unknown			N	POTABLE		N	WZ	POLICEMAN CREEK ALLUVIUM

Pump Tests Part 1 0 records for RN 165101

Pump Tests Part 2 0 records for RN 165101

Bore Conditions 0 records for RN 165101

Elevations 1 records for RN 165101

Pipe	Date	Elevation (m)	Precision	Datum	Meas	Point	Survey Source
A	25/04/2015	214.00	GPS	Global Positioning System	AHD - Aust. Height Datum	R	Reference Point ELEVATION FROM GOOGLE EARTH

Water Analysis Part 1 0 records for RN 165101

Water Analysis Part 2 0 records for RN 165101

From Year:

Water Levels 11 records for RN 165101

Pipe	Date	Time	Measure (m)	Meas Point	Remark	Meas Type	Coll Auth	Coll	Method	Project	Quality
A	13/05/2015		-7.50	R	Reference Point	ACT Actual	XX	MA	Manual/Hand		130 Data is of unknown quality
A	10/06/2015		-7.59	R	Reference Point	ACT Actual	XX	MA	Manual/Hand		130 Data is of unknown quality
A	22/10/2015		-7.76	R	Reference Point	ACT Actual	XX	MA	Manual/Hand		130 Data is of unknown quality
A	14/02/2016		-7.87	R	Reference Point	ACT Actual	XX	MA	Manual/Hand	PR	130 Data is of unknown quality
A	24/04/2016		-7.85	R	Reference Point	ACT Actual	XX	MA	Manual/Hand	PR	130 Data is of unknown quality
A	31/08/2016		-7.82	R	Reference Point	ACT Actual	XX	MA	Manual/Hand	PR	130 Data is of unknown quality
A	16/05/2017		-8.01	R	Reference Point	ACT Actual	XX	XX	Unknown		130 Data is of unknown quality
A	13/02/2019		-9.04	R	Reference Point	ACT Actual	XX	MA	Manual/Hand	XX	130 Data is of unknown quality
A	15/07/2019		-8.93	R	Reference Point	ACT Actual	XX	XX	Unknown		130 Data is of unknown quality
A	12/11/2019		-9.13	R	Reference Point	ACT Actual	XX	XX	Unknown		130 Data is of unknown quality
A	31/03/2020		-9.29	R	Reference Point	ACT Actual	XX	XX	Unknown		130 Data is of unknown quality

Wire Line Logs 0 records for RN 165101

Field Measurements 10 records for RN 165101

Pipe	Date	Depth (m)	Conduct (uS/cm)	pH	Temp (C)	NO3 (mg/L)	DO2 (mg/L)	Eh (mV)	Alkalinity (mV)	Samp	Method	Samp	Source
A	10/06/2015		6267	8.1	26.7					XX	Unknown	GB	Groundwater - from Bore
A	22/10/2015		6050	8.1	34.7					XX	Unknown	GB	Groundwater - from Bore
A	14/02/2016		6430	8.3	28.8					PU	Pump - Other or Flowing Bore	GB	Groundwater - from Bore
A	24/04/2016		4910	7.9	30.9					PU	Pump - Other or Flowing Bore	GB	Groundwater - from Bore
A	31/08/2016		3510	7.9	26.6					PU	Pump - Other or Flowing Bore	GB	Groundwater - from Bore

From Year:

Pipe	Date	Depth (m)	Conduct (uS/cm)	pH	Temp (C)	NO3 (mg/L)	DO2 (mg/L)	Eh (mV)	Alkalinity (mV)	Samp	Method	Samp	Source
A	16/05/2017		3320	7.1	25.9					PU	Pump - Other or Flowing Bore	GB	Groundwater - from Bore
A	13/02/2019		17224	6.7	27.8					PU	Pump - Other or Flowing Bore	GB	Groundwater - from Bore
A	15/07/2019		15293	5.9	22.4					PU	Pump - Other or Flowing Bore	GB	Groundwater - from Bore
A	12/11/2019		3443	6.9	26.1					PU	Pump - Other or Flowing Bore	GB	Groundwater - from Bore
A	31/03/2020		5370	7.9	26.9					PU	Pump - Other or Flowing Bore	GB	Groundwater - from Bore

Special Water Analysis	0 records for RN 165101
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From Year:

