

Chapter 4
Project Description

ESMERALDA GRAPHITE PROJECT

aarc ENVIRONMENTAL SOLUTIONS
APEM Group

GRAPHINEX

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Glossary, acronyms and abbreviations

Acronym or Abbreviation	Meaning
ABARES	Australian Land Use Management Classification
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
ALC	Australian Land Classification
AS	Australian Standard
BOM	Bureau of Meteorology
CSIRO	Commonwealth Scientific and Industry Research Organisation
DAF	Department of Agriculture and Fisheries
DEHP	Department of Environment and Heritage Protection
DES	Department of Environment and Science
DESI	Department of Environment, Science and Innovation
DETSI	Department of the Environment, Tourism, Science and Innovation
DIDO	drive-in-drive-out
DILGP	Department of Infrastructure, Local Government and Planning
DNRME	Department of Natural Resources, Mines and Energy
DNRMMRRD	Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development
DPI	Department of Primary Industries
EA	Environmental Authority
EIS	Environmental Impact Statement
EMR	Environmental Management Register
EP Act	*Environmental Protection Act 1994*
EPM	Exploration Permit for Minerals
ERA	Environmentally Relevant Activity
ERP	Emergency Response Plan
FIFO	fly-in-fly-out
FTE	full-time equivalent
IAA	Important Agricultural Areas
IECA	International Erosion Control Association
ILUA	Indigenous Land Use Agreement

Acronym or Abbreviation	Meaning
LOM	life-of-mine
MAW	Mine affected water
MIA	Mine infrastructure area
MIBC	Methyl Isobutyl Carbinol
ML	Mining Lease
MLA	Mining Lease Application
MM	Millimetres
MPP	Mineral Processing Plant
MW	Megawatt
NC Act	*Nature Conservation Act 1992*
NRM	Natural resource management
PAA	Priority Agricultural Areas
PLA	Priority Living Areas
PMLU	Post Mining Land Use
PRCP	Progressive Rehabilitation and Closure Plan
QAS	Queensland Ambulance Service
QFS	Queensland Fire Service
QLD	Queensland
QPS	Queensland Police Service
RNTBC	Registered Native Title Body Corporate
ROM	Run-of-Mine
RPI	*Regional Planning Interests Act 2014*
RSO	radiation safety officer
SCA	Strategic Cropping Areas
SDPWO	State Development and Public Works Organisation
SEA	Strategic Environmental Areas
SPC	Soil profile classes
SSRC	*Strong and Sustainable Resource Act 2017*
STP	Sewage treatment plant
TBC	To be confirmed
TGC	Total graphitic carbon
TMR	Transport and Main Roads
TOR	Terms of reference

Acronym or Abbreviation	Meaning
TSF	Tailings Storage Facilities
WRD	Waste rock dump

4 Project Description

This chapter describes the full particulars of the Project including details on the:

- activities of the proposed development;
- design of the infrastructure;
- project footprint;
- site description; and
- project phases.

This chapter has been prepared to address the requirements of the Project's terms of reference (TOR); the requirements of Schedule 1 of the State Development and Public Works Organisation (SDPWO) Regulation (specifically Sections 3(a), 3(b) and 3(c)); as well as *'Preparing and environmental impact statement – Guideline for proponents February 2024'* (CG 2024).

4.1 Proposed development

Qld Aus Graphite Pty Ltd (Graphinex, the Proponent) proposes to develop the Esmeralda Graphite Project (the Project), located approximately 70 km south of Croydon, Queensland, Australia (Figure 4-1).

The objectives of the Project are to:

- operate profitable mining operations to locally produce high-quality critical mineral products ;
- support economic development in rural and wider Queensland, through the creation of employment and procurement of local goods and services;
- assist the renewable energy transition by enabling graphite concentrate production locally for use in renewable energy products and other markets;
- design, construct, and operate the Project in a manner that avoids and minimises adverse impacts on the social and natural environments; and
- comply with all relevant statutory obligations and continue to improve processes which enhance sound environmental management.

4.1.1 Project summary

The Project proposes mining of the Esmeralda Granite Unit and on-site concentration of graphite ore. Key activities within the scope of the Project include:

- construction, operation and rehabilitation of an open cut graphite mine within Mining Lease Application (MLA) 100431 and MLA 100430;
- mineral processing of ore to produce a graphite concentrate;
- haul road construction and transport of concentrate along a private road to an intersection with the public road network at Esmeralda Prosect Road; and
- transport of graphite concentrate using road trains on the public road network to the Port of Townsville.

The proposed open cut mining operation would mine up to 3.5 million tonnes per annum (Mtpa) of Run-of-Mine (ROM) ore. A total of approximately 170 of Mt graphite ore would be mined over the operational life of the Project.

The proposed life-of-mine (LOM) is approximately 65 years, including construction (2 years), operation (53 years), and final rehabilitation (10 years). The resource base consists of a granite hosted ore body of approximately 150 meters thickness, located beneath approximately 70-100 metres of weathered sedimentary overburden. Ore would be mined to an approximate maximum depth of 250 m below ground level. Extracted ROM ore would be hauled to the mineral processing plant for stockpiling and processing via conventional floatation methods. Low-grade ore would be stockpiled separately for processing later in the mine life, as ore reserves begin to deplete in the pit.

On-site processing of the ore would produce approximately 100 ktpa graphite concentrate during the first three years of the operational phase of the Project, before increasing to approximately 200 ktpa graphite concentrate. The increase from 100 ktpa to 200 ktpa production is based on the duplication of capacity in the on-site mineral processing plant. Any ROM ore not ready to be processed would be stockpiled for later use.

Excavated overburden and waste rock would be deposited in out-of-pit waste rock dumps located adjacent to the mining void. The majority of overburden and waste rock excavation would occur within the first 18 years of the mine life. An indicative mining schedule is provided in Section 4.3.2.4.

Graphite concentrate from the processing plant would be trucked via B-double trucks on a dedicated haul road would to Esmeralda Prospect Road, approximately 20 km south-east of the mine. Road trains would then continue south to Richmond and then east on the Flinders Highway to Townsville for distribution to market via the Port of Townsville.

The Project would backfill the open-cut pit, such that no final void remains post-closure. Progressive rehabilitation would also be undertaken in the late stages of the Project as areas become available. Processing of low-grade stockpiles would continue post-mining, concurrent with the backfilling and rehabilitation of the pit to a safe, stable, and self-sustaining landform.

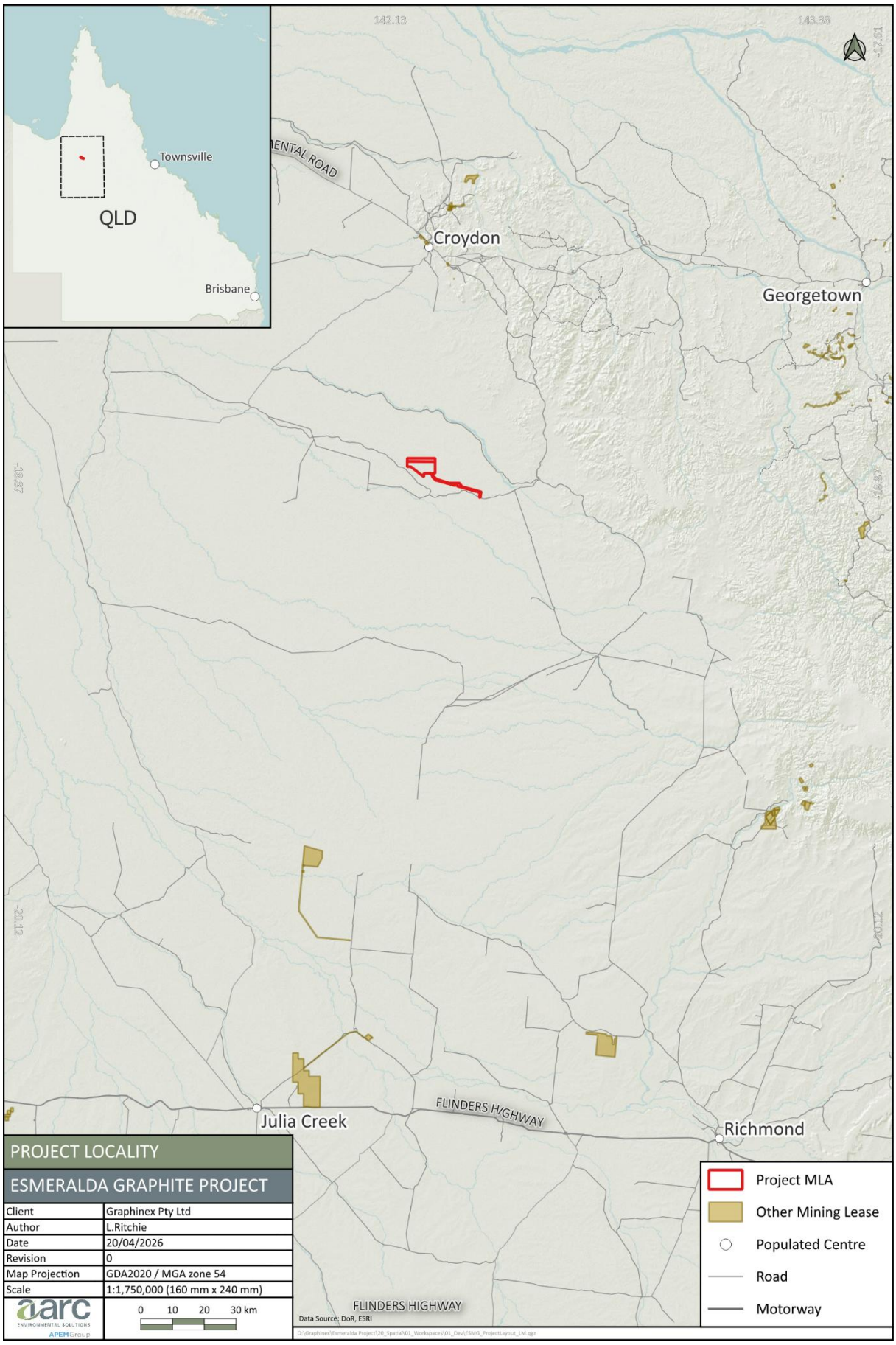


Figure 4-1: Project location

4.1.2 Project components

The Project is to be delivered over three stages: construction, operations and closure. The following summarises the key project components across these stages:

- site preparation works that include clearing vegetation, removing topsoil, stockpiling, earthworks, and temporary drainage works;
- open-cut mining of approximately 3.5 Mtpa of ROM ore, using conventional surface mining equipment (excavator, trucks, dozers, drill rig, grader) or equivalent;
- construction and use of a ROM pad for ore stockpiling and handling of ore;
- construction and operation of a Mineral Processing Plant (MPP), including an initial crushing and milling circuit, followed by a conventional flotation circuit consisting of rougher and flotation stages;
- product load-out area for stockpile and loading of graphite concentrate;
- construction of dedicated Tailings Storage Facilities (TSFs) for storage of process waste streams;
- establishment of waste rock dumps adjacent to the open-cut pit;
- construction of an on-site workers accommodation facility, ablutions, and sewage treatment plant;
- construction of an on-site airfield for transport of workers to and from the site;
- installation of water management infrastructure including a watercourse diversion, flood levee, dams, drains, and bunds;
- power supply through installation of an on-site solar array and battery energy storage system with back-up diesel generation and energy distribution infrastructure;
- potable water supply through on-site water treatment and/or importing water to site;
- supply of processing water from recycled sources on the mine site, including pit dewatering groundwater abstracted to enable the mining operations;
- construction of a private access road connecting the mine to the public road network at Esmeralda Prospect Road;
- backfilling of the mining void to natural surface level using a combination of tailings waste and waste rock stockpiled on the site, including capping, such that no final voids remain; and
- progressive rehabilitation commencing as land becomes available. Final landforms would be reshaped, topsoiled and revegetated to ensure safe, stable and self-sustaining landforms post-mining.

The maximum area of land proposed to be disturbed by the Project is approximately 2,413.7 ha (Figure 4-2). This footprint includes a buffer zone, whereby additional disturbance outside of the direct impact from the development of infrastructure and mining operations may be required to ensure safe operations and minimise risks, including those associated with bushfires. The indicative layout of the Project is shown in Figure 4-2 and Figure 4-3.

Outside of the Project scope, other infrastructure and services that might be utilised over the life of the Project includes:

- public road networks for transport of product, equipment, materials, reagents and personnel. If required, any upgrade to public road infrastructure would be undertaken outside of the EIS scope in conjunction with local councils and in accordance with the Planning Act 2016 (Qld);
- temporary accommodation and services offered from local towns such as Croydon;
- occasional use of local airfields; and
- the Port of Townsville for product export.

The Project is proposed based on the presence and extent of the inferred graphite resource, including the location and depth of pit, infrastructure requirements to support operations, and economic viability for extraction and processing.

The cost-benefit analysis and economic assessment determined that the Project is economically viable (Chapter 21, Economics). Technical assessments and consideration of other environmental values, including but not limited to terrestrial and aquatic flora and fauna, social and cultural values, surface water and groundwater, has further determined that the Project as described in this EIS can be developed in a manner that would minimise significant residual impacts. Where unacceptable impacts were identified, the Project has been revised to ensure that these do not eventuate. For example, reducing impacts to watercourses by locating all disturbance areas and infrastructure (except for the pit, watercourse diversion and flood protection levee) outside of the watercourse and riparian extents. Where unavoidable impacts have been identified, mitigation and management measures have been proposed, including offsets only as a last option.

Alternatives have been considered for various Project elements (Chapter 5, Project rationale and alternatives). The EIS assessed the preferred alternatives to ensure that the Project support overall benefit to the environment and people (Chapter 31, Conclusions and Commitments).

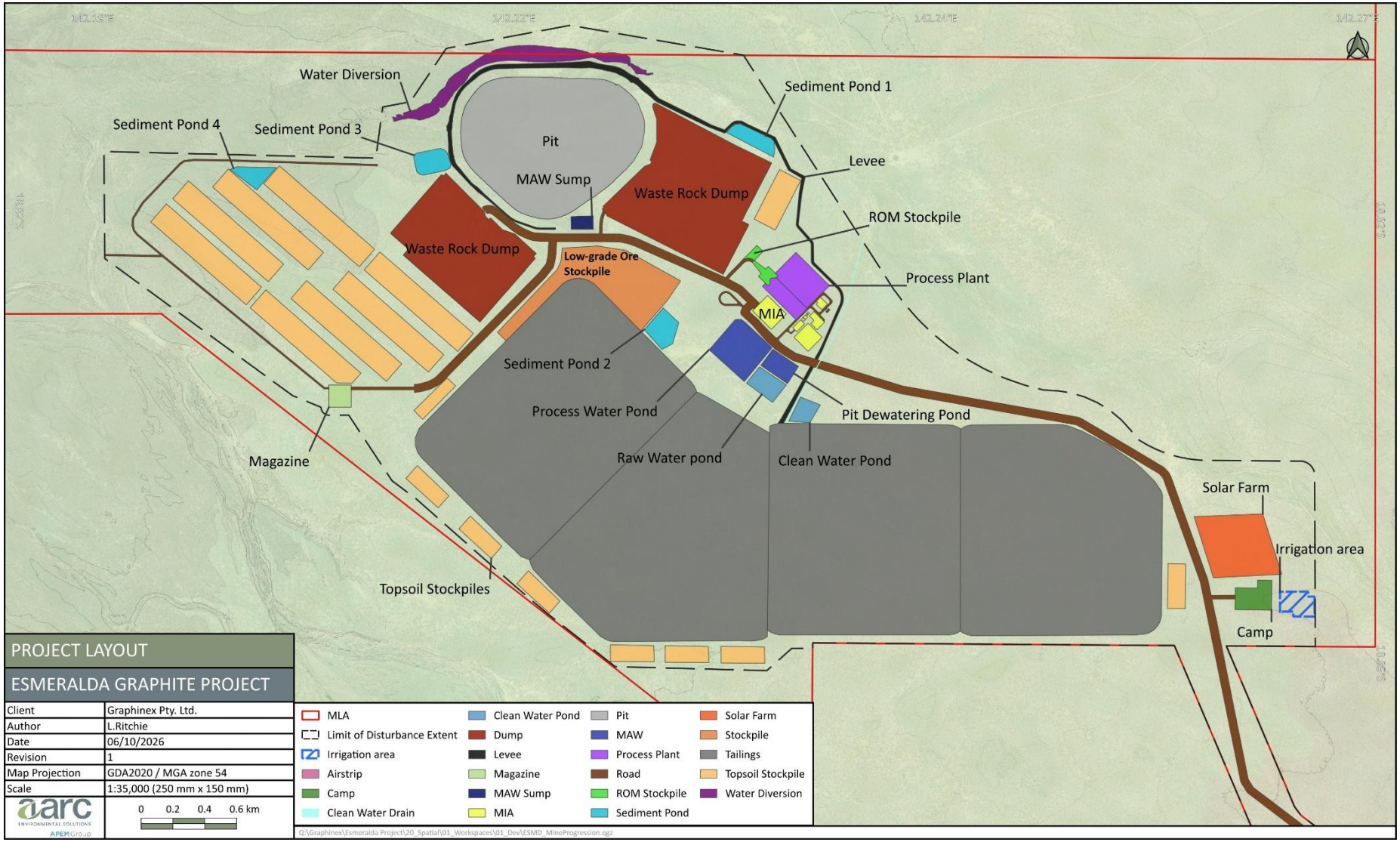


Figure 4-2: Project infrastructure layout

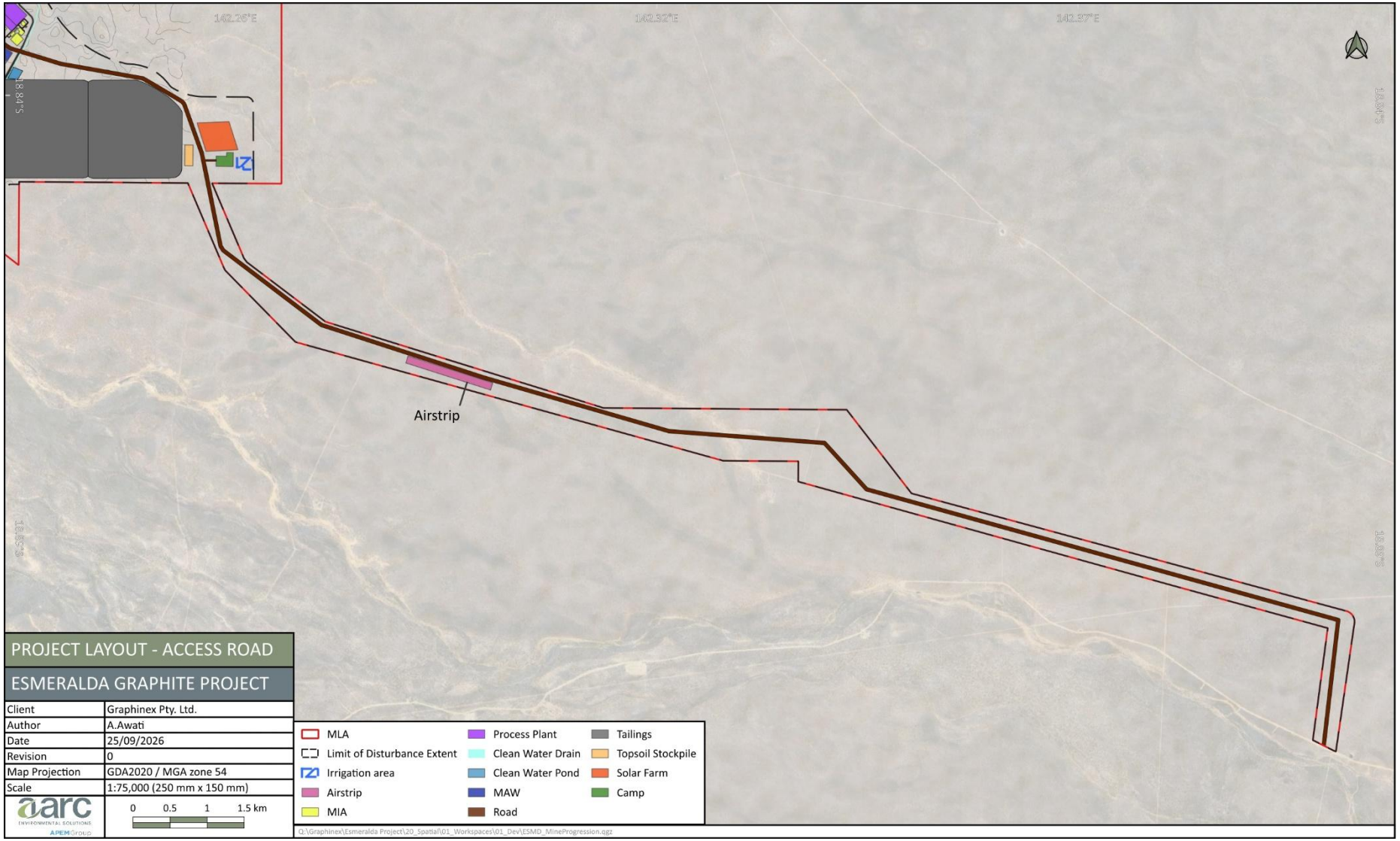


Figure 4-3: Project transport corridor

4.1.3 Project delivery

The Project would be owned and delivered by Graphinex and funded via a mix of debt and equity before shifting to an operational cash flow model (as discussed in Section 4.1.4). The proposed delivery model is via an integrated mining and processing facility, road transport concentrate and export of final product via the Port of Townsville. The Project would supply high-quality graphite to markets for production of battery anodes and other products.