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From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
165102	Sub-Artesian Facility	Existing	25/04/2015	Emerald	2270 - CENTRAL HIGHLANDS REGIONAL

Details			Location		
Description			Latitude	23-27-03	Basin 1302
Parish	109 - ANAKIE		Longitude	147-47-58	Sub-area
Original Name	CSWW002		GIS Latitude	-23.45086072	Lot 96
			GIS Longitude	147.79934184	Plan SP227975
			Easting	581645	
Driller Name	LORGER, DANIEL PAUL		Northing	7406342	Map Scale
Drill Company			Zone	55	Map Series
Const Method	ROTARY AIR		Accuracy		Map No
Bore Line			GPS Accuracy		Map Name
D/O File No	TROC0022	Polygon	Checked	Yes	Prog Section
R/O File No		Equipment			
H/O File No		RN of Bore Replaced			
Log Received Date	25/04/2015	Data Owner			
Roles	Mine Monitoring				

Casing

4 records for RN 165102

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	25/04/2015	1	0.00	18.00	Polyvinyl Chloride	2.600	WT - Wall Thickness	60
A	25/04/2015	2	9.00	15.00	Perforated or Slotted Casing	0.800	AP - Aperture Size	60
A	25/04/2015	3	6.00	18.00	Gravel Pack	3.000	GR - Gravel Size	115
X	25/04/2015	4	0.00	6.00	Grout			115

Strata Logs

6 records for RN 165102

From Year:

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	1.00	TOP SOIL
2	1.00	4.00	SAND, FINE
3	4.00	7.00	SAND, COARSE
4	7.00	14.50	SAND, COARSE AND CLAY
5	14.50	16.00	GRAVEL
6	16.00	18.00	GRANITE, WEATHERED

Stratigraphies	0 records for RN 165102
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Aquifers	1 records for RN 165102
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Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	11.00		GRAV - Gravel			N	POTABLE		N	UC	POLICEMAN CREEK ALLUVIUM

Pump Tests Part 1	0 records for RN 165102
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Pump Tests Part 2	0 records for RN 165102
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Bore Conditions	0 records for RN 165102
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Elevations	1 records for RN 165102
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Pipe	Date	Elevation (m)	Precision	Datum	Meas	Point	Survey Source
A	25/04/2015	218.00	GPS	Global Positioning System	AHD - Aust. Height Datum	R	Reference Point ELEVATION FROM GOOGLE EARTH

Water Analysis Part 1	0 records for RN 165102
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Water Analysis Part 2	0 records for RN 165102
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Water Levels	11 records for RN 165102
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Queensland Government
Groundwater Information
Bore Report

From Year:

Pipe	Date	Time	Measure (m)	Meas	Point	Remark	Meas	Type	Coll Auth	Coll	Method	Project	Quality
A	13/05/2015		-7.41	R	Reference Point		ACT	Actual	XX	MA	Manual/Hand		130 Data is of unknown quality
A	10/06/2015		-7.46	R	Reference Point		ACT	Actual	XX	MA	Manual/Hand		130 Data is of unknown quality
A	22/10/2015		-7.59	R	Reference Point		ACT	Actual	XX	MA	Manual/Hand		130 Data is of unknown quality
A	14/02/2016		-7.71	R	Reference Point		ACT	Actual	XX	MA	Manual/Hand	PR	130 Data is of unknown quality
A	24/04/2016		-8.07	R	Reference Point		ACT	Actual	XX	MA	Manual/Hand	PR	130 Data is of unknown quality
A	31/08/2016		-7.78	R	Reference Point		ACT	Actual	XX	MA	Manual/Hand	PR	130 Data is of unknown quality
A	16/05/2017		-7.84	R	Reference Point		ACT	Actual	XX	XX	Unknown		130 Data is of unknown quality
A	13/02/2019		-8.34	R	Reference Point		ACT	Actual	XX	MA	Manual/Hand	XX	130 Data is of unknown quality
A	15/07/2019		-8.28	R	Reference Point		ACT	Actual	XX	XX	Unknown		130 Data is of unknown quality
A	12/11/2019		-8.38	R	Reference Point		ACT	Actual	XX	XX	Unknown		130 Data is of unknown quality
A	31/03/2020		-8.45	R	Reference Point		ACT	Actual	XX	XX	Unknown		130 Data is of unknown quality