Construction and operation of the Project would be managed via an integrated management team and contractor operating model. The on-site processing plant is planned to be operated by Graphinex under an owner operator structure.

4.1.4 Project funding

The development and operation of the Project would require significant investment. Capital expenditure would be funded via a mix of debt and equity, while operating expenditure would be funded via operation cash flows.

The following Project elements would require capital expenditure:

- mineral processing plant;
- mining specific infrastructure;
- 30-year mining plant purchase, replacement and salvage; and
- construction works.

Decommissioning and rehabilitation costs for the Project are estimated at approximately $150 million.

The Esmeralda Project would contribute directly to the long-term economic prosperity of the region. The Project would generate royalties for Queensland, and, where minerals are exported, the Project would generate revenue for Australia.

In 2025, Graphinex secured an US$860 million Letter of Interest (LOI) from the United States Export-Import (EXIM) Bank, supported by Export Finance Australia. This forms part of the U.S. – Australia Critical Minerals Framework signed by President Trump and Prime Minister Albanese. The LOI from EXIM provides validation of the Project's technical and commercial foundations, and a pathway to accelerate development.

4.1.5 Relationship to other projects

The Project is related to the Battery Anode Demonstration Facility in Townsville.

This facility may be used to demonstrate capabilities to produce battery anodes from graphite concentrate. However, the quantity of concentrate that would be produced by the mine would significantly exceed the capacity of the facility to process it. Graphite concentrate from the Project would instead be exported to the United States of America (USA) for refinement and battery anode production. Domestic refinement would continue to be explored based on capacity, capability, and economic context.

The facility is beyond the scope of this EIS.

Other unrelated resource projects identified in the surrounding region include:

- the Croydon Gold Project (owned by Jubilee Metals) including several precious and base metals near term gold exploration and development projects;
- the Vecco Critical Minerals Project (owned by Vecco Industrial Pty Ltd and currently subject to approvals);
- the Saint Elmo Vanadium Project (owned by Multicom Resources Limited and currently at construction phase);

- the Julia Creek Vanadium and Energy Project (owned by QEM Limited and currently subject to approvals); and
- the Richmond-Julia Creek Vanadium Project (owned by Richmond Vanadium Technology Pty Ltd and currently subject to approvals).

The Project does not currently include plans for common user facilities with these projects.

4.1.6 Project schedule

Construction activities would commence within 12 months of approvals being obtained. The construction phase, nominally Project 'Year -2' and 'Year -1', is expected to occur across a period of approximately 2 years. Mineral production would commence in 'Year 1' for approximately 53 years.

Rehabilitation would occur progressively, with areas of waste rock dumps and tailings cells becoming available for rehabilitation late in the Project life. Following the cessation of operations, a period of 10-years is anticipated for the removal and rehabilitation of non-retained infrastructure and rehabilitated landforms.

Project phases are summarised in Table 4-1 and discussed further in Section 4.3.

Table 4-1: Project phases

Approximate timeframe	Project phase
Year -2 to Year -1	**Construction** Project site works commence and is expected to occur over a period of approximately 2 years. This includes pre-strip, topsoil stockpiling, development of on-site accommodation, mine infrastructure area and mine-access road, and waste/overburden removal in Year -1.
Year 1	**Operation** Mining production commences. 100 ktpa production output from processing plant. Low-grade or unused ROM ore stockpiled for later use. First tailings storage facility constructed.
Year 3	Ramping up to full production of 3.5 Mtpa plant feed. Doubling of the processing plant capacity and output, from 100 ktpa to 200 ktpa. Watercourse diversion commences development.
Year 12	Second tailings storage facility constructed.
Year 18	Third tailings storage facility constructed.
Year 28	Fourth tailings storage facility constructed.
Year 35	In-pit waste backfill commences on small scale.
	Ex-pit tailings would be progressively reclaimed to fill the large pit void.
Year 46	In-pit waste backfill ramped up, including waste rock dump material.
Year 48	Mining operations progressively cease. Plant and vehicle movements continue, associated with use of any remaining stockpile and initial rehabilitation.

Approximate timeframe	Project phase
Year 54 – Year 63	**Decommissioning and rehabilitation** Decommissioning and removal of non-retained infrastructure, final rehabilitation and ongoing environmental monitoring and maintenance works.

4.1.7 Workforce

Employment opportunities that would be generated by the Project are expressed in terms of full-time equivalent (FTE) positions.

The Project is expected to support a construction workforce of up to 100 personnel and an operational workforce of up to 192 personnel at peak production. Approximately 128 of these would be directly related to mining, with the remainder employed across mineral processing and general site work.

The workforce would represent a mix of local and remote workers. Skilled workforce availability constraints in regional communities within 125 km of the Project, driven by low population density and an existing local industry that is largely agricultural, mean that the Project workforce would likely be primarily sourced externally.

In accordance with the *Strong and Sustainable Resource Act 2017* (Qld) (SSRC Act), and in the interest of positive social stewardship, the Project would ensure the following standards are met to reduce potential impacts on local communities:

1) workforce not comprised of 100% FIFO;

2) equal opportunities provided to recruit workers from local communities; and

3) undertake a social impact assessment.

Remote workers would likely fly-in-fly-out to a local airfield on the project site from Brisbane and/or North Queensland. A small number of local workers may access the site by the public road system.

4.1.7.1 Construction workforce

The peak construction workforce is estimated to be approximately 100 FTE personnel. The main workforce categories include:

- civil works;
- initial excavation of the pit tertiary material;
- MPP construction;
- site buildings and infrastructure construction;
- equipment assembly;
- accommodation village construction; and
- accommodation village management.

Occupations represented in the construction workforce are likely to include:

- earthmoving plant operators;
- structural steel and welding trade workers;
- electrical trade workers;

- professionals including geologists, managers, safety officers, engineers and environmental scientists;
- concreters; and
- construction and mining labourers.

4.1.7.2 Operational workforce

The peak on-site operational workforce is estimated to be approximately 192 FTE personnel, comprising approximately 64 personnel for surface infrastructure operations and 128 personnel for mine operations. The total number would only be reached during peak production periods over the mine life.

Occupations required by the Project during operations are anticipated to include:

- machinery plant and truck operators;
- process plant operators;
- tradespeople including diesel fitters, boiler makers and electricians;
- engineers, surveyors, geologists;
- health, safety, environment, human resources, and mine management professionals; and
- administrative staff.

The operational workforce is broadly categorised as:

- mining staff and crew;
- processing plant staff and crew; and
- other staff and crew.

For the operational workforce, it is expected that:

- greater than 95% of the staff would fly-in-fly-out (FIFO) to the mine; and
- less than 5% would drive-in-drive-out (DIDO) from the surrounding areas.

4.1.7.3 Rostering

The construction and operational hours would be 24 hours a day, seven days a week. The planned workforce roster would be 12-hour day/night shifts. Several operational roster options are currently under review, including 8 days on and 6 days off, 7 days on 7 days off. Local operators may be on 12-hour day shifts on a 5 days on 2 days off roster.

4.1.7.4 Accommodation

Due to the remote location of the mine, the work force would be accommodated in an on-site accommodation village. There are no alternate accommodation options available within a safe daily driving distance. During site preparation and primary construction, temporary accommodation would be available for non-resident workers on-site. Options for on-site accommodation would include mobile accommodation facilities. During operation, the workforce would be accommodated in the purpose-built facility located in the southern section of the Project area (Figure 4-2). Access to the facility would be via the mine access road (Figure 4-3).

The accommodation facility would include sleeping quarters, associated facilities such as a kitchen and mess hall, and a sewage treatment plant (STP). The facility would have capacity to accommodate up to 200 persons,

but under normal conditions would be occupied by approximately 192 persons at peak operation, in split rosters.

While the majority of workers would travel to the mine via air to the site's purpose-built airfield, then bus from the accommodation facility, some personnel would travel via light vehicle with or without carpooling from the Croydon Shire Council area. The on-site accommodation facility is intended to accommodate all workers during their roster, ensuring worker safety by reducing fatigue and daily travel time.

4.2 Site description

4.2.1 Mining leases

Mining and mineral processing activities would occur within two proposed MLAs covering a total area of approximately 4,444 ha (Figure 4-4). The MLAs were submitted for the Project on 6 May 2025. These MLAs are identified as follows:

- MLA 100430, which would contain disturbance associated with the water diversion and levee.
- MLA 100431, which would contain disturbance associated with the pit, levee, diversion, MIA, process plant, process water dams, ROM stockpile, sediment dam, solar farm, tailings storage facilities (TSFs), camp, and road access from Esmeralda Prospect Road.

4.2.2 Land tenure and property details

Land underlying and adjacent to the Project area is described in Table 4-2 and shown in Figure 4-4. The Project MLAs are entirely located within a single landholding, Lot 75 on SP273198, known as Esmeralda Station. The proponent has undertaken negotiations with the property owner in relation to occupancy and subdivision and has acquired rights to the land title underlying the Project MLAs. The process to subdivide the pastoral lease into separate titles has commenced. The anticipated land tenure layout post-subdivision would cover the full Project area and some adjacent land, and have the expected title of Lot 76 on SP353379.

No State Forests, National Parks or conservation tenure is located within or adjacent to the Project. Lot 75 on SP273198 is a registered forest management area (MUID: CY1AESM01), pastoral holding type.

The Project access route is located near an existing stock route, 395CROY.

Additional land tenure detail is provided in Chapter 8, Tenure including Native Title, and Chapter 9, Land Use Planning.

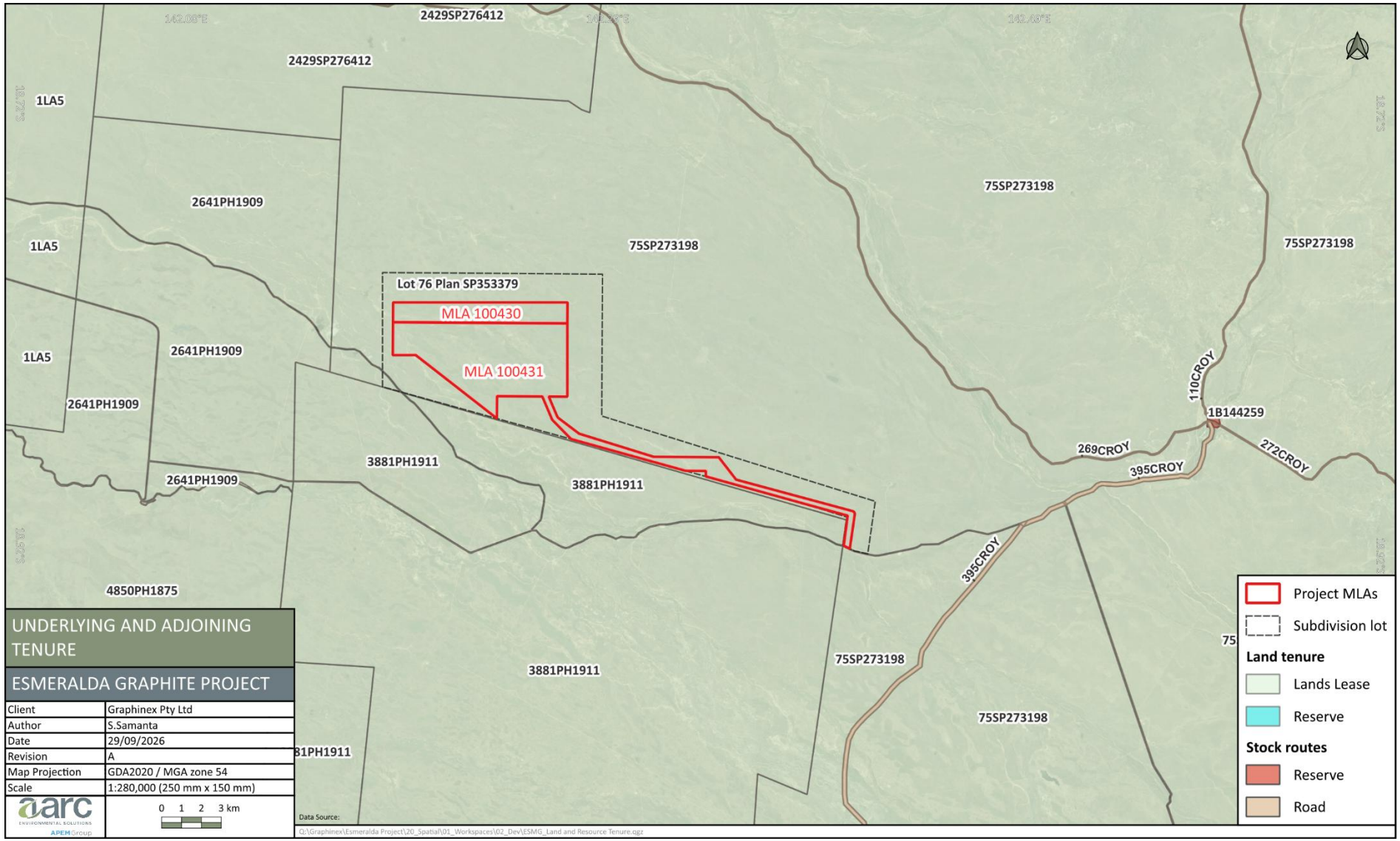


Figure 4-4: Underlying and adjoining land tenure

Table 4-2: Current underlying and adjoining land tenure details

Lot	Plan	Tenure	Local Government Area	Name
Underlying				
75	SP273198	Lands Lease	Croydon Shire	Esmeralda
Adjoining				
3881	3881PH1911	Lands Lease	Croydon Shire	-
-	-	Road Parcel	Croydon Shire	Esmeralda Prospect Road

4.2.3 Resource tenements

The Project MLAs overlay Exploration Permit for Minerals (EPM) 28274, 25210, 27818 and 27195 held by the Proponent.

One unnamed road parcel (ID: QLDRXXR14198614187551426000) underlies EPM 28274, however is not intersected by the Project MLAs.

The neighbouring and overlapping resource and exploration tenures within the vicinity of the Project are detailed in Table 4-3 and shown in Figure 4-5.

Table 4-3: Underlying and adjoining resource tenure

Tenure number	Tenure type	Name	Holder	Grant Date	Expiry Date
Underlying					
EPM 28274	Exploration Permit Minerals	Esmeralda	QLD Aus Graphite Pty Ltd	21 November 2023	20 November 2028
EPM 25210	Exploration Permit Minerals	Empress Springs 3	QLD Aus Graphite Pty Ltd	8 April 2014	7 April 2029
EPM 27818	Exploration Permit Minerals	Prospect	QLD Aus Graphite Pty Ltd	30 August 2021	29 August 2026
EPM 27195	Exploration Permit Minerals	Croydon 6	QLD Aus Graphite Pty Ltd	21 January 2020	20 January 2030
Adjoining					
EPM 28306	Exploration Permit Minerals	Clara River	Clara Resources Pty Ltd	9 May 2023	8 May 2026
EPM 28276	Exploration Permit Minerals	Warrigal Creek	QLD Aus Graphite Pty Ltd	24 February 2025	23 February 2030
EPM 28309	Exploration Permit Minerals	Prospect Road	Clara Resources Pty Ltd	12 May 2023	11 May 2026

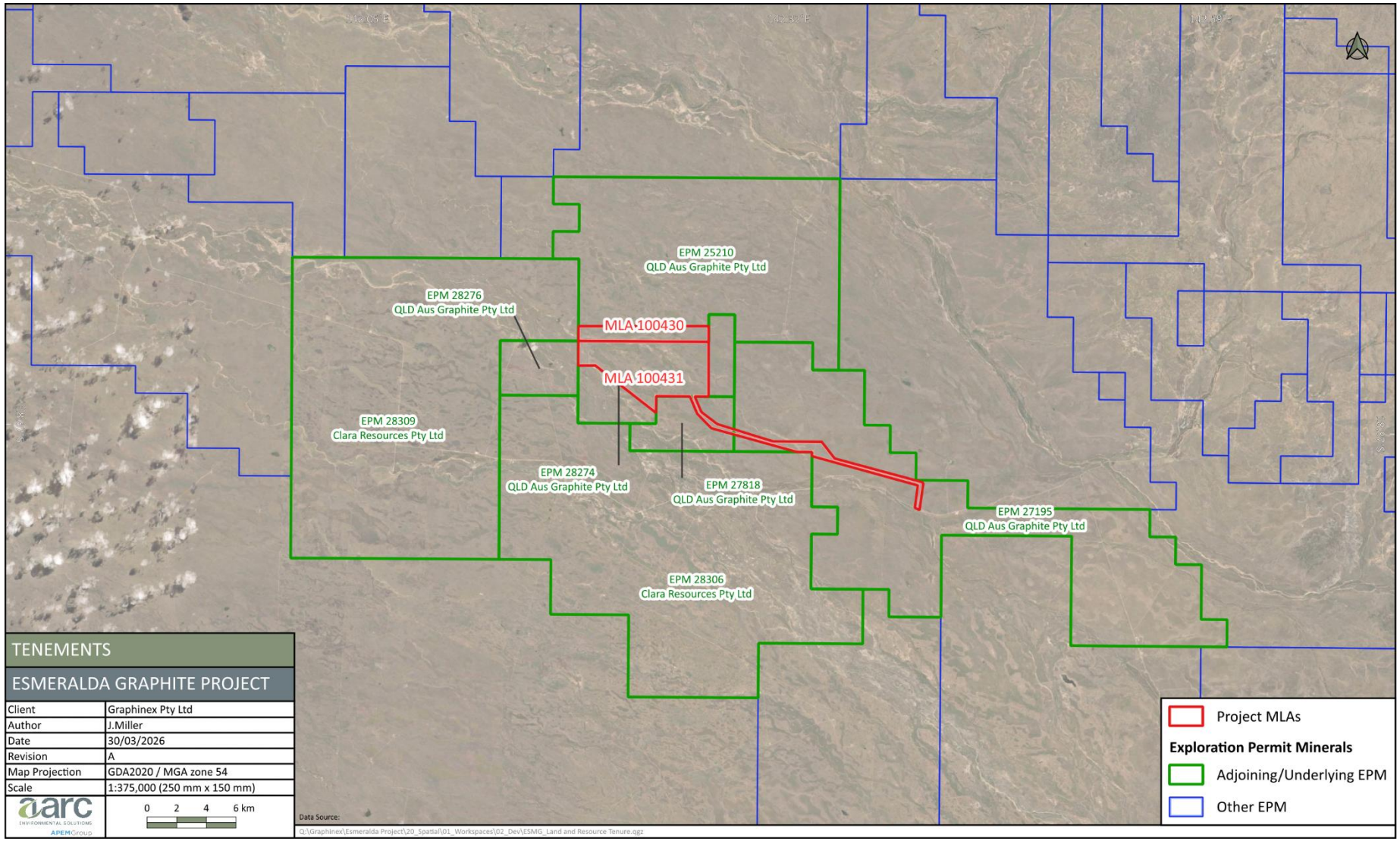


Figure 4-5: Underlying and adjoining resource tenure

4.2.4 Existing infrastructure

External or enabling infrastructure which may support or be impacted by the Project is detailed in the following sub-sections.

4.2.4.1 Road infrastructure

Public roads in the vicinity of the Project are detailed in Table 4-4. Access from the Project area to the Flinders Highway is mainly limited to unsealed roads, via the route shown in Figure 4-6.

Table 4-4: Key local road network

Road	Jurisdiction	Construction
Flinders Highway between Bruce Highway and Richmond (to Larsen Street)	Department of Transport and Main Roads (TMR)	Sealed
Richmond Road and Richmond Woolgar Road	Council	Sealed and Gravel
Esmeralda Prospect Road	Council	Gravel

Burchills Engineering Solutions undertook a traffic impact assessment for the Project, detailed further in Chapter 25, Traffic and Transport. A fit for use assessment was undertaken as part of this assessment for Richmond-Croydon Road and Esmeralda Prospect Road, including potential mitigation measures (i.e. road improvements) which can be undertaken to address any shortfalls in road conditions for use by the Project. The outcomes of this assessment are presented in Table 4-5. The existing road network is suitable for access and use by vehicles for cattle transport, mineral exploration and access to rural homesteads. However, upgrades may be required for safe use by an operational mining project.

Upgrades and roadworks would be subject to separate agreements with local council and approval under the *Planning Act 2016 (Qld).*

The road network connecting the Project site to Croydon is not likely to require upgrades, as this connection would not be used by the majority of Project traffic. Haulage of materials to and from site would be via the Richmond connection route. Light vehicles and some small trucks may connect to Croydon on an infrequent basis, including for the local workforce on shift changeover days.

The road network would be utilised across all Project phases.

Table 4-5: Fit for use assessment Richmond Croydon Road

Road	Suitable Road Condition	Sufficient Road Capacity	Adequate Road Safety	Potential Mitigation
Richmond Road Richmond Woolgar Road Unnamed Section	No	Yes	No	The subject section of Richmond Croydon Road is to be widened to a 9.2m formation with 6.2m wide carriageway in accordance with Austroads GTRD Part 3. Regular road maintenance should be provided. Upgrade narrow road sections to double width. Mitigation measures such as traffic signage including guideposts and advance warning signages should be installed to warn drivers of road conditions and hazards.

Esmeralda Prospect Road	No	Yes	No	The subject section of Richmond Croydon Road is to be widened to between 8.7m and 9.2m formation in accordance with Austroads GTRD Part 3. Regular road maintenance should be provided. Upgrade narrow road sections at the intersection with Richmond Croydon Road to double width. Mitigation measures such as traffic signage including guideposts and advance warning signages should be installed to warn drivers of road conditions and hazards.

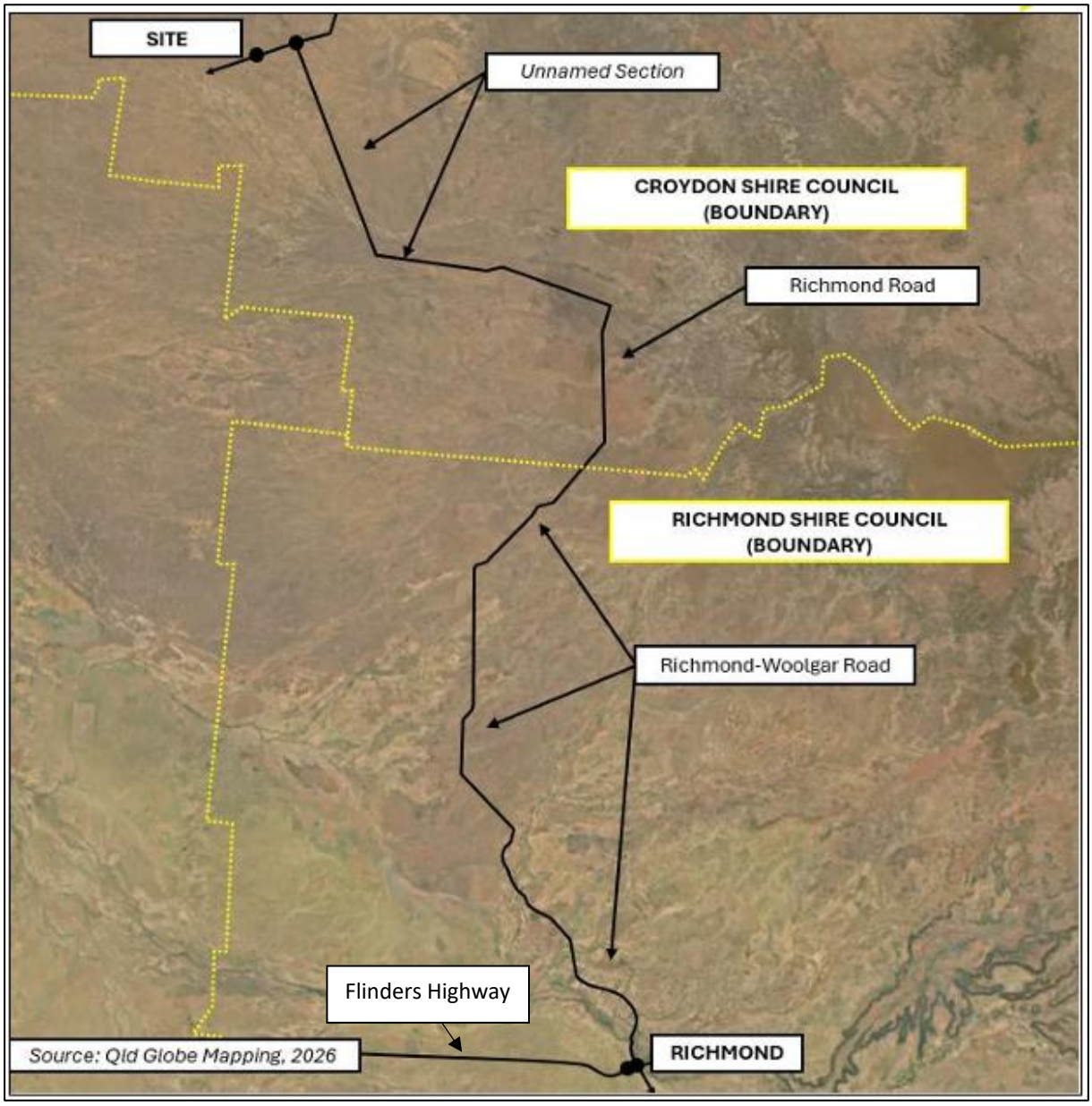


Figure 4-6: Project connection to Flinders Highway

4.2.4.2 Port/sea infrastructure

Graphite concentrate would be shipped from the Port of Townsville. The Port of Townsville has suitable infrastructure for export and would not require any additional works to be undertaken. Alternate port options such as Karumba may also be considered as part of ongoing planning and assessment.

Some Project components, including mineral processing machinery, may be imported through the Port of Townsville and trucked to site.

Port/sea infrastructure would be used across the construction and operation phases of the Project, but it is unlikely to be used during the rehabilitation phase.

4.2.4.3 Air services

Surrounding regional aerodromes or airports may be considered for occasional transportation of the non-local workforce, contractors or consultants, including for the construction, operation, and rehabilitation phases of the Project. Possible airport facilities include Normanton Airport, Cloncurry Airport, and Mount Isa Airport. Travel from the relevant airport would be by car or small bus on public roads.

4.2.4.4 Energy infrastructure

The closest connection to the regional electricity grid would be via the township of Croydon. Connection to the grid is not currently proposed for any stage of the Project life It is proposed that an on-site solar farm would be developed and supported by diesel generators and batteries. Proposed power supply is discussed further in Section4.3.1.12 and Section 4.3.2.11.

4.2.4.5 Water infrastructure

The Project would not be connected to the regional water supply infrastructure and network which services the township of Croydon at any stage of the Project life. Supply of processing water would be from recycled sources on the mine site, including pit dewatering groundwater (as raw water) abstracted to enable the mining operations and process water returned from the tailings.

To supply potable water, the Project would develop an on-site reverse osmosis system, with capacity for up to 2,000 L per hour. Construction of this system would occur concurrently with the construction of the on-site accommodation camp. This system would treat raw water to meet the requirements of all site personnel. This is discussed further in Section 4.3.1.11 and Section 4.3.2.10.

4.2.4.6 Wastewater infrastructure

The Project would not be connected to a regional sewage system. An on-site sewage treatment plant would be constructed, while a primary sewage treatment process would be installed during the construction phase. This is discussed further in Section4.3.2.14.

4.2.4.7 Waste disposal infrastructure

Disposal of other general wastes would be undertaken by a registered contractor to a licensed waste facility that is suitable for the type and quantity of waste. Local facilities which may be considered for the final disposal of wastes are the Croydon Landfill Facility. Where local facilities are unable to accept Project waste types or quantity, it may be transported to larger facilities in Mt Isa or Mareeba.

A designated on-site waste collection area would allow for the temporary collection, segregation and storage of waste prior to disposal off-site. Skips, bins and other receptacles would be located at appropriate locations around the site to facilitate the collection and segregation of waste streams, prior to transfer to the waste collection area.

Waste and waste disposal is detailed further in Chapter 17, Waste.

4.2.5 Local townships and facilities

The nearest town is Croydon, a historic gold mining town located approximately 70 km to the north of the Project. The town is popular with tourists who utilise accommodation at the caravan park, the local hotel, service station, café and supermarket.

The Croydon Economic Development Strategy (2023) indicates that the local council is aware of the strong graphite deposits identified within the local government area, noting that "Croydon is well positioned to support the development of the critical minerals industry" and that resource exploration and mining are positive drivers of economic growth for the region.

Where practical, the Project would offer local employment and support the Croydon community, including through local procurement of goods and services.

4.2.6 Topography, catchments and watercourses

4.2.6.1 Topography and landforms

The Project is located immediately north of Warrigal Creek and the Borer River. Topography surrounding the Project area is very flat which results in widespread flooding with interactions between the major waterways during significant flood events.

Topography within the Project area is flat to gently undulating, with elevations ranging between 120 m and 140 m Australian Height Datum (AHD). The Project area is traversed by unnamed tributaries of the Warrigal Creek draining generally from south-east to north-west through the site. The Project topography and waterways are shown in Figure 4-7.

There are several seasonal wetlands mapped in the wider Project area, with only two isolated, ephemeral wetlands mapped within the Project MLAs.

4.2.6.2 Regional catchments

The Project is located within the Norman River Drainage Basin, which encompasses an area of 50,667 km^2 and only contains the Norman River sub-catchment area (DESI 2023). The Norman Drainage Basin is part of the Gulf Drainage Division.

The Project area forms part of Warrigal Creek catchment, which in turn flows into the Borer River before converging with the Clara River. The Clara River subsequently joins the Norman River, eventually discharging into the Gulf of Carpentaria.

4.2.6.3 Watercourses and flooding

The landscape is characterised by the braided channels of the surrounding watercourses, as shown in Figure 4-8. Periods of flow in Warrigal Creek and its tributaries are restricted due to their highly ephemeral nature, often dry during the dry period, with significant overland flooding during heavy rainfall events of the wet season months between December and late March.

Significant rainfall events have been recorded at the Yappar River Gauging Station (29154) in January 2009, January 2021 and December-January 2025/26. The most recent event was caused by a tropical low tracking south from the Gulf Coast in late December 2025, resulting in a period of heavy rainfall. In January 2026 the remanent moisture interacted with a monsoon low and an embedded trough over western Queensland (BOM 2024). Over an 11-day period, significant widespread rainfall was recorded, with peak daily rainfall totals occurring on different days across the catchment. The rainfall data shows considerable spatial variation in rainfall during the event, with larger rainfall totals up to ~ 700mm recorded at the downstream extent of the catchment.

Satellite imagery (Sentinel-2 L2A) of the Norman River captured on 8 January 2026 during the flood event is shown in *Figure 4-9*. The peak maximum flood extent at the MLAs is unavailable due to high cloud cover; however, the MODIS Corrected Reflectance imagery (12 January 2026) has captured flooding at the MLAs (Figure 4-10). Sentinel-2 L2A imagery illustrates the breakout flooding from Warrigal Creek and Yappar River downstream of the site.

The watercourses of the Project area are discussed further in Chapter 14, Water Resources. Flooding is discussed further in Chapter 16, Flooding and Regulated Structures.