Wire Line Logs

0 records for RN 165102

Field Measurements

10 records for RN 165102

Pipe	Date	Depth (m)	Conduct (uS/cm)	pH	Temp (C)	NO3 (mg/L)	DO2 (mg/L)	Eh (mV)	Alkalinity (mV)	Samp	Method	Samp	Source
A	10/06/2015		1437	7.9	26.6					XX	Unknown	GB	Groundwater - from Bore
A	22/10/2015		1350	7.9	32.8					XX	Unknown	GB	Groundwater - from Bore
A	14/02/2016		1290	8.3	30.8					PU	Pump - Other or Flowing Bore	GB	Groundwater - from Bore
A	24/04/2016		1302	8.1	27.7					PU	Pump - Other or Flowing Bore	GB	Groundwater - from Bore
A	31/08/2016		1316	8.0	26.5					PU	Pump - Other or Flowing Bore	GB	Groundwater - from Bore
A	16/05/2017		1330	7.0	24.3					PU	Pump - Other or Flowing Bore	GB	Groundwater - from Bore

From Year:

Pipe	Date	Depth (m)	Conduct (uS/cm)	pH	Temp (C)	NO3 (mg/L)	DO2 (mg/L)	Eh (mV)	Alkalinity (mV)	Samp	Method	Samp	Source
A	13/02/2019		1338	7.0	28.4					PU	Pump - Other or Flowing Bore	GB	Groundwater - from Bore
A	15/07/2019		1403	7.1	20.4					PU	Pump - Other or Flowing Bore	GB	Groundwater - from Bore
A	12/11/2019		1359	7.2	26.6					PU	Pump - Other or Flowing Bore	GB	Groundwater - from Bore
A	31/03/2020		1244	7.0	27.8					PU	Pump - Other or Flowing Bore	GB	Groundwater - from Bore

Special Water Analysis	0 records for RN 165102
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From Year:

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L & L Benney
Subera
Sapphire Qld

17 March 2002

To Whom it May Concern

Re: Great Northern Mining on Subera Property

We wish to confirm that we have requested Great Northern Mining to provide us with a permanent dam at the Nardoo South pit site as part of the final rehabilitation process. The approximate location of this dam is shown on the accompanying plan.

Yours sincerely

A handwritten signature in cursive script, reading "L. R. Benney". The signature is written in dark ink and is positioned below the "Yours sincerely" line.

L & L Benney

L & L Benney
Subera
Sapphire Qld

12 May 2002

To Whom it May Concern

Re: Great Northern Mining on Subera Property

I wish to confirm the following points concerning Great Northern Mining's operations on Subera property:

1. The office and workshop buildings around the plant site will be given to me by Great Northern Mining at the conclusion of mining at Subera. This is part of the purchase agreement for the property and as such I will not be requiring they be removed.
2. The old treatment plant site and dam areas within the compound area are not required to be returned to the original land contours. These areas are to be rounded off, the topsoil returned and then re-seeded but the final landform will contain a contoured mound. I am in agreement with this proposal as it enables the provision of dams on other areas of my property. The rehabilitation process in this area is already well advanced.
3. The haulroads used by Great Northern on Subera are almost totally upgraded versions of existing farm tracks and in most cases I have requested they be left at the completion of mining.
4. I have requested Great Northern to provide me with a number of permanent dams as part of the final rehabilitation process. There are currently four such dams constructed that I have requested:
 - one at Poinseta pit
 - one at Eastern Creek pit
 - two in the Laneway pit

It is likely there will be other dams that I request before mining is completed.

5. At this point in time I am more than satisfied with Great Northern Mining's mining and rehabilitation activities on Subera. Our relationship is extremely good with Great Northern always consulting me concerning their plans and my requirements with respect to day to day mining operations and final land rehabilitation. There are no ongoing issues requiring resolution between us.

Yours sincerely

L R Benney
L. Benney
L Benney

Shane & Patricia Benney
P.O. Box 62
Clermont Qld 4721
Ph: 0437 630 414

To Whom It May Concern

Agreement with Great Northern Mining on "Subera" Property (Lot 9 PT203)

We have requested that Great Northern Mining Pty Ltd (GNM) convert the mining void at Pig Pit to a permanent stock water storage. This action has been agreed to by Great Northern Mining Pty Ltd.