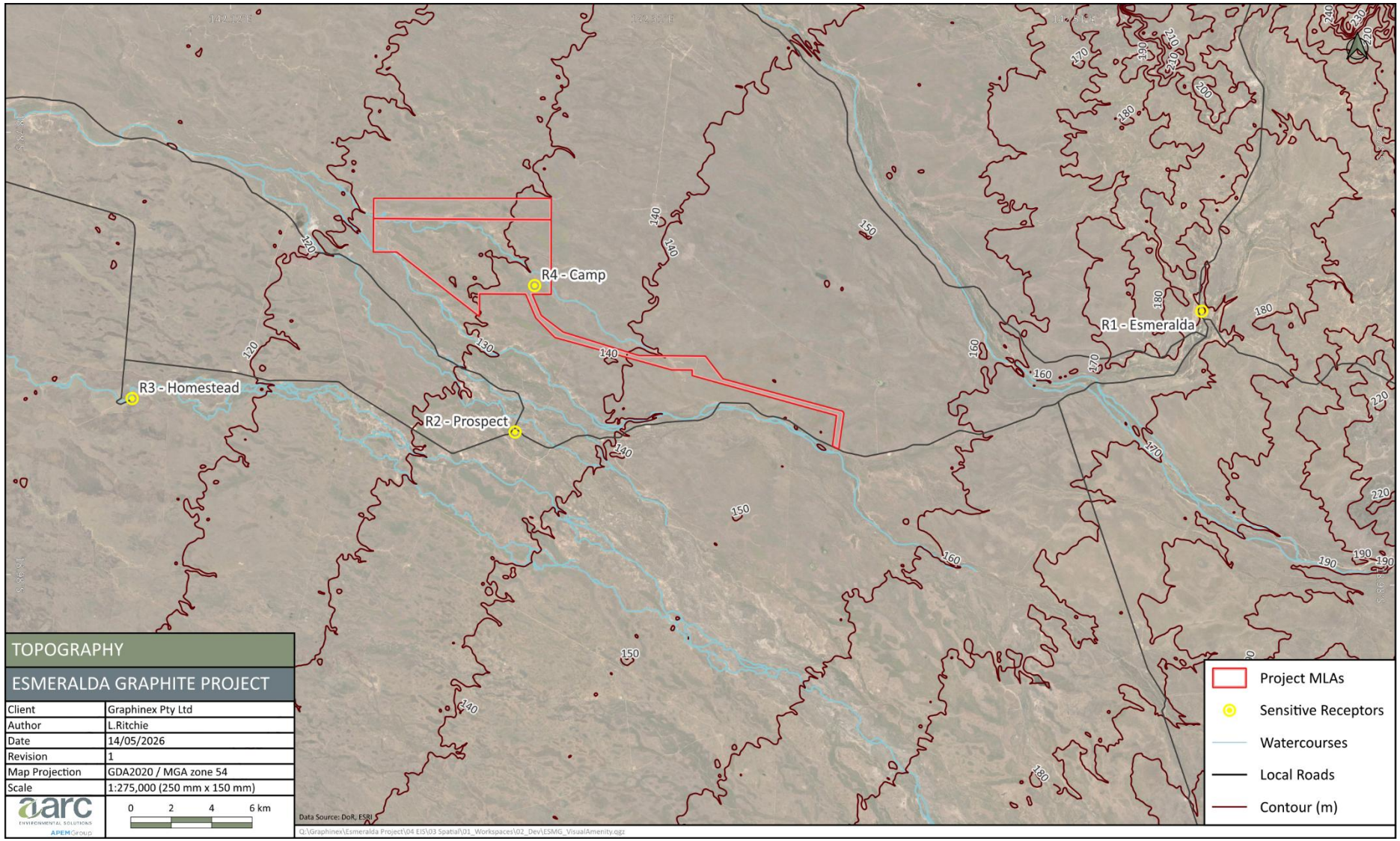


Figure 4-7: Topography and hydrological context

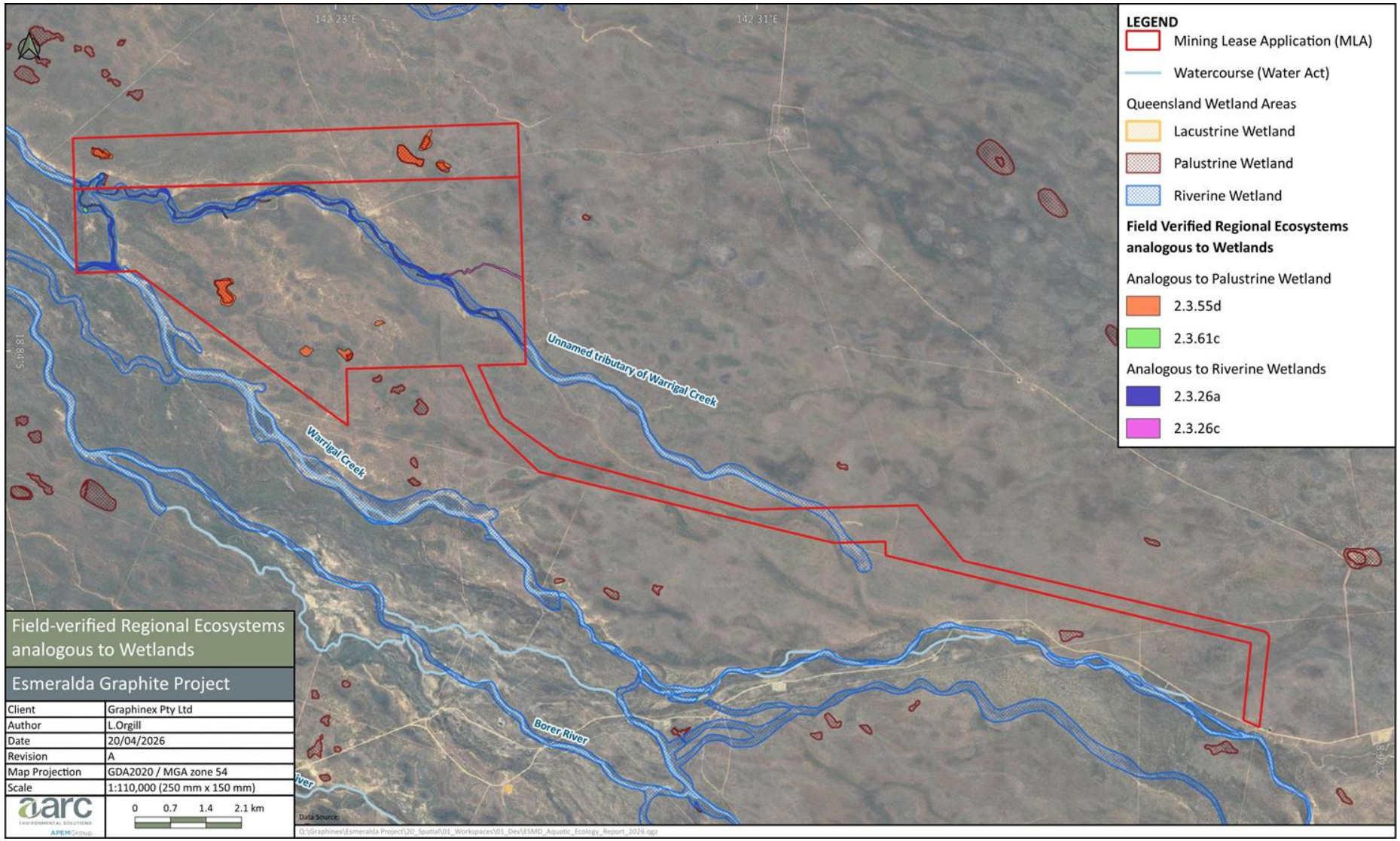


Figure 4-8: Watercourses and wetland areas

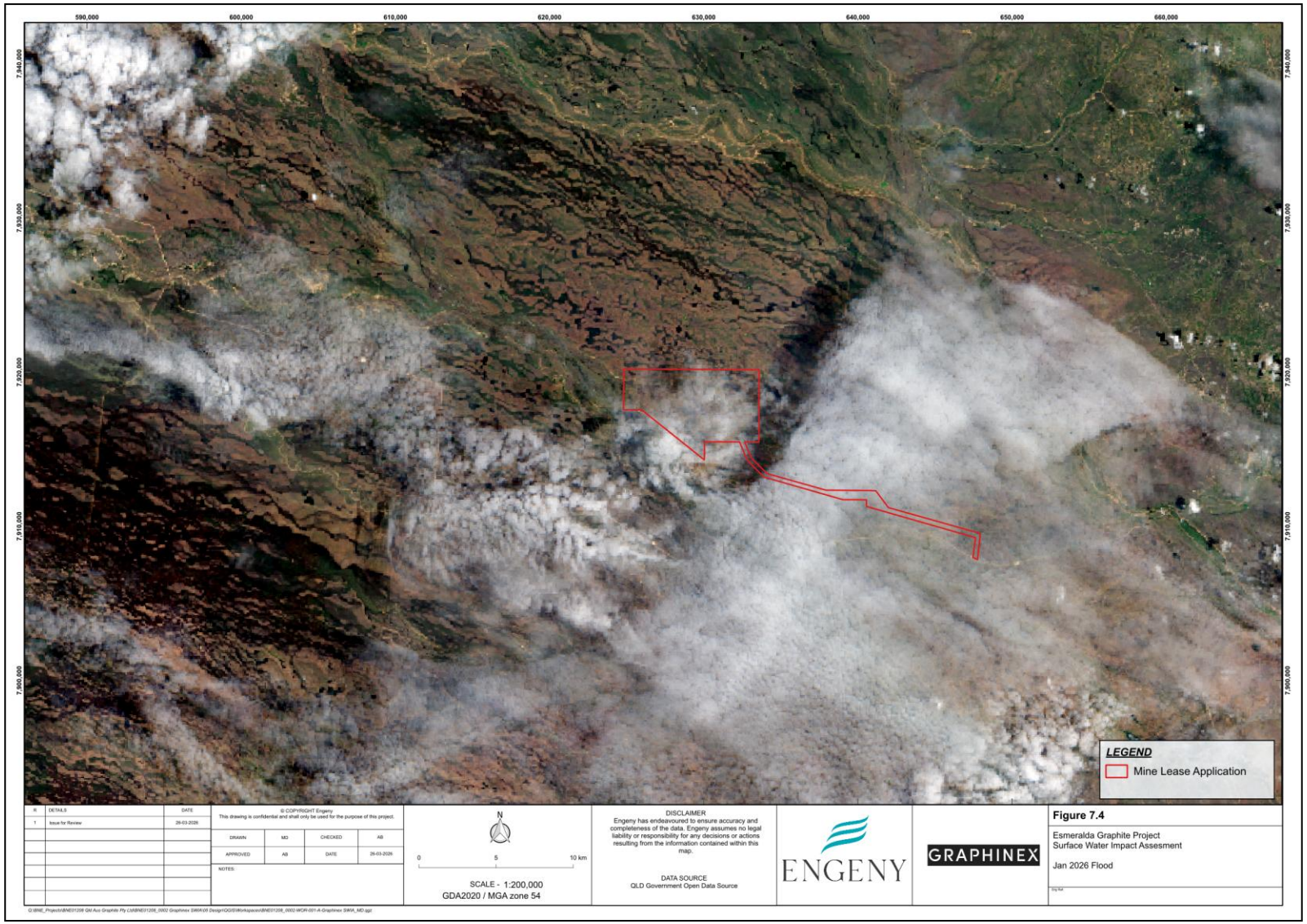


Figure 4-9: Satellite imagery (8th January 2026)



Figure 4-10: Satellite imagery (12th January 2026)

4.2.7 Climate

Long-term climate statistics for the Project area have been extrapolated from Croydon, which has a hot, semi-arid climate with distinct dry and wet seasons. The wet season runs from December to March, with an average rainfall of 635.6 mm during that period. The dry season runs from April to November with average maximum daily temperatures of 33 °C.

The major climate statistics used for the Project are summarised in Table 4-6.

Wind speed and direction is available from Georgetown, Qld, which is located approximately 140 km from the Project. Wind speed and direction from Georgetown is shown in Figure 4-11.

Table 4-6: Climate statistics for Croydon, Queensland

Aspect	Value
Maximum temperature	43.9 °C
Average maximum temperature	33.6 °C
Minimum temperature	2.6 °C
Average minimum temperature	20.6 °C
Rainfall annual average	744.8 mm
Rainfall - Number of rain days per year	53.3 days
Relative humidity annual range (9am)	43-76 %
Relative humidity annual range (3pm)	25-61 %

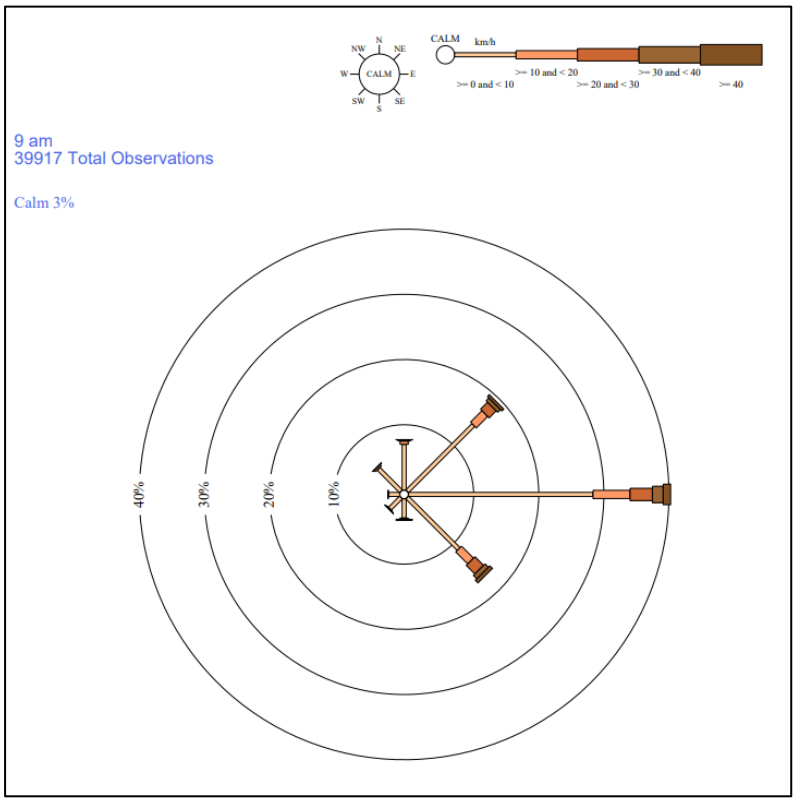


Figure 4-11: 9am Wind speed and direction, Georgetown, Queensland

4.2.8 Geology and Geomorphology

4.2.8.1 Regional geology

The Carpentaria and Karumba Basins cover parts of northern Queensland and the Northern Territory, extending over an area of 560,000 km^2. The Carpentaria Basin is Middle Jurassic to Late Cretaceous in age and is constrained to the east by the Palaeozoic and Proterozoic Coen, Yambo and Georgetown Inliers.

Sediments overlie a cratonic basement of Proterozoic and Palaeozoic rocks of the inliers outcropping on edges of the basin. The central part of the onshore Carpentaria Basin is unconformably overlain by the Cainozoic Karumba Basin.

A sequence of Mesoproterozoic S-type volcanic rocks and related granites in the Croydon area in the western part of the Georgetown Inlier is assigned to the Croydon Province. Outcropping rocks of the Croydon Province are rhyolitic to dacitic ignimbrite, rhyolite and rare andesite of the Croydon Volcanic Group, granites of the Esmeralda Supersuite and shallow water quartzose, mainly arenaceous sedimentary rocks of the Inorunie Group, which unconformably overlie the Croydon Volcanic Group. The Croydon Volcanic Group and Esmeralda Supersuite are contained within a cauldron subsidence structure that is likely to have been emplaced at ~1550 Ma, at the close of the main deformation event in the Forsayth Subprovince.

The Esmeralda Granite is a coarse-grained biotite granite containing inclusions of graphite and xenoliths of graphitic meta-sedimentary rocks. Mackenzie (1988) noted that “parts of the granite are extremely rich in graphite,” observing at Croydon tabular zones 120 m thick and several kilometres long, packed with graphitic metasedimentary enclaves and masses of almost pure graphite set in a matrix of intensely hydrothermally altered granite.

A geological fault structure, the Coralie Structure, that is an ‘inferred or concealed’ structure is mapped approximately 3 km to the northeast of the Project mining area. Given the distance of this inferred structure from the Project mining area, it is highly unlikely that this structure would influence resource formation or extraction, or groundwater conditions.

4.2.8.2 Local geology

The Project is located within an area of Cainzoic and Mesozoic cover sequences. Cainozoic sediments are underlain by the Mesozoic sediments of the Carpentaria Basin consisting of sandstone, siltstones, and shales of the Gilbert River Formation. A major unconformity exists between the Mesozoic sediments and Proterozoic basement. The basement is interpreted to be the Esmeralda Supersuite granites.

Previous drilling in the area suggests that the cover sequence consists of flat laying laminated and cross bedded siltstone, claystone and coarse sandstones. These sediments appear to have alternating porous and non-porous horizons and differing strengths. According to historic drill holes, this sequence is approximately 50-70 m thick across the project area.

Below this cover lies the target unit, a granitic pluton of unknown size, which has been interpreted to be the Esmeralda Granite, a member of the Esmeralda Supersuite of the Croydon Province. The pluton is assumed to be unaffected by any major structures at the local scale.

There are no faults mapped within the overburden sequence (Gilbert River Formation or Tertiary sediments). Exploration drilling has identified some local scale joints and fractures within the orebody, with associated observations of slickensides and clay gouge. These joints and fractures have been identified in drill core samples and are associated with local scale deformation with minimal displacement. These localised joints and fractures are discontinuous and cannot be traced between nearby drillholes. The presence of these joints and fractures is not expected to influence groundwater conditions at a larger (pit) scale.

Local and regional geology and faults are shown in Figure 4-12. A conceptual cross-section of geological stratigraphy in the Project area is presented in Figure 4-13.

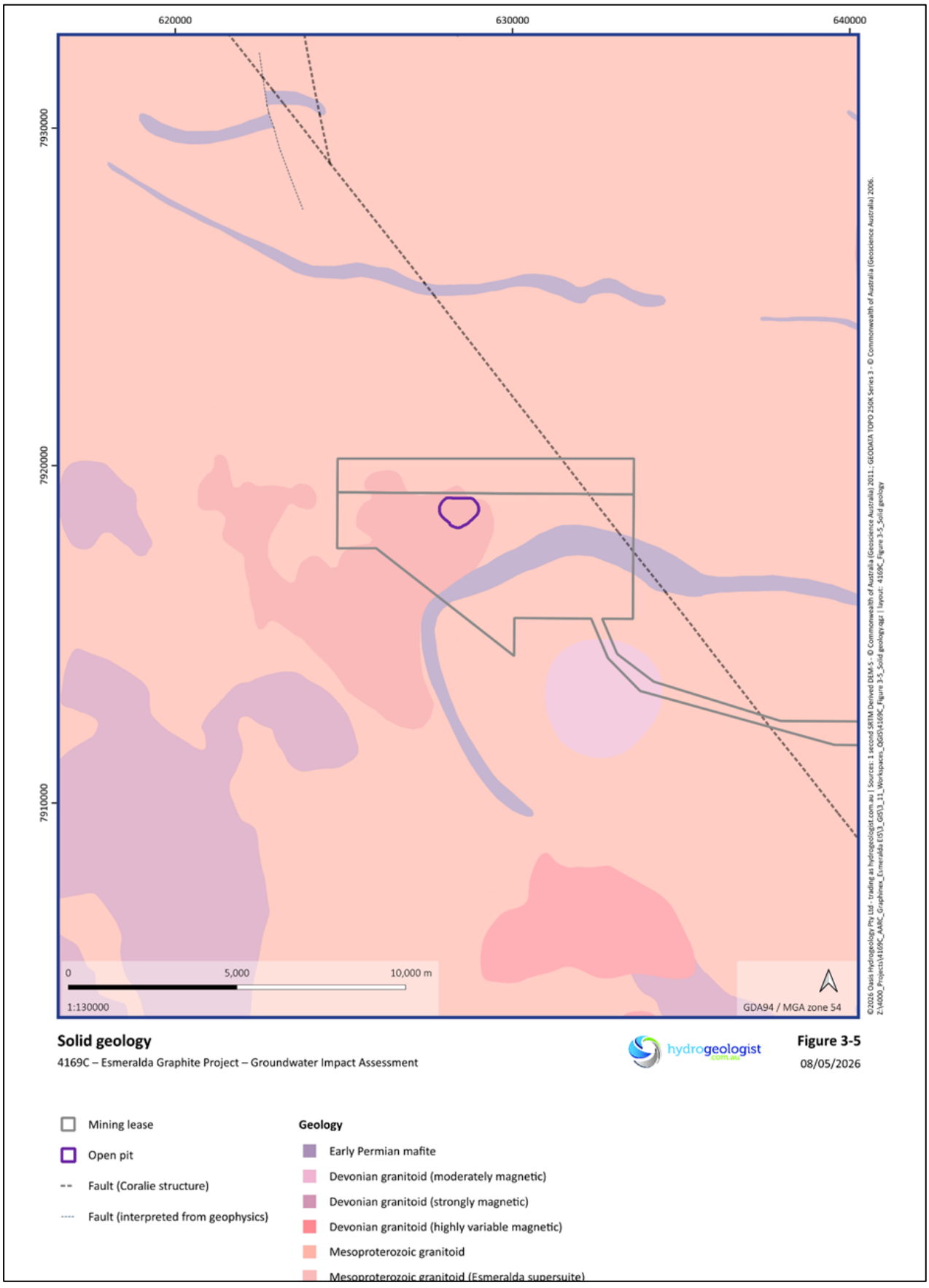


Figure 4-12: Regional geology and fault line

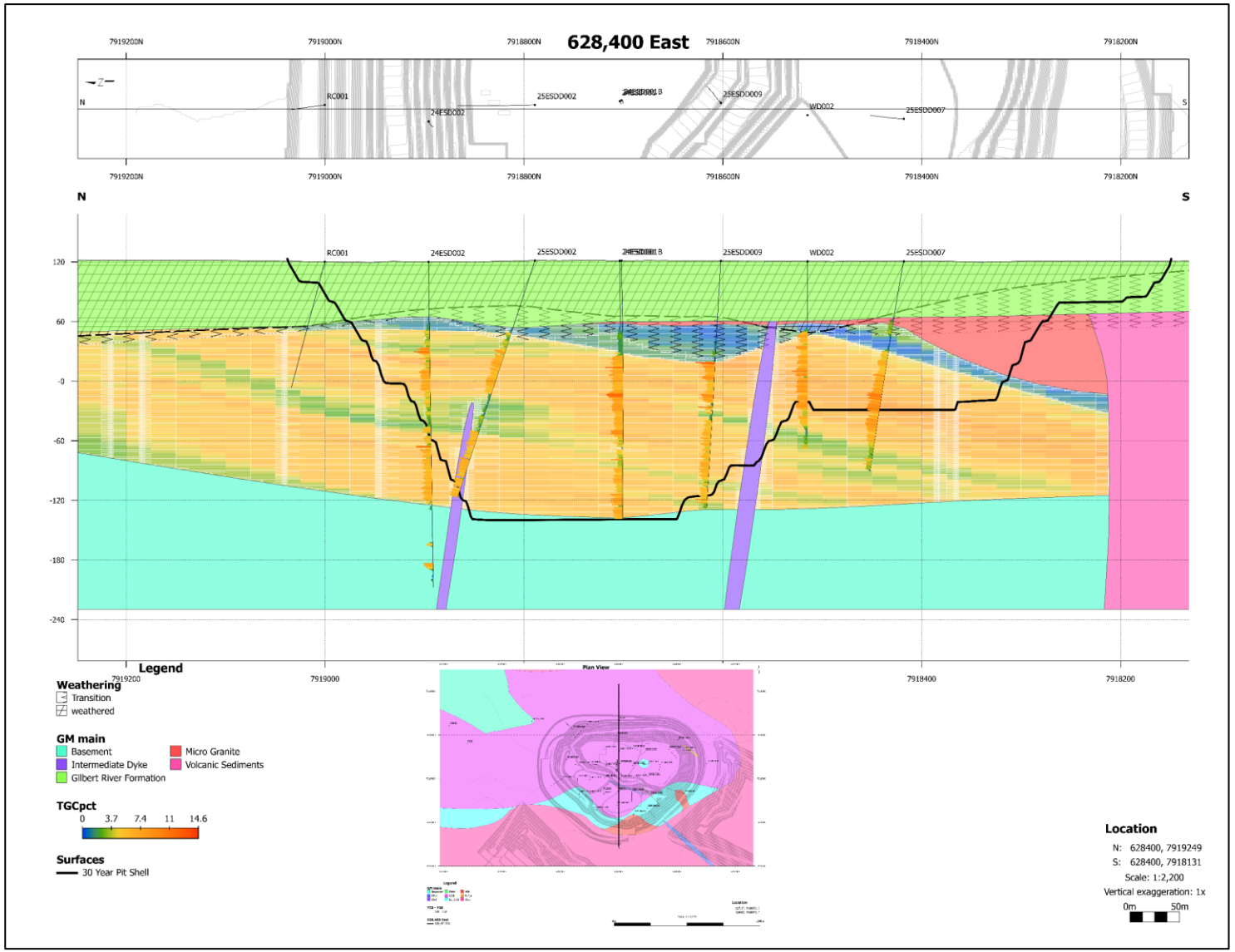


Figure 4-13: Stratigraphy and target resource

4.2.9 Resource description

4.2.9.1 Exploration history

Exploration drilling has been extensively undertaken across the Proponent's exploration tenure from the 1970s to 2025 (detailed in Table 4-7). Drilling primarily targeted metalliferous/gold mineralisation. Assay results of previous drilling indicated concentrations of combined niobium and tantalum pentoxide and molybdenum, and anomalous concentrations of other metals. In 2015, drill holes intersected graphite mineralisation in the Esmeralda Granite area, confirming graphite occurrences.

In 2023, Graphinex completed preliminary metallurgical test work on graphite core to evaluate its potential to be used for battery anode material. The results successfully produced battery-grade purified spherical graphite and confirmed the potential for the Esmeralda Granite hosted graphite orebodies to produce a battery anode material.

Table 4-7: Exploration history summary

Year	Company	Activities/Target	Tenement
1971 - 1973	Ford, Bacon & Davis P Inc	Fluorine. Exploration for the source of the enigmatic fluorine anomaly within the groundwater at the base of the Mesozoic cover. FBD drilled four (4) BQ core holes proximal to the Nara Bore on Prospect Station looking for mineralisation to explain the fluorine anomaly.	EPM 953/954
1984 - 1989	Strategic Metals Corp Pty Ltd (Initially, then JV with) Golden Plateau NL	REE, Vanadium, Diamond, PGE, Gold, Fluorine, Tantalum-Niobium. Ground magnetic surveys. Two percussion holes drilled (PB1 & PB2). Major aeromagnetic survey was flown and Landsat imagery interpretation. 26 open percussion holes drilled totalling 2,110m. Petrology analysis.	EPM 2872/ 4429 / 4785/ 4786
1992 - 1994	North Mining Ltd (nee Geopeko)	Silver, Gold, Zinc, Copper, Lead. Review of previous exploration. Groundwater study by CSIRO. Reinterpretation of available aeromagnetics. Ground magnetic and gravity survey. 9 percussion holes drilled.	EPM 8818 / 8817 / 8836
1994 - 1996	Western Mining Corporation Ltd	Targeting IOCG (Cu-Au) mineralisation in the Proterozoic basement similar the eastern succession of the Mt Isa inlier. Review of previous exploration and drilling results, ground reconnaissance, review of historic aeromagnetic data and further acquisition and regional gravity survey.	EPM 10327
2004 - 2021	Metallica Minerals Ltd	Nickel, Copper, Titanium, Vanadium and Gold. Graphite from 2014.	EPM 14406 / 25779

Year	Company	Activities/Target	Tenement
		Desktop review of previous exploration. Airborne EM survey. Ground EM survey. Four RC holes drilled. Two diamond drill holes completed in 2015 to twin historic exploration holes with graphite mineralisation. Petrography study. Preliminary metallurgical study.	

4.2.9.2 Resource estimation

Total tonnes of graphite ore have been assessed in accordance with the JORC Code (2012), indicating the presence of an estimated 434.5 million tonnes (Mt) at 5.83% total graphitic carbon (TGC) for 25.35 Mt of contained graphite.

A summary of the Esmeralda mineral resource as of November 2024 is provided in Table 4-8. A cross-section of the pit at year 30, relevant target resource, and adjacent geology is presented in Figure 4-13. Approximately 170 mt of resource is targeted for extraction by the Project. Factors that determined the pit shell, and therefore the reserves, included the floodplain to the north and other environmental, economic, or technical constraints.

The Project considers total graphitic carbon >6% to be high-grade and used for immediate processing. Lower grade ore would be stockpiled for processing in the later stages of the Project as extraction from the pit ceases.

Table 4-8: Mineral resource for the Esmeralda Graphite Project

Resource category	Total graphitic carbon (TGC) %	Tonnes (Mt)	Contained Graphite (Mt)
Indicated	5.84	173.1	10.11
Inferred	5.83	261.4	15.24
Total	5.83	434.5	25.35

4.2.10 Soils

A Soils and Land Suitability Assessment (Appendix H) was undertaken for the Project, which included a detailed field survey to map and validate soil boundaries, and sample soil to develop a land suitability assessment, agricultural land classification, and any limitations for Project development or site rehabilitation. The survey characterised soil profile classes (SPCs) for the Project area covering the MLA boundaries and disturbance extent. Detailed soil profile sites, representative sites for sampling, and observation-sites were selected to appropriately represent all soil types, and the unit boundaries present in the broader Project area.

A total of seven SPCs were identified and described. An overview of each SPC and its extent within the Project area is provided in Table 4-9, and depicted in Figure 4-14.

Soil survey results found that topsoil chemistry is within a suitable range for plant growth and not expected to limit the availability of essential nutrients. The upper soil horizons of each SPC are considered suitable for rehabilitation purposes and would be stripped and stockpiled in advance of Project development. Subsoil would also be stripped to varying depths and combined with topsoil to create a growth medium for rehabilitation purposes.

Table 4-9: Soil profile classes

Soil Profile Class	Australian Soil Class	Area within Project footprint (ha)*
1Cl(Ck)	Brown Tenosol	93.8
2Cl(Ck)	Brown Arenosol	1072.4
3Cl(Ck)	Brown Tenosol	1,159.6
4Cl(Ck)	Brown Kandosol	62.4
5Cl(Nm)	Leptic Tenosol	2.4
6Cl(El)	Brown Dermosol	19.1
7Cl(Nm)	Leptic Rudosol	4.1

*Areas have been rounded and may not match the Project footprint area of 2,413.7 ha.

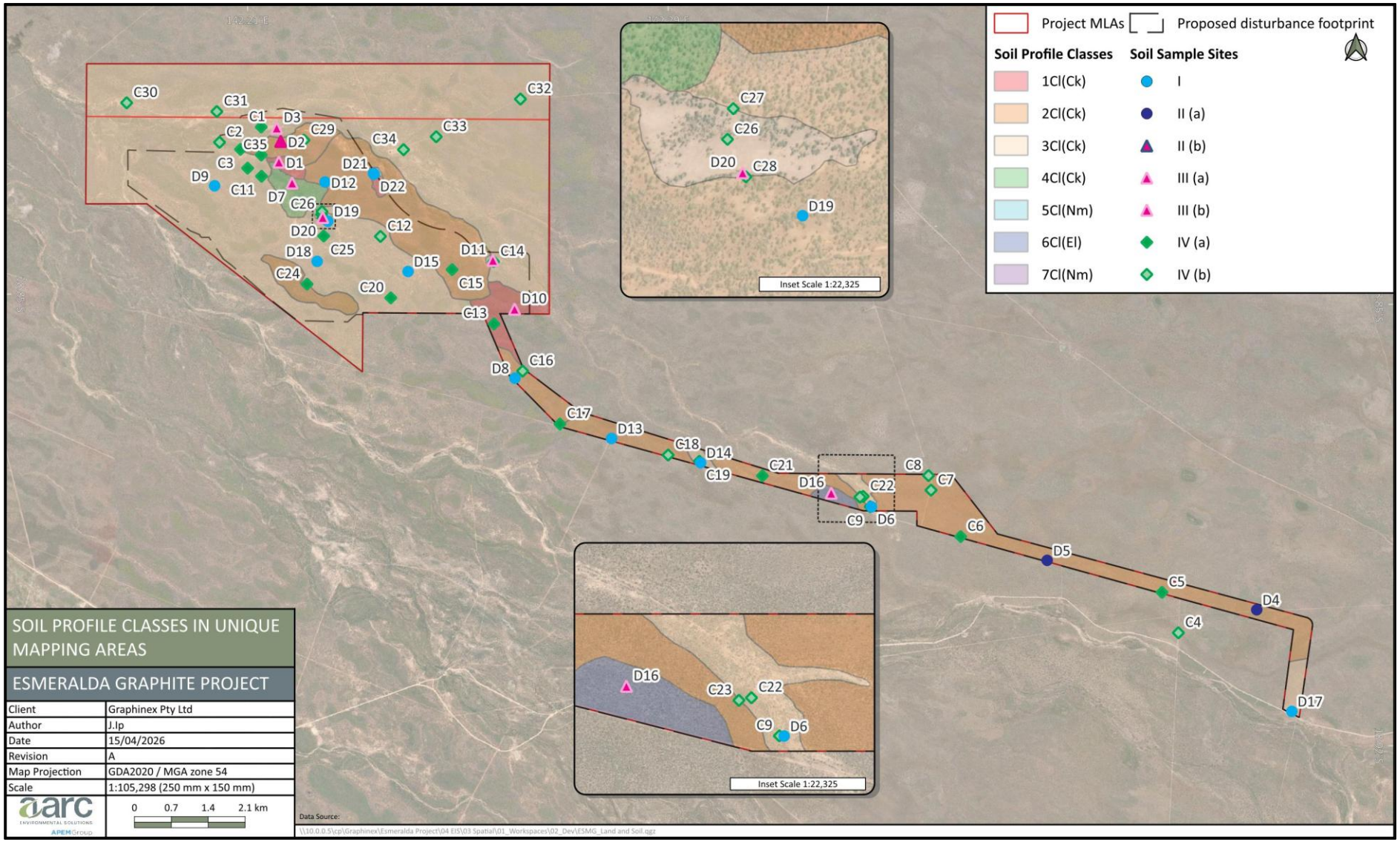


Figure 4-14: Soil profile classes and observation sites

4.2.11 Land use

4.2.11.1 Existing land use

The Project area is located within the Gulf Savannah natural resource management (NRM) region. The Project area is located within an existing pastoral property. Land within and surrounding the Project is designated as being within the 'Rural' zone under the Croydon Shire Planning Scheme 2019. The land in the Project area is currently used for low-intensity cattle grazing of native vegetation.

No historical mining has occurred in the Project area. Exploration drilling has been conducted as part of resource definition and for the development of groundwater monitoring bores. Esmeralda Prospect Road is a local council road providing access to local properties and the southern boundary of the MLAs. There are no protected areas near the Project. There are no areas zoned for future use or future residential areas intersecting the Project.

4.2.11.2 Areas of Regional Interest

The Regional Planning Interests Act 2014 (Qld) (RPI Act) regulates impacts from resource and other regulated activities on identified areas of regional interest. This includes Strategic Cropping Areas (SCA), Strategic Environmental Areas (SEA), Priority Agricultural Areas (PAA) and Priority Living Areas (PLA).

SCA is land that is, or is likely to be, highly suitable for cropping because of a combination of the land's soil, climate, and landscape features. The Project area is not mapped within the Strategic Cropping Land trigger map.

SEAs identify areas where the impact of a prescribed activity would not result in a widespread or irreversible impact on an environmental attribute of a strategic environmental area. The Project area is not mapped within an SEA.

PAAs are strategic areas, identified on a regional scale, that contain significant clusters of the region's high value intensive agricultural land uses. Within a PAA, high value intensive agricultural land uses are recognised as the priority land use over other proposed land uses. The Project area is not mapped within a PAA.

A PLA is an area that includes the existing settled area of a city, town or other community, and other areas considered necessary or desirable for the future growth of the existing settled area and as a buffer between the existing or a future settled area and resource activities. The Project area is not mapped within or adjacent to a PLA.

As the Project would not be located within an SCA, PLA, PAA or SEA, the RPI Act does not apply to the Project.

4.2.11.3 Areas of state interest

A State Planning Policy may be used to define specific matters of state interest in land use planning and development. The 'State Interest guideline – Agriculture' (DILGP 2016) nominates Important Agricultural Areas (IAA) and the identification of Class A and Class B land, using the Agricultural Land Classification approach, as core concepts of which local government planning schemes should be informed.

There are no important agricultural areas mapped within 80 km of the Project site. State mapping databases identify the Project site as Agricultural Land Class C2, meaning Pasture Land – native pastures.

4.2.11.4 Native title and Indigenous land use agreements

A search of the National Native Title Tribunal Register of Native Title Claims was undertaken on 10 March 2026. It identified two successful Native Title determinations in favour of the Tagalaka People. The Project area is in the determination area, finalised and in effect from 10 December 2012.

The determinations can be found under 'Owens on behalf of the Tagalaka People and Tagalaka People #2 v State of Queensland', tribunal files QCD2012/012 and QCD2012/013, 10 December 2012 (National Native Title Register 2026).

The Cultural Heritage party for the Project area is the Tagalaka People – through the registered cultural heritage body, the Tagalaka Aboriginal Corporation RNTBC.

Other interests exist within the determination area, namely the:

- QI2013/034 Tagalaka People and Ergon Energy ILUA;
- QI2013/030 Croydon Shire Council - Tagalaka People Determination ILUA;
- QI2006/047 Tagalaka - Croydon Area ILUA #2 with the Croydon Shire Council;
- QI2004/019 Small Scale Mining and Exploration Activities North Queensland Area TAGALAKA with the State of Queensland; and
- QI2003/021 Tagalaka Croydon Area ILUA #1 with the Coordinator General.

The indigenous land use agreement (ILUA) in the Project tenement is QI2003/007 Tagalaka People Exploration Permit Backlog Project with the State of Queensland (Native Title Vision 2026).

The Proponent is engaging with the Tagalaka People regarding the Project. Consultation is discussed in Chapter 7, Stakeholder Consultation and Engagement. Cultural heritage values are discussed further in Chapter 11, First Nations Cultural Heritage.

4.2.11.5 Visual amenity and landscape character

The Project is located 70 km south of Croydon, within the Gulf Plains Bioregion. This bioregion is dominated by grasslands, Eucalypt woodlands, *Melaleuca* and *Acacia*, which cover the landscape of plains and river channels, comprising clay and alluvial soils (DEHP 2015). The local area is generally flat to gently sloping upwards to the east, with elevations ranging between 120 m and 140 m Australian Height Datum (AHD). Elevation gently slopes upwards towards the east.

The dominant regional land use, as mapped by DES (2016), is grazing native vegetation, with some residential and farm infrastructure

The Project is located within the Gulf Savannah natural resource management (NRM) region, with land surrounding and underlying Project site used for low-intensity cattle grazing and resource exploration activities (DESI 2023). Queensland Land Use Mapping classifies the Project site and surrounding area as 'Grazing Native Vegetation' (DNRMMRRD 2025a).

During mine operation, the waste rock dumps may impact the visual amenity of the sensitive receptors during night-time (when lighting may be present). By year 40 of the Project, the western and eastern WRDs would reach a height of 90 m above surface with an elevation of 215 mAHD. The WRD's may appear prominently on the relatively flat regional terrain, however the terrain does gradually increase in elevation to the east, close to matching the WRD's height by sensitive receptor R1.

During the final years of the operation stage, waste rock from the WRDs would be used to backfill the open-cut pit, and consequently, the eastern WRD would not be present in the final landform, and the western WRD elevation would be significantly reduced to approximately 60 m above the surface with an elevation of 185 mAHD.

Once the Project site, including the features detailed above, have been rehabilitated, the proposed Project is considered unlikely to create a distinct landscape character that would negatively impact visual amenity.

4.3 Project Phases

Project design and development is an ongoing iterative process influenced by numerous variables including:

- mineral resources definition;
- geological constraints to mining;
- environmental values and impacts;
- social values and impacts;
- state and federal policy and legislation;
- variability in market and economic conditions; and
- technology advancements.

To support Project execution, the Project would be undertaken in three phases typical of open cut mining. These phases are:

- construction (Year -1 and Year -2);
- operation (Year 1 to Year 53); and
- decommissioning and rehabilitation (Year 54 to Year 63).

These phases are discussed in more detail in the following subsections.

4.3.1 Construction

Pre-construction and construction would progress together before the start of operations and after successful approvals are secured including, the MLs, EA, PRC Plan, and other permits required for the Project to proceed. Construction activities are forecast to take place over the first 24 months of the Project.

Construction activities would be undertaken 24 hours per day, split between day and night shifts. The construction workforce is discussed in Section 4.1.7.

- Construction activities would include:
- the development of access tracks and mine infrastructure;
- development of water management infrastructure;
- construction of the mineral processing plant;
- procurement and transport of mining equipment; and
- commencement of waste removal (overburden) for the pit development; and establishment of environmental monitoring programs.

Drilling is likely to continue through the construction phase for the purpose of improved resource definition, geotechnical assessment, environmental monitoring and the commencement of mine dewatering.

The following sections provide a detailed description of activities expected to occur during the construction phase.

4.3.1.1 Vegetation clearing and topsoil stockpiling

Site preparation and pre-construction works would include the clearance of vegetation, topsoil removal and stockpiling for rehabilitation. Removal of vegetation and disturbance of soil would be staged across the construction phase, to coincide with infrastructure installation and development, and to reduce unnecessary impacts. Progressive clearing would also minimise the duration which cleared areas are exposed to erosion.

Vegetation clearing

A maximum area of approximately 2,413.7 ha of remnant vegetation may be impacted as a result of the Project. The actual area of direct clearing impact is likely to be less as a buffer has been incorporated into the maximum impact area.

Clearing protocols would be also prepared for the Project, by a suitably qualified ecologist, to mitigate impacts to flora and fauna values. These protocols would be developed in consideration of relevant technical guidelines, and include the following criteria:

- Measures would be implemented to minimise disturbance and prioritise the salvage and reuse of select habitat features, including hollow logs.
- Protocols would be implemented to handle fauna encountered prior to, or during clearing activities, including to manage any necessary relocation to suitable habitat areas.
- An appropriately qualified fauna spotter/catcher would oversee clearing activities.
- Protocols would be implemented to handle injured wildlife, including emergency euthanasia if necessary.

If required, a general Species Management Program to address Section 88 of the NC Act and Section 335 of the Nature Conservation (Animals) Regulation 2020, would be prepared by a suitably qualified ecologist in accordance with guidelines before clearing activities.

Soil stockpiling

Soil stripping would be undertaken as part of construction and site development, to recover valuable growth medium resources for future mine rehabilitation. A summary of the recommended stripping depths and estimated volume of growth medium is provided in Table 4-10.

Where suitable, soil would be stripped with its existing ground cover vegetation and, if subject to stockpiling, stored with the application of a suitable cover crop to prevent erosion and maintain biological function.

Future rehabilitation activities would utilise stockpiled growth medium in recreated profiles to enable a sustainable vegetation cover.

Table 4-10: Recommended topsoil stripping depth and estimated topsoil volumes

Soil profile class	Topsoil stripping depth (mbgl)	Subsoil stripping depth (mbgl)	Area within disturbance footprint (Ha)	Available topsoil volume within disturbance (m^3)	Available subsoil volume within disturbance (m^3)
1Cl(Ck)	0.00–0.70	-	93.8	657,090	0
2Cl(Ck)	0.00–0.50	UMAs 2, 8, 13, 16: 0.50–2.20 UMA 11: 0.50–1.15 UMA 18: 0.50–1.40 UMA 19: 0.50–1.70	1,072.4	5,362,000	UMAs 2, 8, 13, 16: 10,327,500 UMA 11: 407,550 UMA 18: 2,893,500 UMA 19: 968,400
3Cl(Ck)	0.00–0.45	0.45–0.65	1,159.6	5,218,200	2,319,200
4Cl(Ck)	0.00–0.60	0.60-0.75	62.4	374,160	93,540

5Cl(Nm)	0.00–0.35	-	2.4	8,400	0
6Cl(El)	0.00–0.30	0.30-2.00	19.1	57,720	327,080
7Cl(Nm)	0.00–0.15	–	4.1	6,150	0
			Total:	11,683,720	17,336,770

[1] Where UMAs of sufficient size and topsoil/subsoil depth exist, UMAs have been calculated separately.

4.3.1.2 Erosion and sediment control

As part of construction activities, erosion and sediment control, aimed at reducing the risk and impacts of erosion, would be implemented in accordance with 'Best Practice Erosion and Sediment Control' (IECA 2008) and 'Soil Erosion and Sediment Control Engineering Guidelines for Queensland Construction Sites' (Witheridge and Walker 1996). These erosion and sediment controls would continue to be implemented and would evolve to address risks during all phases of the Project, including construction, operation, and rehabilitation.

Erosion and sediment control practices during construction would include:

- Where practical, preservation of vegetation around drainage lines and riparian zones.
- The use of sediment fences and filters prior to vegetation disturbance to retain and filter suspended solids.
- Use of upslope diversions to reduce clean water interaction with disturbed areas.
- Documenting soil types, including potentially sodic and dispersive soils, and disturbed catchment areas on the site and their potential for sediment generation.
- The use of downslope diversions or collection drains to divert sediment water (e.g. mulch berms, sediment drains, and/or drop inlet protection) to allow for the settlement from sediment-laden runoff from disturbed areas.
- Design and management of drainage control measures to prevent erosion from concentrated flows and manage the flow of clean and sediment runoff.
- Design and management of sediment dams including dewatering and desilting requirements to meet IECA standards.