The Pig Pit Stock Water Storage was reshaped from a mining void and the surrounds were rehabilitated during Dec 2011. The location of this storage is E 580938 N 7406341GDA 94.

We are very satisfied with this water storage and may request further voids on other mining sites be developed for stock water storage in the future.

Yours sincerely,

Shane and Patricia Benney

SCR Benney

P.M. Benney

Date:

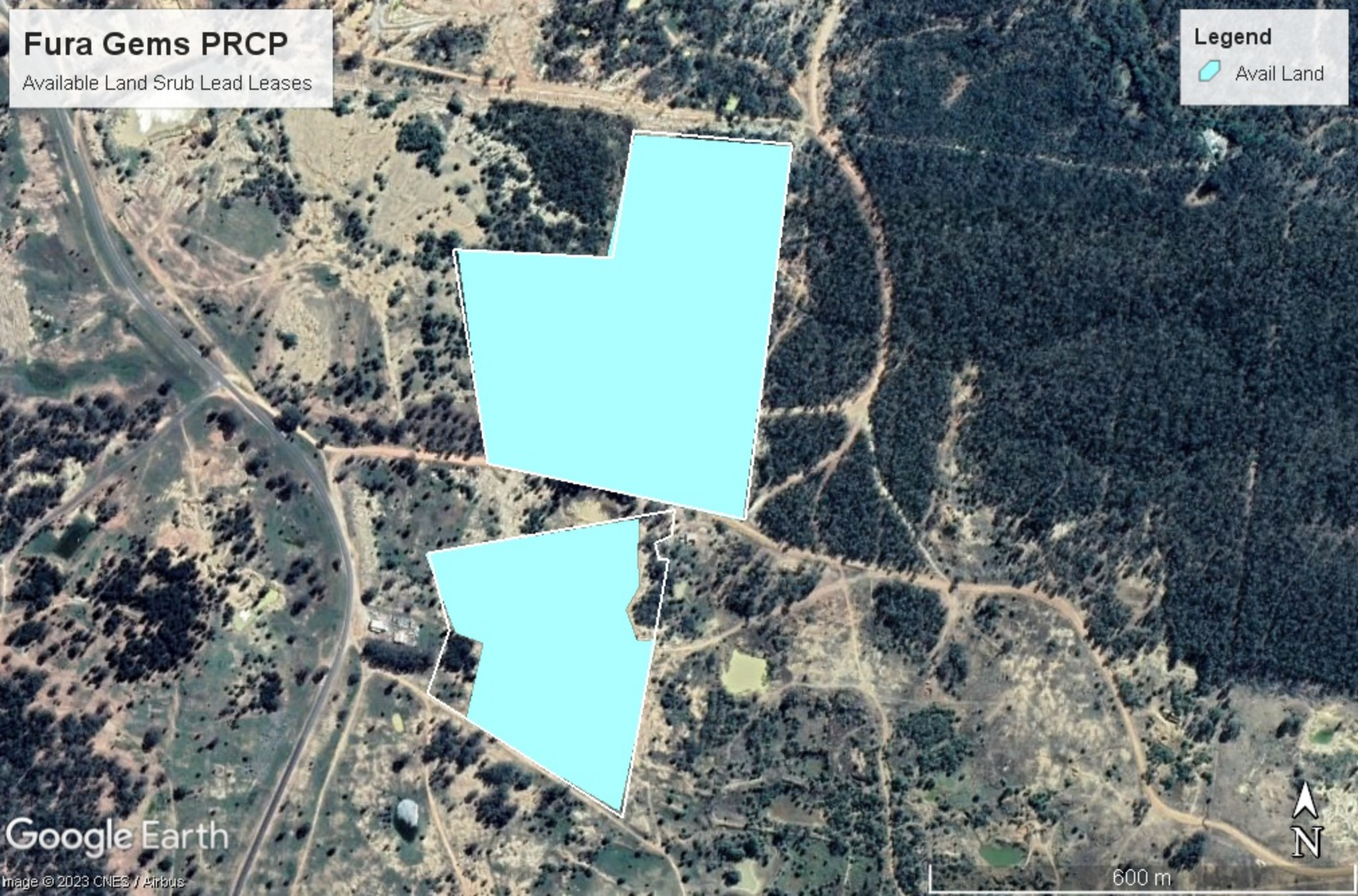
6/4/2023

Fura Gems PRCP

Available Land Srub Lead Leases

Legend

 Avail Land

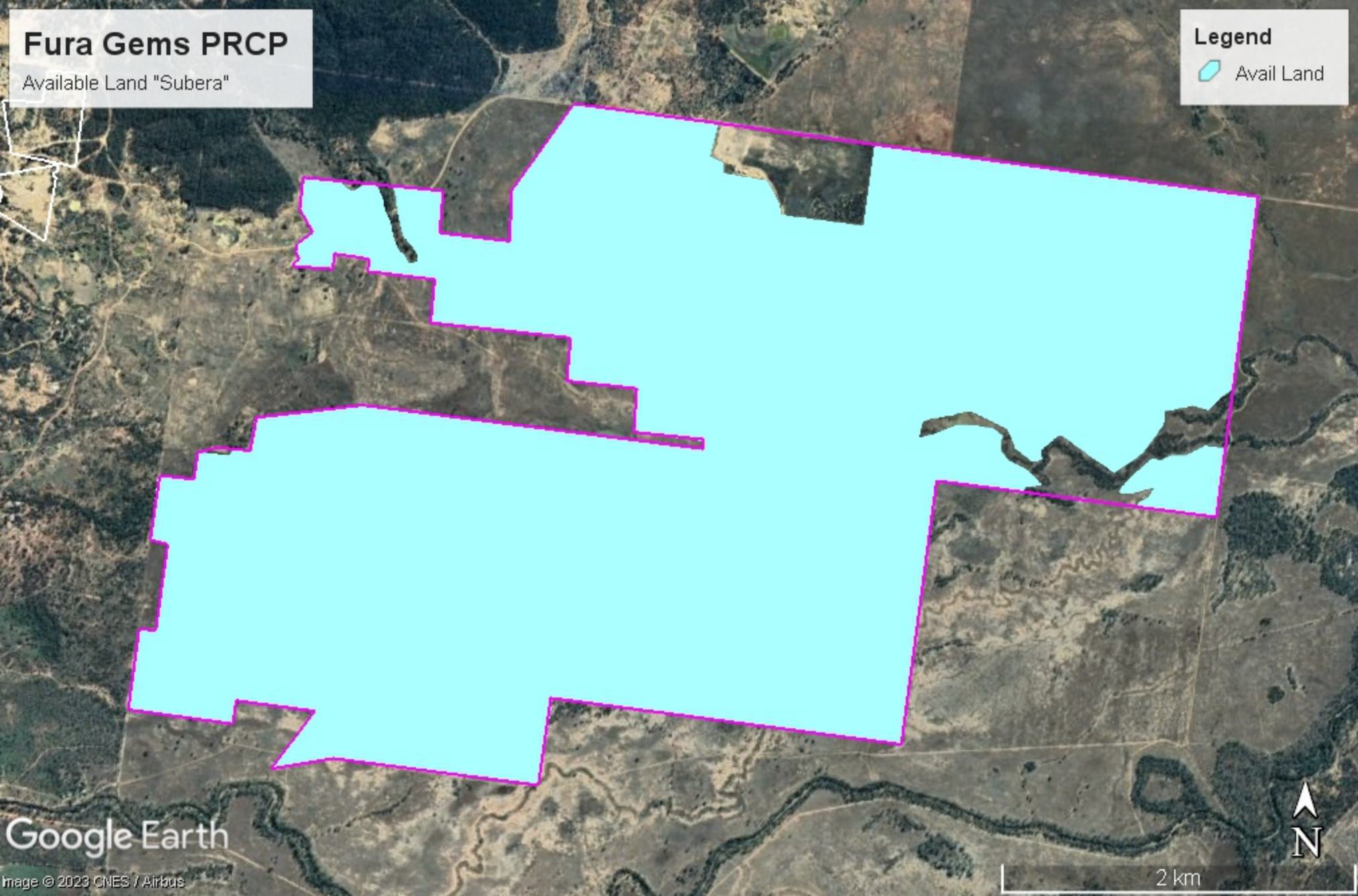


Fura Gems PRCP

Available Land "Subera"