Installed erosion and sediment control structures would not be removed until disturbed areas have been stabilised or rehabilitated. More permanent erosion and sediment controls, including sediment drainage and sediment dams, would be developed during the construction phase in advance of the operation phase, and be retained until rehabilitation and closure.

4.3.1.3 Mine roads

Internal roads (mine access roads and haul roads within the Project MLAs would be developed during the construction phase to facilitate access for heavy equipment and other authorised mine traffic to and from the Project site during construction, as well as future haulage activities during operations. Internal roads would be unsealed.

The Project's mine access road is located on-lease and would connect the Project site to Esmeralda Prospect Road. The road would primarily be constructed from locally sourced materials, including suitably sized waste materials excavated from the pit overburden and waste rock. The access road would be designed to facilitate B-double truck traffic, including the carrying of concentrate, fuel and reagents to and from the site. It is expected to have a total width of approximately 20 m, including earthen safety bunds on either side as required.

Mine haul roads are required for movement of waste during pit development, as well as during mining. Haul roads would be approximately 26 m in width, or of sufficient width to support safe truck movements, with earthen side bunds appropriate for haul truck specifications. A typical cross-section of a mine site haul road is presented in Figure 4-15.

Other mine service roads would be developed during construction and situated to provide access around the Project site and, where necessary, separation of light and heavy vehicle traffic would be incorporated. Mine service roads would typically have a width of 8–10 m and be sufficient for two-way traffic. A typical cross-section of a mine service road is presented in Figure 4-16. The mine service network would also provide access to the mine accommodation facility as shown in Figure 4-2 and Figure 4-3.

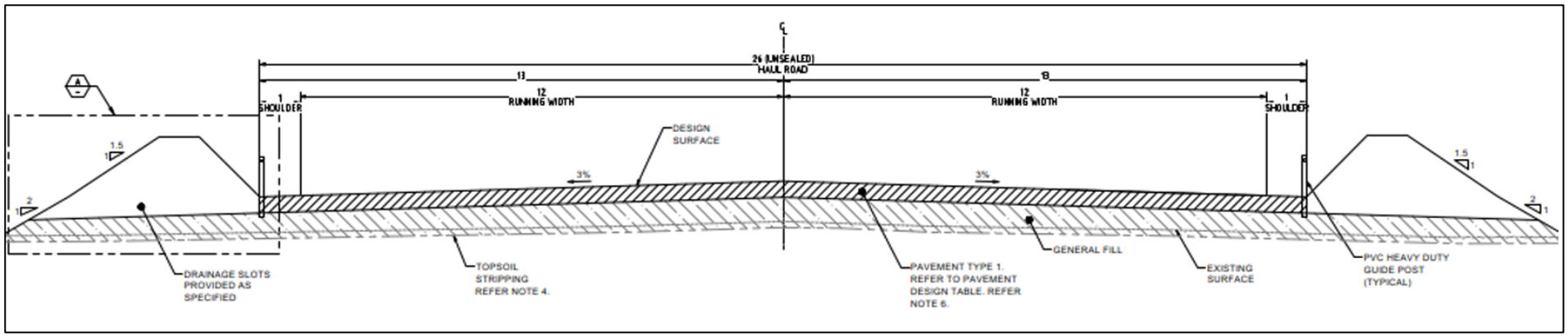


Figure 4-15: Mine site haul road cross-section

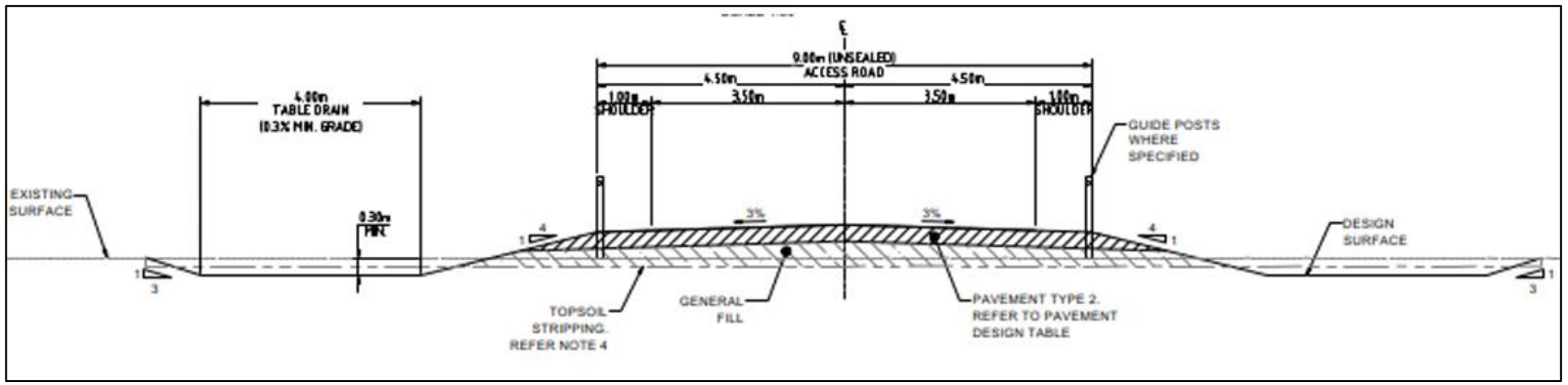


Figure 4-16: Service road cross-section

4.3.1.4 Mineral Processing Plant

The Project includes construction of an on-site MPP. The plant includes an initial crushing and milling circuit that liberates the graphite in 106-micron product. The MPP would include infrastructure to convey ore to a flotation circuit, consisting of rougher and flotation stages. Finally, ore is processed through filtration and drying circuits deliver graphite concentrate to the product stockpile and load out areas near the MPP. Construction of the MPP would be completed in construction Year -1. A process flow of the graphite ore through the MPP is provided in Figure 4-17. Details of the MPP operation are provided in Section 4.3.2.6.

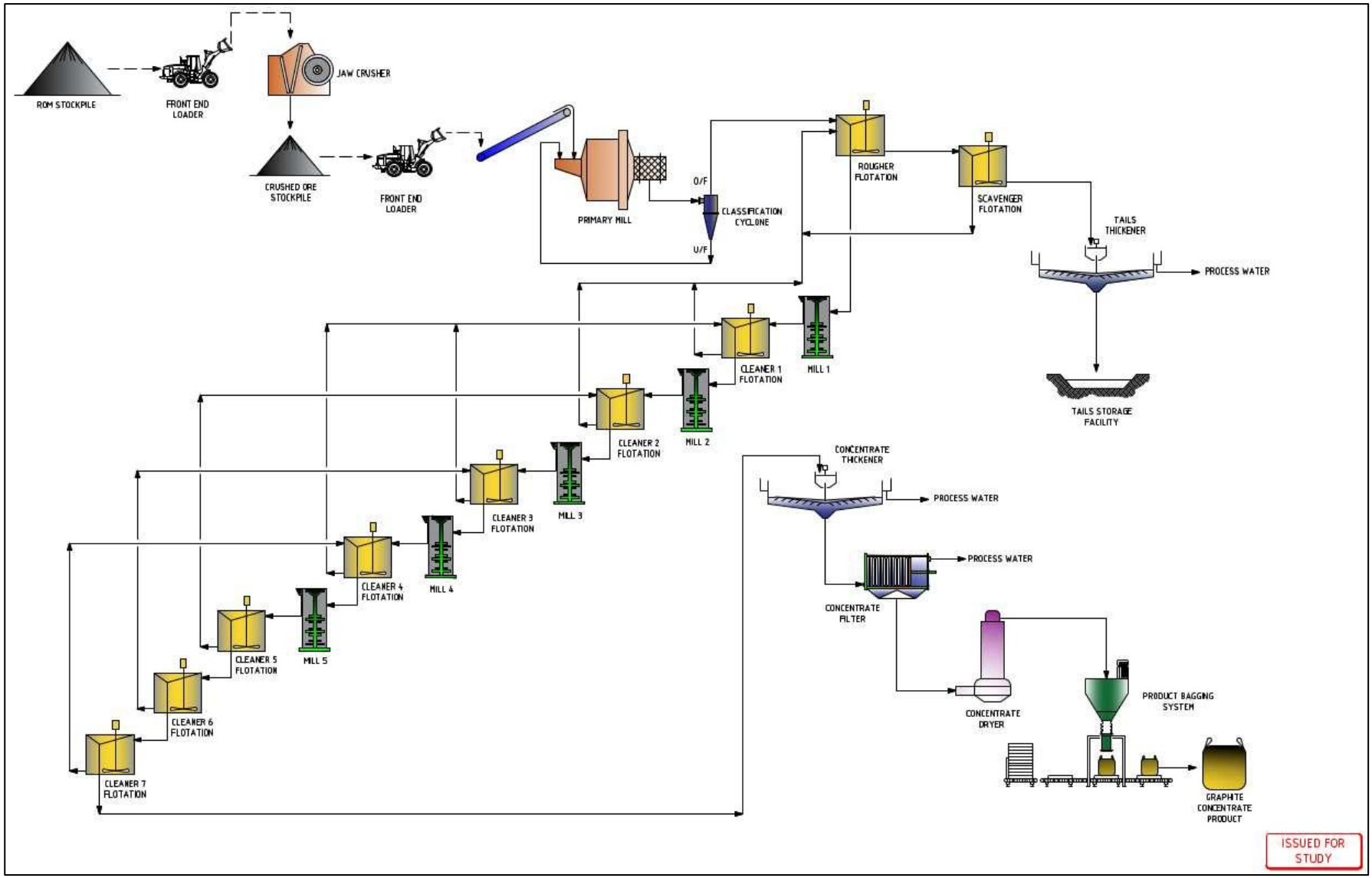


Figure 4-17: Process flow from ROM to graphite concentrate through MPP

4.3.1.5 Accommodation facility and sewage treatment plant

During the construction phase of the Project, temporary accommodation would be available for non-resident workers within the local region or on-site (through mobile accommodation facilities). During the operational phase of the Project, the workforce would be accommodated in the on-site workers accommodation facility, to be constructed during the Project construction phase.

The workers accommodation would include sleeping quarters and associated meal facilities and administration area. Under normal conditions, the camp would be occupied by approximately 113 persons. This would be sufficient to accommodate peak workforce of 200 workers on different roster configurations. Access to the accommodation village would be from the mine access road.

In producing a workforce and accommodation strategy, Graphinex has engaged with an array of local stakeholders, including local Government, relevant landowners, State Government agencies , local emergency services (QAS, QPS and QFS) and numerous key private sector partners.

Key considerations in the decision to house employees in an on-site facility include:

- distance to the nearest town;
- safety of workers and the community on public roads; and
- limited available housing and accommodation in nearby towns.

Where practicable, resources to develop and operate the Project site would be sourced through local supply agreements. This would ensure that the Project would provide long-term support for local businesses and industry.

A package sewage treatment plant (STP) would be constructed at the on-site accommodation facility. Sewage generated at the accommodation facility and MIA would be pumped to a package STP by way of underground sewage pump stations and underground rising mains. The STP would be designed to treat 100% of the potable water (modelled at 200 L per person per day) assumed to become wastewater requiring treatment in the plant. Additional sewage treatment details are provided in Chapter 17, Waste.

4.3.1.6 Explosives magazine

An explosives magazine would be constructed for the storage of explosives, used in the controlled blasting of ore bearing geological units and waste rock/overburden, enabling extraction during the operations phase. The magazine has been located with an acceptable separation distance from other mine infrastructure and accommodation facilities.

The use of explosives would be in accordance with all licensing requirements.

4.3.1.7 Other mine infrastructure

Other ancillary mine infrastructure to be constructed includes:

- laydown areas;
- ROM Pad and product stockpile / load out areas;
- offices, administration buildings and ablutions, and sewage treatment plan and irrigation area;
- airstrip;
- chemical and fuel storage areas;
- general waste, reusable items storage, recyclables, and regulated waste storage areas; and
- heavy and light vehicle workshops.

Additional supporting infrastructure such as piping and powerlines would be sited and developed according to detailed engineering designs drafted prior to Project commencement.

4.3.1.8 Project footprint

The Project footprint is shown in Figure 4-2 and Figure 4-3. The footprint includes a buffer around the proposed infrastructure layout, whereby additional disturbance outside of the direct impact from development may be facilitated to ensure safe operations and minimise risks, such as those associated with fires or storms. The footprint shown does not equate to the total disturbance footprint at any one point in time or indicate that the entirety would be impacted. Infrastructure would be developed on an as-needed basis to avoid unnecessary clearing where possible. The maximum total disturbance area including the buffer zone around Project infrastructure is approximately 2,413.7 ha.

4.3.1.9 Construction materials

The commencement of pit development in the construction stage would provide an ample source of sandstone overburden, which is geochemically stable, and is suitable for use in road base and other landform construction including tailings storage facilities.

If material of specific properties is required during construction of dams or other landforms, quarry material may be trucked to site from regional commercial suppliers.

The remainder of anticipated construction materials include:

- cement;
- pre-cast concrete structures;
- prefabricated buildings;
- structural steel and steel reinforcing; and
- other oversized specialty items.

Approximately 80% of the deliveries for construction phase are expected to arrive from Townsville, while the remainder may arrive from Mt Isa or other regional hubs. Table 4-11 describes the predicted transport movements for materials to the Project during the construction stage.

Most infrastructure components (e.g. Mineral Processing Plant equipment, HDPE Pipes, Concrete Culverts, pipelines, solar array, etc.) would be manufactured off-site and transported to site for assembly and installation. These components would generally originate from Townsville or further afield.

Table 4-11: Construction materials transportation

Vehicle type	Quantity per Day
Heavy vehicles during construction	
Concrete Mixer	8
Class 3 truck	12
Low Loader	2
Class 9 AV	4
Class 10 B-Double	26
Total	**52**

4.3.1.10 Construction method

Construction activities would be undertaken 24 hours per day split between day and night shifts. Equipment used during construction would include excavators, haul trucks, dozers, graders, front-end loaders and water trucks. The start-up mining fleet would also be delivered to the Project during the construction stage. A concrete batching plant would be set up on site.

The Project would seek to minimise unnecessary land disturbance, including where the MIA foundations would be formed by cut-and-fill methods, to minimise earthworks. Construction and laydown areas would be sited to avoid unnecessary disturbance beyond the planned disturbance footprint (I.e. there would be no temporary construction areas).

Security gates and signage may be installed at the intersection of the access road with Esmeralda Prospect Road, and/or the entrance to the MIA to prevent unauthorised access to the site. Additional fencing requirements, including fencing to prevent stock access and for security purposes, would be installed progressively as required. Temporary fencing would be installed around construction sites to isolate working areas and avoid unauthorised entry. Fencing would comply with the Australian Standard 4687 Temporary Fencing (AS 4687.4.2022) and would be:

- difficult to climb or crawl under;
- fitted with securely connected gates and joints without weak points for entry; and
- capable of withstanding reasonable force and loads, including high-strength winds.

All workers and contractors would be required to adhere to the Mining and Quarrying Safety and Health Act 1999 (Qld) and regulations, environmental standards and safety policies and protocols for the duration of the Project. These standards would comply with relevant legislation, policies and procedures to protect both the environment and worker safety.

The construction phase of the Project would transition to the operations phase, once all relevant infrastructure is developed and commissioned. Construction activities would be demobilised progressively during this transition.

4.3.1.11 Water supply

Due to the remote location of the Project, water security is a key factor in Project viability. At a minimum, water during the construction phase is required to:

- facilitate dust suppression; and
- supply potable water.

The Project would source water from advance pit dewatering abstracted as raw water. This would enable the initial overburden removal during the construction phase. Water supply would also be supplemented by water collected in the water storages (including sediment dams). For the construction period, this is expected to generally be Sedimentation Pond 2.

The *Mineral Resources Act 1989* (Qld) (MR Act) entitles the holder of a mining lease to take or interfere with underground water as part of approved mining operation. This entitlement is termed the mining lease holder's 'underground water rights'. Groundwater that is taken or interfered with while exercising the underground water rights is termed 'associated water'. The holder of a mining lease or mineral development licence is entitled to use associated water for any purpose. In order to exercise the underground water rights for the project, the proponent must:

- apply for an EA under the EP Act;
- comply with the notification requirements under section 334ZP(6) of the MR Act by notifying the Department of Environment, Science, Tourism and Innovation (DETSI) of the exercise of its underground water rights; and

- comply with its monitoring and reporting obligations under section 334ZP(5) of the MR Act and Chapter 3 of the Water Act 2000 (Qld). Section 334ZP(5) of the MR Act requires that the volume of associated water taken is measured and reported. The proponent's obligations under Chapter 3 of the Water Act 2000 (Qld) would include undertaking baseline assessments of the groundwater regime and water supply bores, providing ongoing assessment and reporting of groundwater take and, where necessary, entering into 'make good agreements' with owners of affected water supply bores.

In accordance with the MR Act, the proponent would notify DETSI of its exercise of underground water rights on the Project site immediately after it starts exercising the rights. The proponent would report the annual associated water volume taken to the Department of Resources in accordance with the Queensland guideline - Q*uantifying the volume of associated water taken under a mining lease or mineral development licence* (Department of Natural Resources, Mines and Energy, 2020).

The water supply has been modelled as part of the Surface Water Impact Assessment (Engeny 2026, Appendix K). This considers a site water balance, measuring expected inflows (including rainfall, pit inflows) and outflows (including evaporation and usage). The water management system has been modelled to have no median annual shortfalls to supply water demands in 95% of years during mine operation years. This is detailed further in Chapter 14, Water Resources. In the event of a reduction in water availability across any period, the Project can respond operationally to reduce water demand accordingly.

Potable water supply would be supplied through an on-site water treatment plant (Reverse Osmosis Plant), installed as part of the construction of the accommodation facility. This plant would treat water sourced from the pit-dewatering process and/or importing water to site to supplement as needed.

4.3.1.12 Power supply

Diesel power generation would be required to provide initial loading until the development of an onsite 10 MW solar farm and associated 5MW / 35MWh energy storage system, or similar. Subsequently, diesel would operate as backup loading.

Infrastructure for distribution would include transmission-lines and an onsite switching/substation located adjacent to the mine infrastructure area.

4.3.1.13 Lighting components

Artificial lighting for the construction of the Project would be designed, installed, operated and maintained in accordance with 'AS 4282:1997 Control of the Obtrusive Effects of Outdoor Lighting' (Standards Australia 1997) to minimise light spill.

Controls stipulated in this standard include consideration of the location and orientation of lighting with respect to surrounding sensitive receptors and environmental values, as well as the selection and maintenance of luminaries. Any further mitigation (e.g. shielding, further restriction on use of lighting) would be implemented on an as-needed basis. Lighting impacts and mitigation are discussed further in Chapter 28, Visual Amenity.

4.3.1.14 Biosecurity management

The construction, operation, and decommissioning and rehabilitation phases of the Project would ensure that:

- the introduction and spread of weeds, pests and disease are avoided and minimised;
- existing weeds and pests are controlled, including biosecurity threats and their management; and
- the performance outcomes correspond to the relevant policies, legislation and guidelines and sufficient evidence is supplied (including through studies and proposed management measures) that shows these outcomes can be achieved.

The workforce, including external contractors, would be required to stay within the defined boundaries of the Project area, unless prior permission is granted. This would reduce the impact of personnel, plant, and equipment being introduced to undeveloped areas. Vehicle washdown standards would be enacted such that access to or from areas with known weeds, pests or diseases that have the potential to be spread would trigger the need for vehicle washdown, and therefore the spread of weeds, pests and diseases are unlikely to be exacerbated by vehicle movement.

Should a biosecurity event emerge, including the spread of weeds or emergence of pests, the area in question would be controlled by suitably qualified contractors. Following control, the area would be monitored to ensure the success of control measures. Post-control, further remediation or rehabilitative steps may be necessary, including for example where weed removal has disturbed vegetation or soil conditions. These would be undertaken on a case-by-case basis to return the environment to a suitable condition.

Vector-borne diseases

Vector-borne diseases are transmitted through bites from infected animals, mosquitoes and ticks. The Project occurs within the cattle tick biosecurity zone (DAF & DNRME 2020). The presence of a workforce has the potential to increase the presence of suitable breeding sites for mosquitoes, thereby increasing the risk for the spread of mosquito-borne diseases. Vector-borne diseases can have potential health impacts for employees, local communities and neighbouring properties.

Queensland Health (2022) have identified several mosquito-borne diseases that are notifiable under the Public Health Act (Qld):

- Dengue;
- Ross River Virus;
- Barmah Forest Virus;
- Japanese Encephalitis;
- Murray Valley Encephalitis;
- Chikungunya Virus;
- Malaria;
- West Nile Virus Kunjin subtype;
- Yellow Fever; and
- Zika Virus.

In livestock, mosquito-borne diseases and viruses can lead to infertility, sickness, fevers, neuromuscular impairment, heart murmurs, diarrhoea, spontaneous abortions, and death (Business Queensland 2023).

Should a mosquito infestation develop as a management concern at any point in the future, management measures would be implemented in accordance with Queensland Health guidelines to prevent the spread of mosquito-borne disease on-site. Furthermore, the Project would implement the following practices to reduce the risk of mosquito outbreaks, and ticks:

- general protection measures would be implemented to reduce the likelihood of mosquito or tick bites (e.g. long sleeves on shirts, insect repellent);
- potential breeding sites for mosquitoes would be eliminated by identifying and minimising the potential for water ponding to occur; and
- should employees begin to show symptoms associated with vector-borne diseases, they would be monitored and taken for treatment, and details of the incident would be reported to appropriate authorities.

Pest and weed management

Table 4-12 provides the monitoring objectives, actions and timeframes for a potential monitoring program for the Project.

Table 4-12: Monitoring objectives, criteria and actions

Objectives	Monitoring approach	Timeframes
Terrestrial and aquatic weeds Avoid, minimise and/or mitigate the spread of terrestrial and aquatic weeds. Control and manage existing terrestrial and aquatic weeds.	The Pest and Weed Management Plan would include a weed species monitoring program with the following components: Monitoring programs would be detailed for the introduced flora species cognisant of staged clearing and progressive rehabilitation programs. Weed species introductions or substantial increases in weed populations would be addressed through applicable management measures.	Prior to Project commencement and ongoing during Project construction and operations.
Terrestrial and aquatic pest animals Avoid, minimise and/or mitigate the spread of terrestrial and aquatic pest animals. Control and manage existing terrestrial and aquatic pest animals.	The Pest and Weed Management Plan would include a fauna pest monitoring program with the following components: Fauna pest surveys would be conducted by site personnel. A fauna pest register would be maintained to record fauna pest observations. Records of new fauna pests or substantial increase in fauna pest populations would be addressed through applicable management measures.	Prior to Project commencement and ongoing during Project construction and operations. Monitoring would occur bi-annually.
Designated pests under the Public Health Act (Qld) Avoid, minimise and/or mitigate the spread of designated pests. Control and manage existing designated pests.	The Pest and Weed Management Plan would include a monitoring program for the designated pests under the Public Health Act (Qld) with the following components: Designated pest surveys would be conducted by site personnel. A designated pest register would be maintained to record the pest observations. Records of new designated pest or substantial increase in the pest populations would be addressed through applicable management measures.	Prior to Project commencement and ongoing during Project construction and operations.

The following weed monitoring activities are proposed to be included:

- Regular weed monitoring: monitoring would occur periodically to identify any weeds not previously identified in the region. This survey would cover each location within the weed management area, including some areas that do not usually have any weeds present.
- Routine monitoring: areas identified as higher risk (e.g. areas that are known to regularly exhibit weeds or are at high risk of weed infestations) would be monitored at the start of each season, and after significant rainfall.
- Opportunistic monitoring: any weeds observed during normal activities are to be recorded and managed accordingly.

Monitoring results would be reviewed on an annual basis to assess the performance outcomes, which would correspond to the Biosecurity Act (Qld) as well as Croydon Shire Council's 'Biosecurity Plan 2019' (GCBAI 2019). If the objectives are not being met, eradication programs would be implemented according to DPI and Croydon Shire Council's recommended methods.

4.3.1.15 Emergency events

An Emergency Response Plan (ERP) would be developed for construction and operation of the Project. Consultation would be undertaken with the following stakeholders, to ensure clear protocols are in place for dealing with emergency events:

- Queensland Fire and Emergency Services;
- Queensland Mines Rescue Service;
- Queensland Ambulance Service;
- Queensland Police Service;
- Rural Fire Service; and
- Royal Flying Doctor Service.

4.3.2 Operation

The operational phase of the Project supports a mine production life of approximately 53 years, under anticipated mining conditions.

The Project would operate 24 hours per day, seven days per week. Operational workforce, proposed shifts and transport demand is discussed in Section 4.1.7.

4.3.2.1 Operational mine life stages

The progression of mining operations over the 53 year mine life is depicted in stage plans in Figure 4-18 to Figure 4-33, with key stages summarised in Table 4-1.