Legend

 Avail Land



Google Earth

Image © 2023 CNES / Airbus

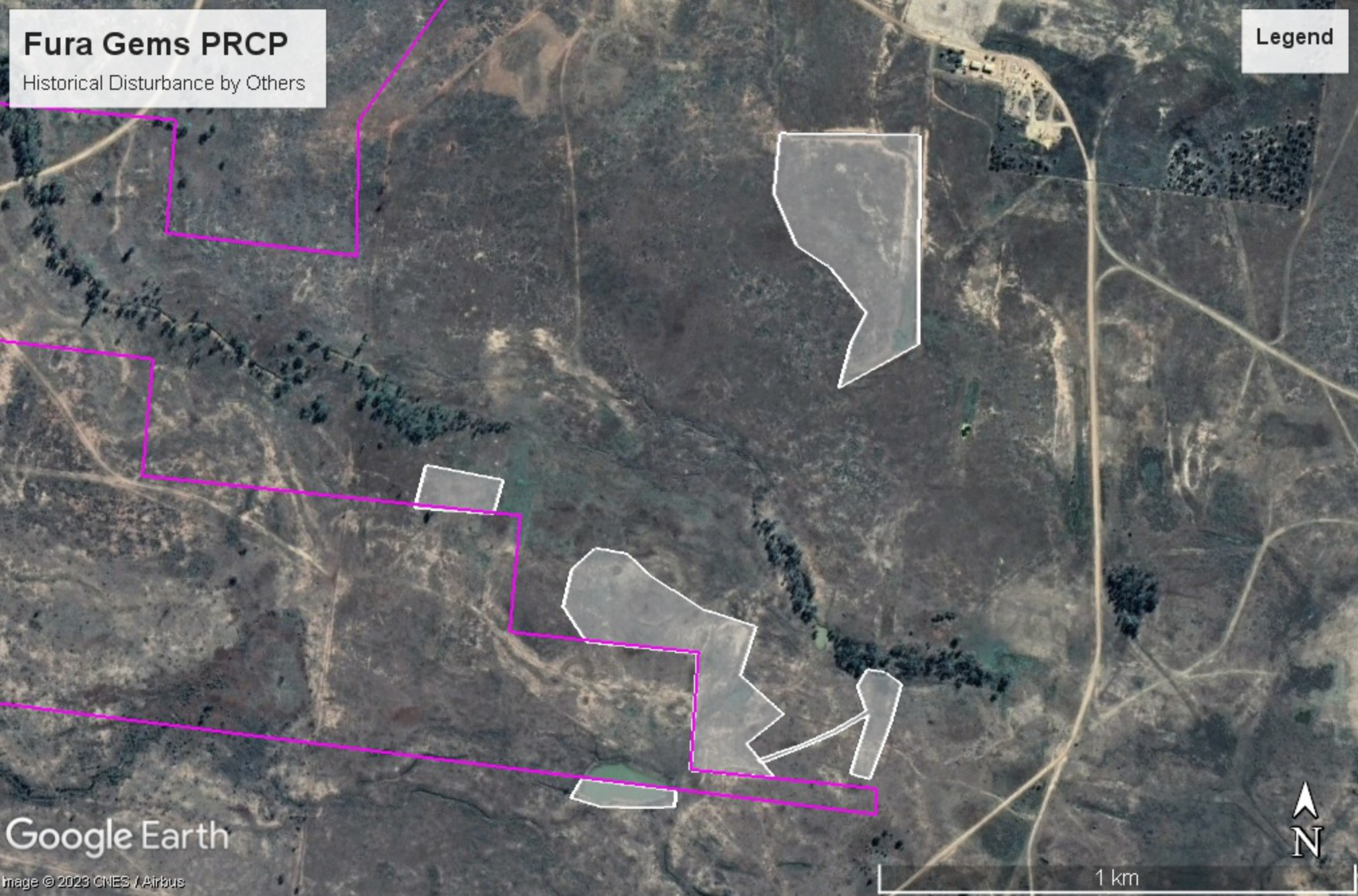
2 km



Fura Gems PRCP

Historical Disturbance by Others

Legend



Google Earth

Image © 2023 CNES / Airbus



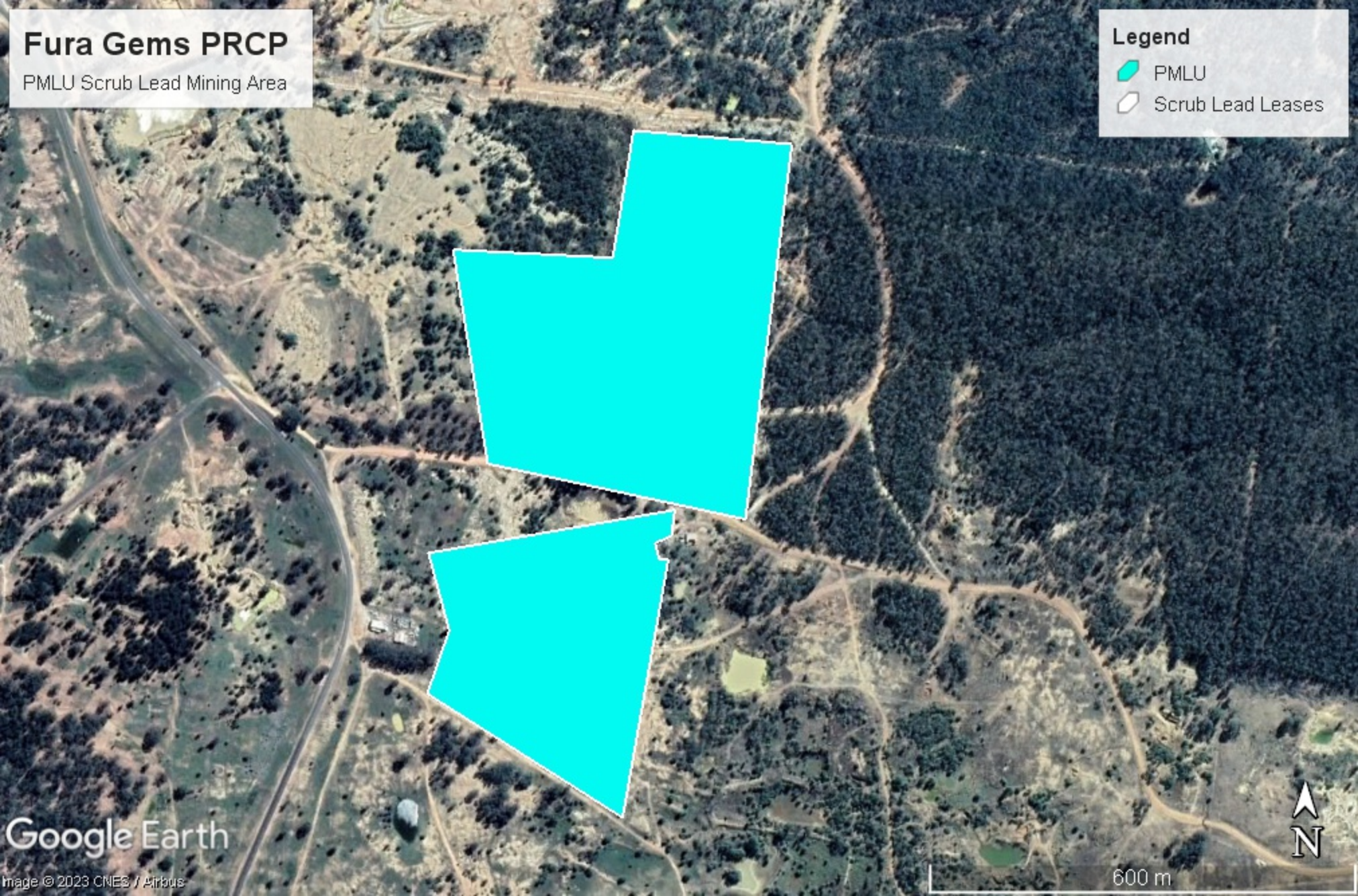
1 km

Fura Gems PRCP

PMLU Scrub Lead Mining Area

Legend

-  PMLU
-  Scrub Lead Leases



Google Earth

Image © 2023 CNES / Airbus

600 m



Fura Gems PRCP

"Subera" Rehabilitation Areas
RA2 - Mining Areas
RA3 - Industrial Area
RA4 - Roads and Tracks
RA5 - Certified Rehabilitaiton

Legend

 RA2

 RA3

 RA4

 RA5 Rejects Hill