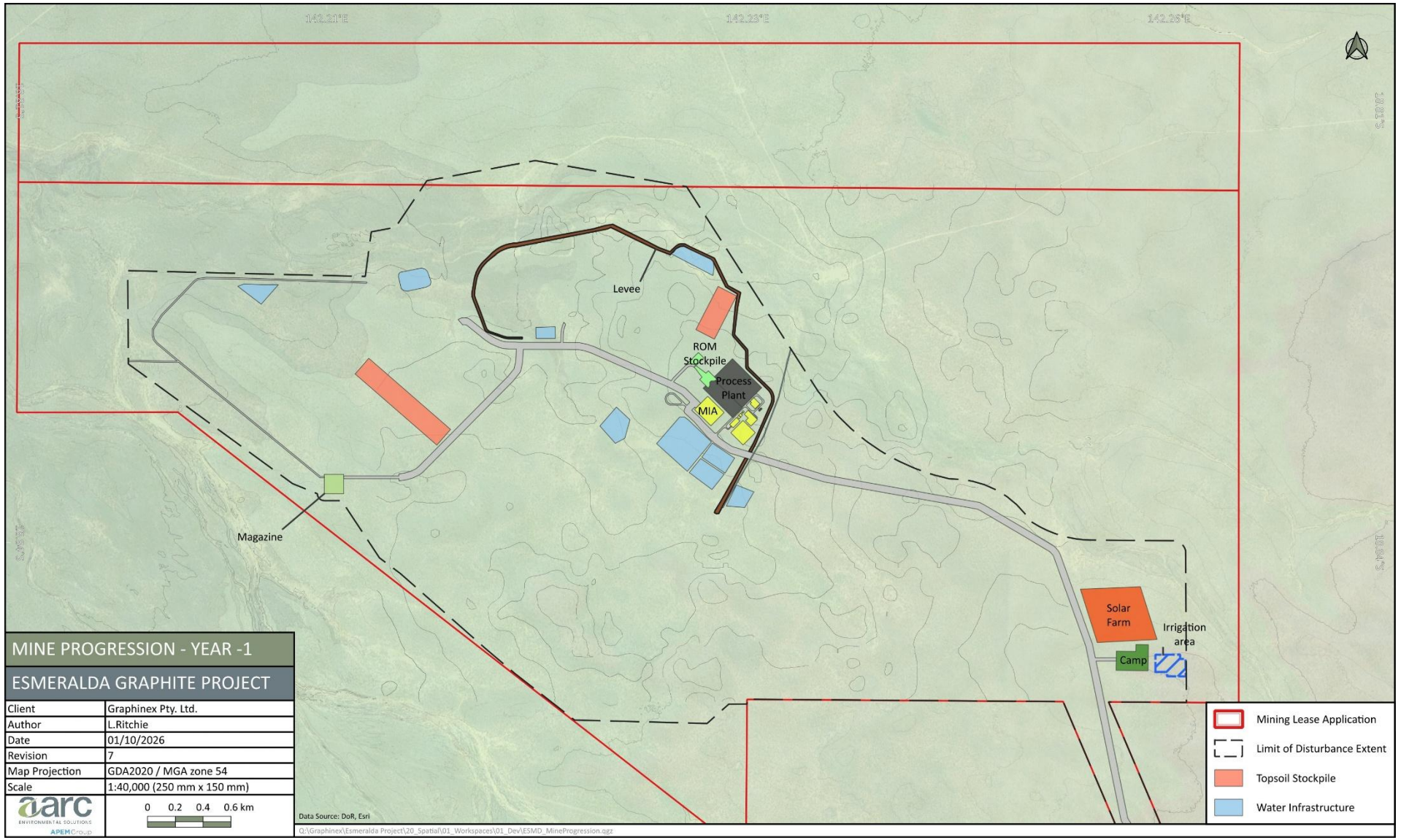


Figure 4-18: Mine progression Year -1

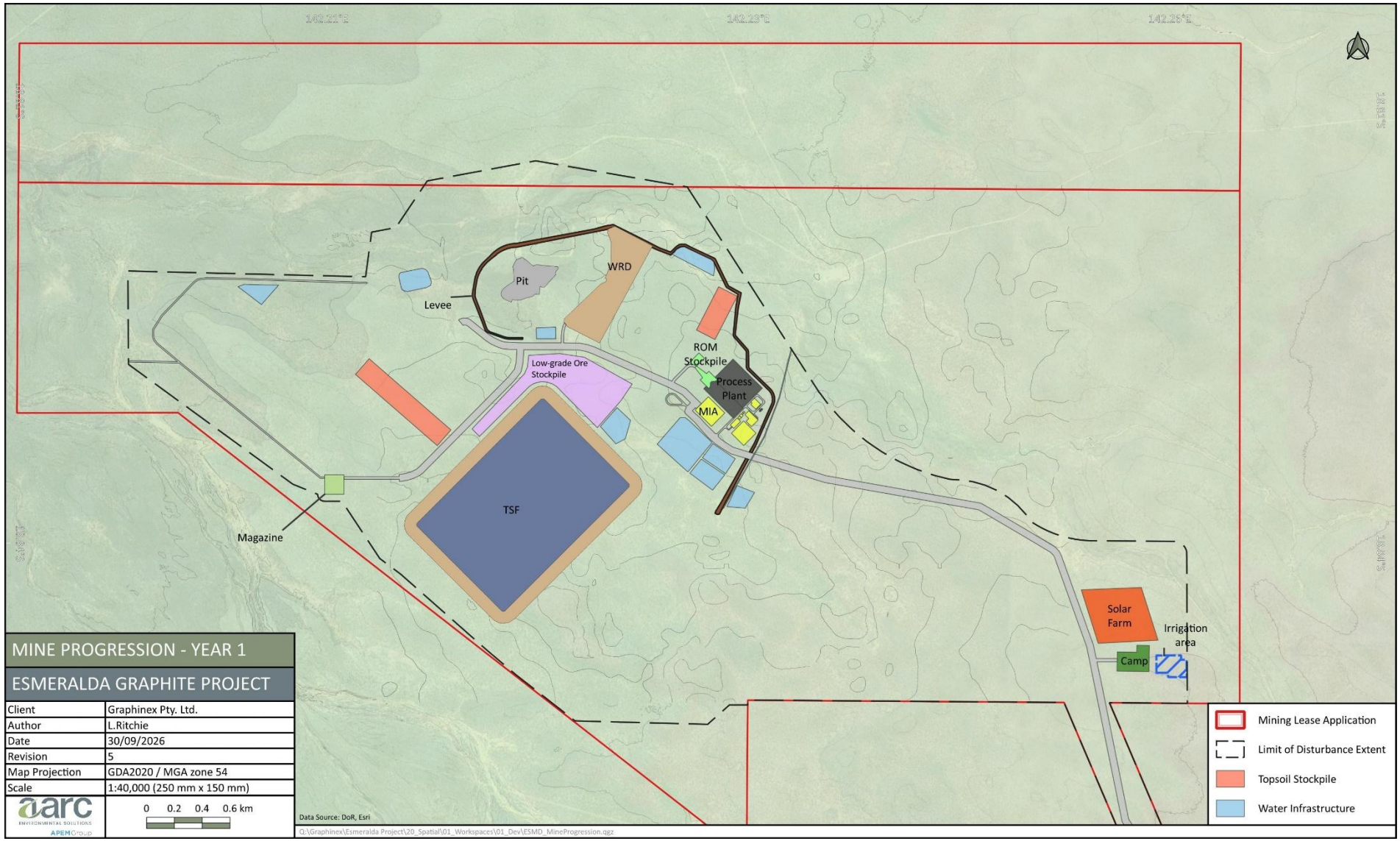


Figure 4-19: Mine progression Year 1

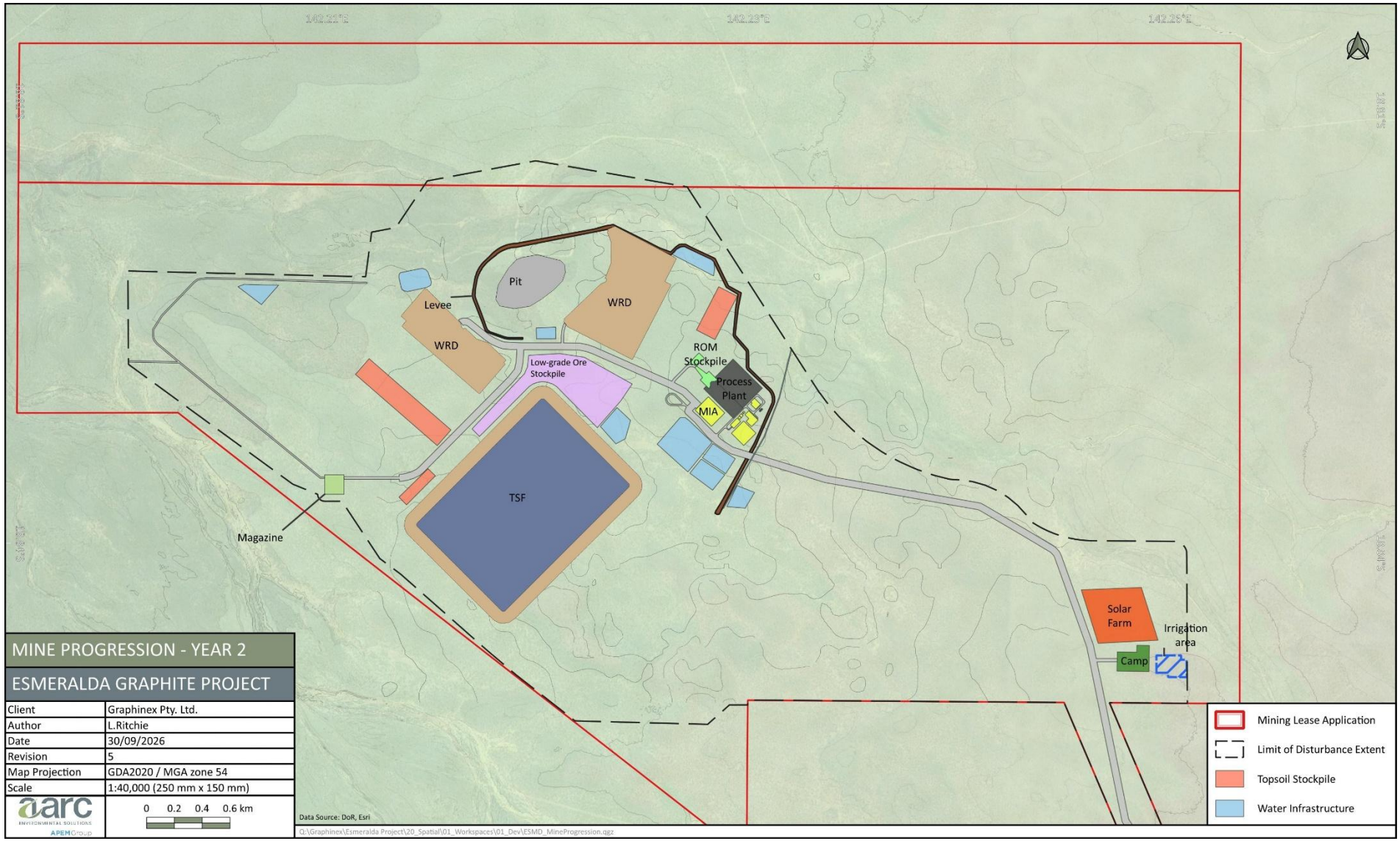


Figure 4-20: Mine progression Year 2

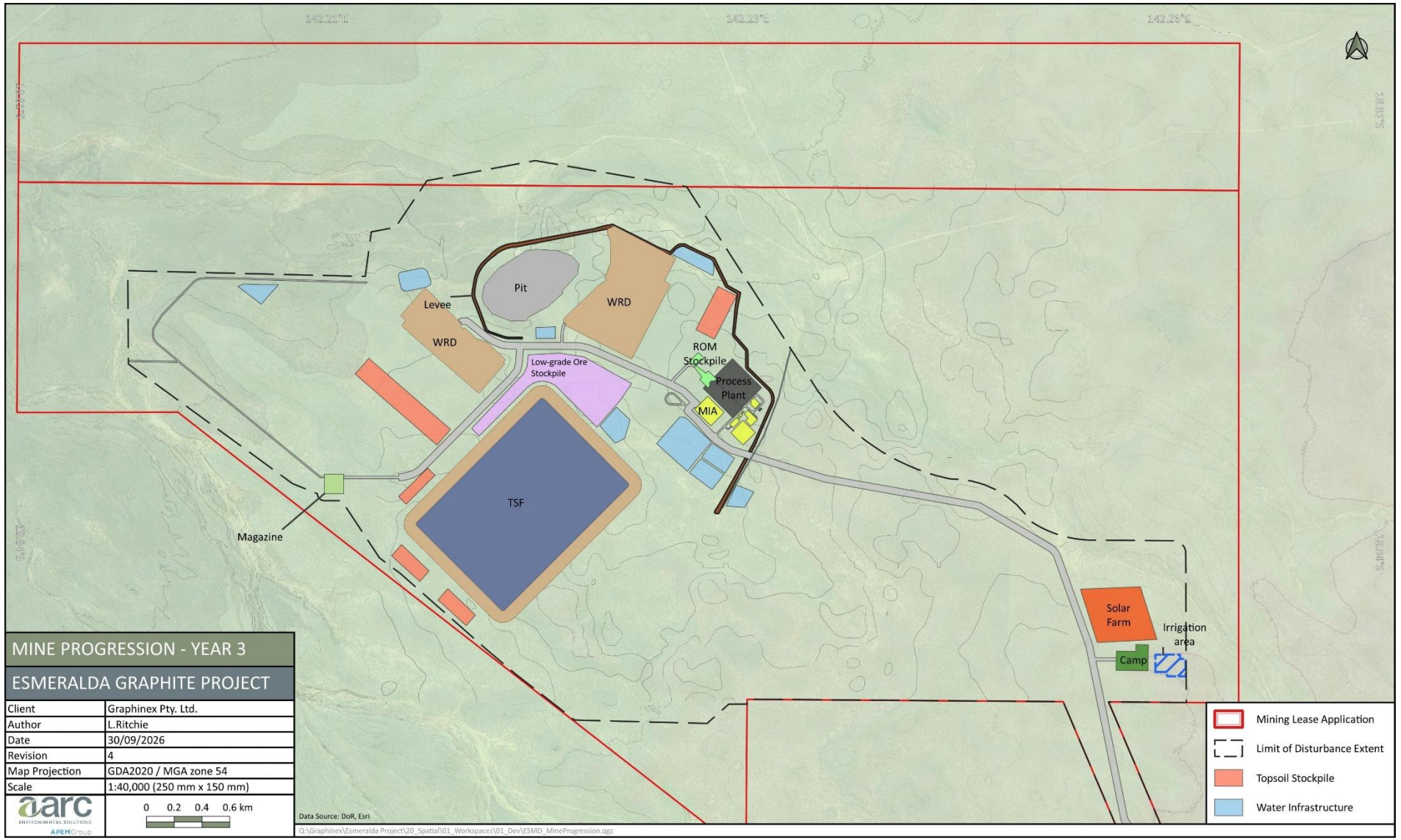


Figure 4-21: Mine progression Year 3

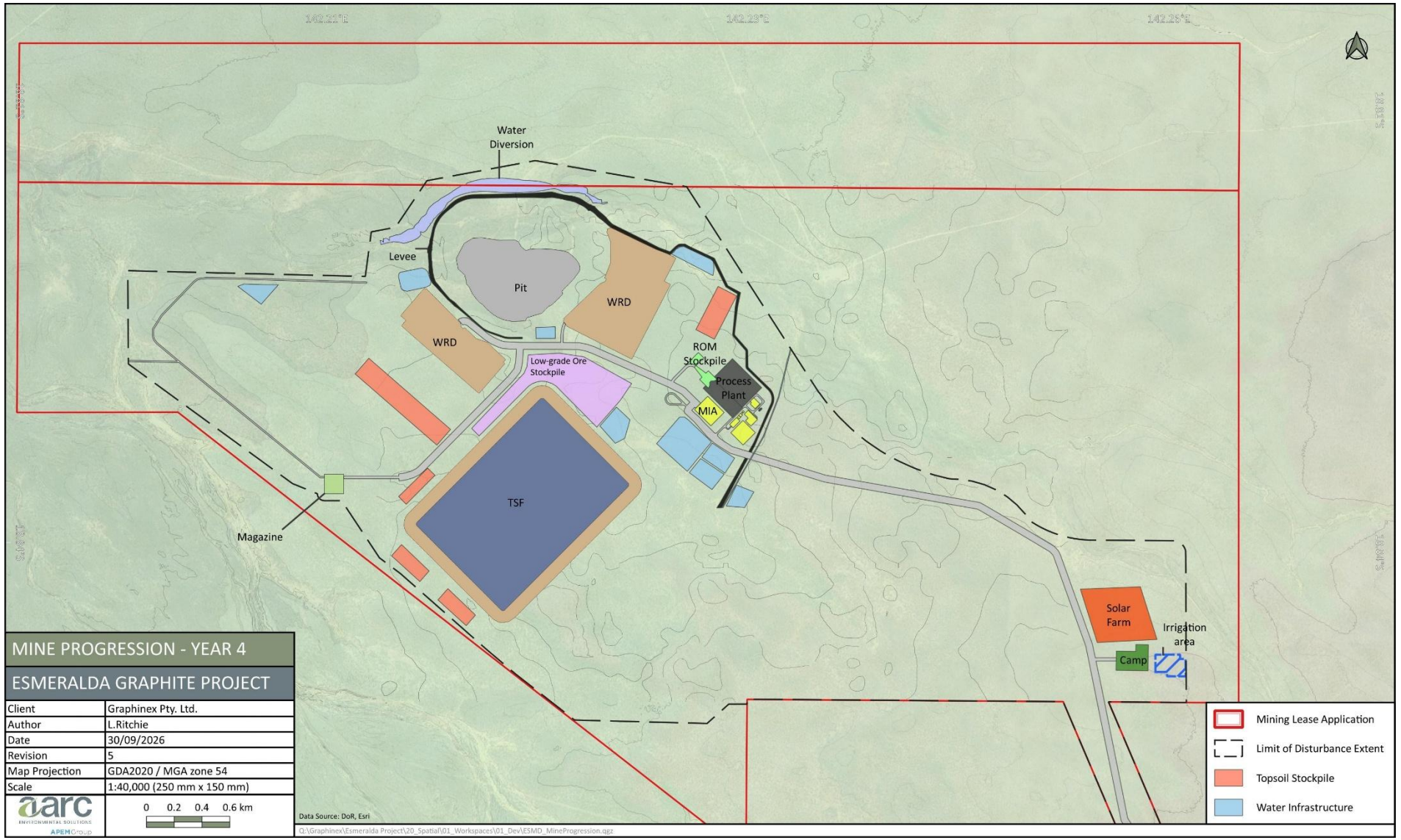


Figure 4-22: Mine progression Year 4

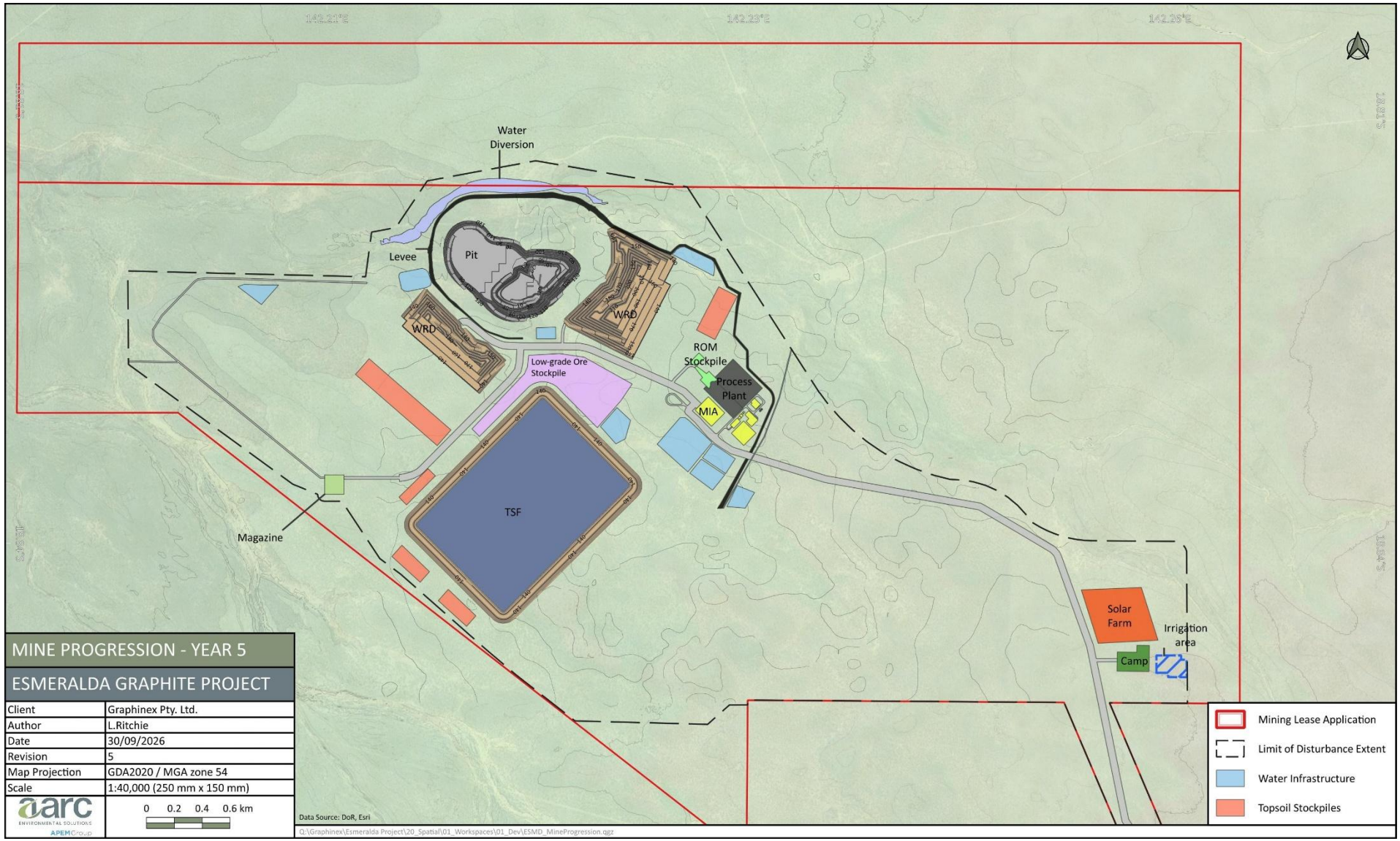


Figure 4-23: Mine progression Year 5

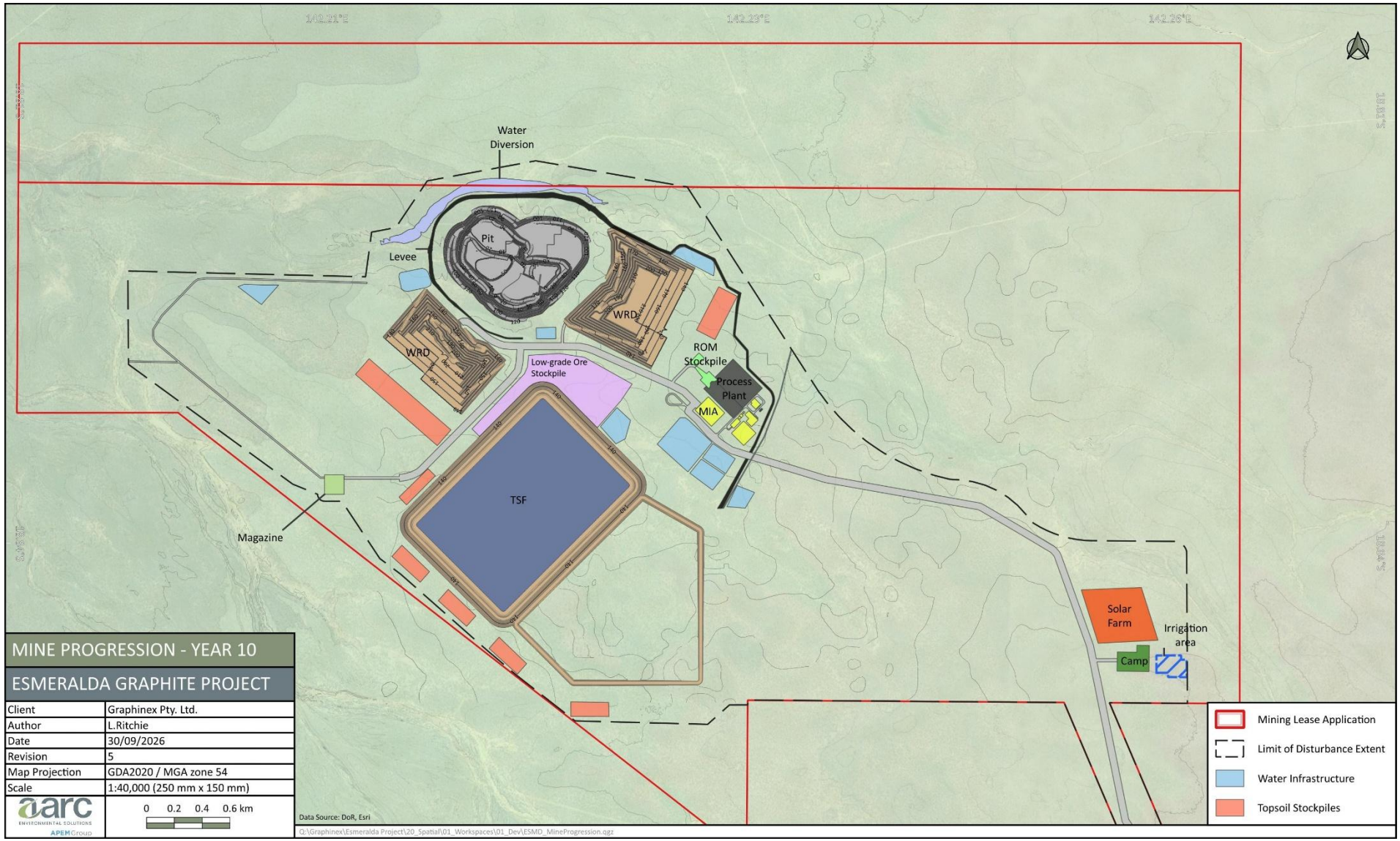


Figure 4-24: Mine progression Year 10

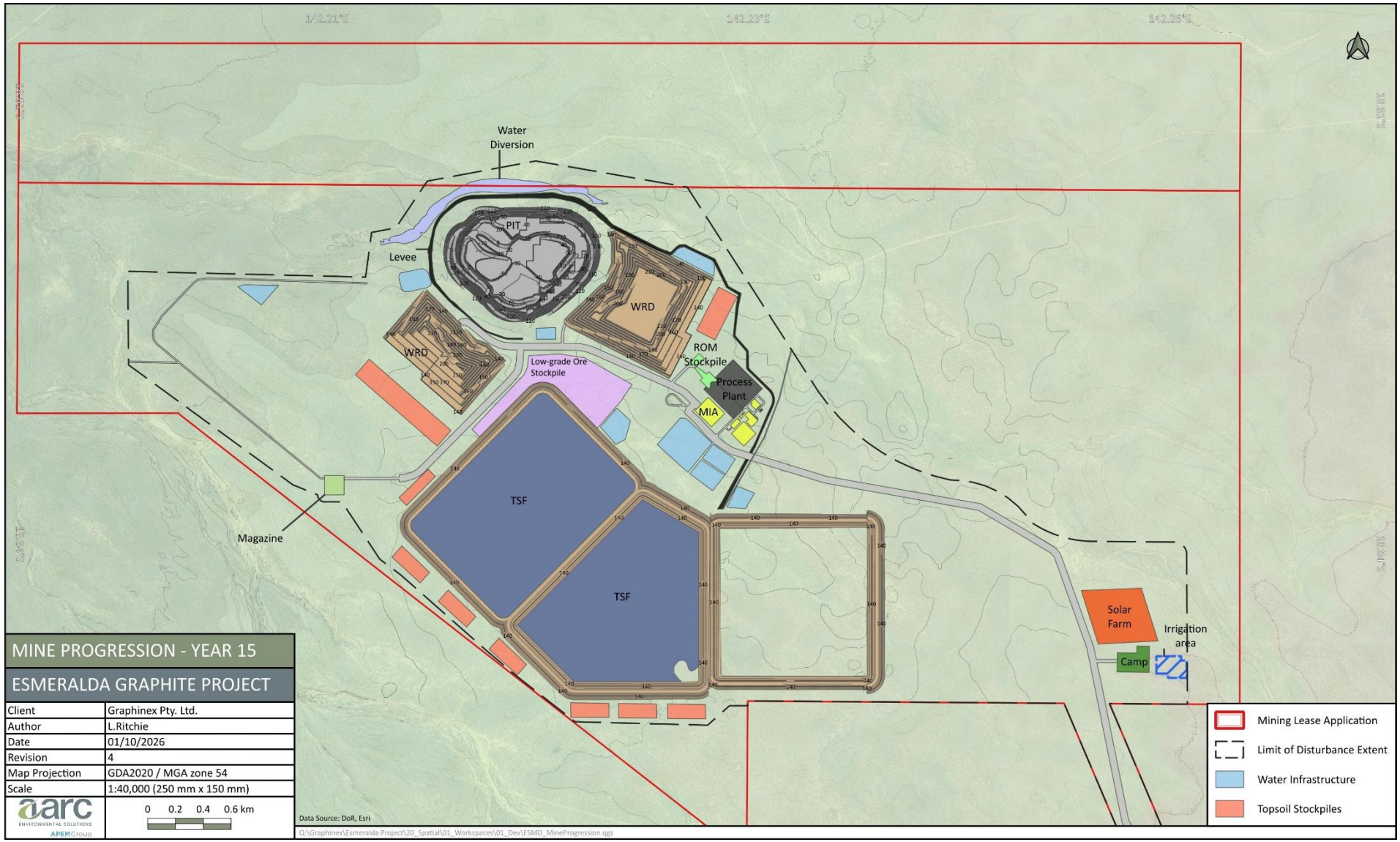


Figure 4-25: Mine progression Year 15

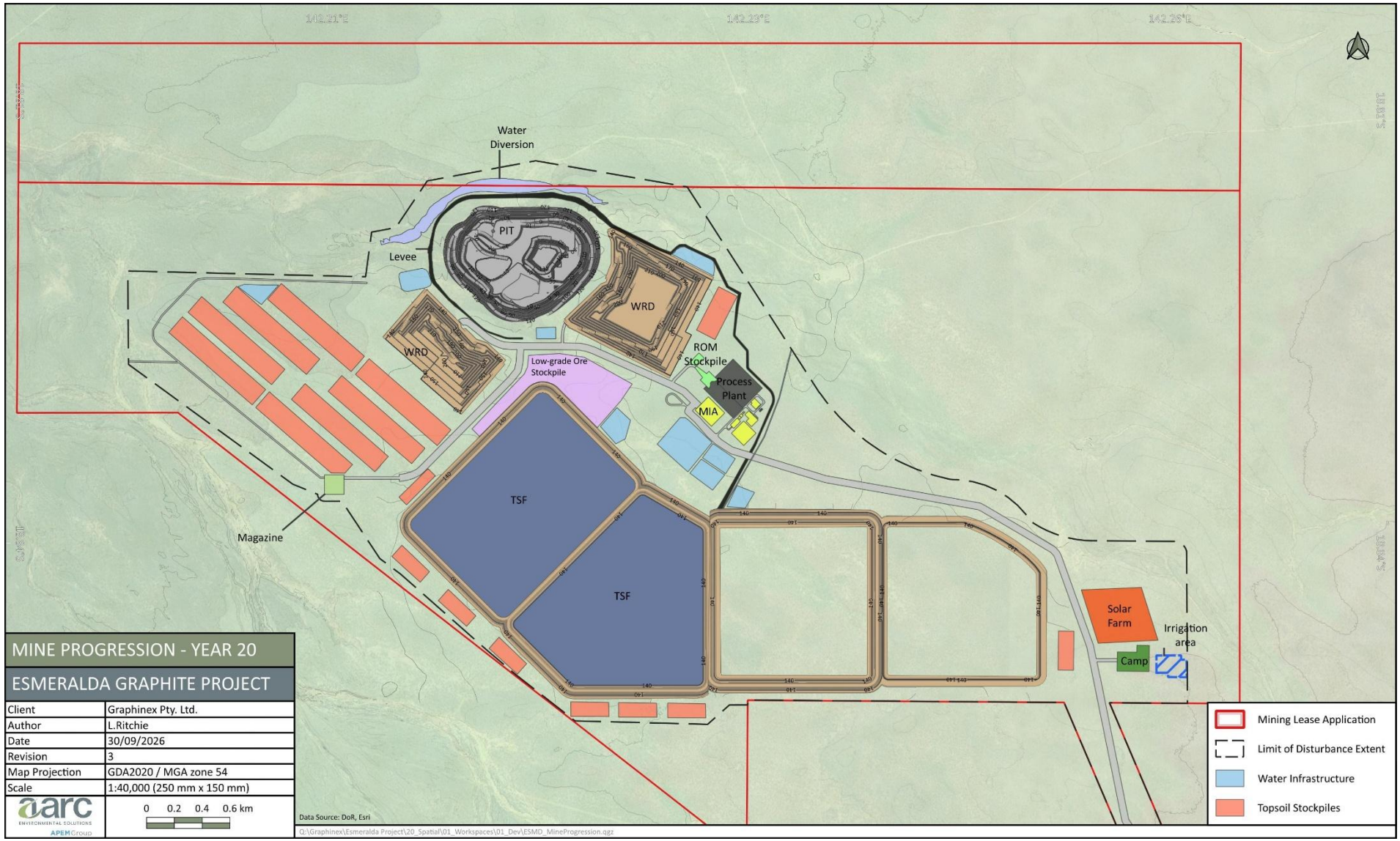


Figure 4-26: Mine Progression Year 20

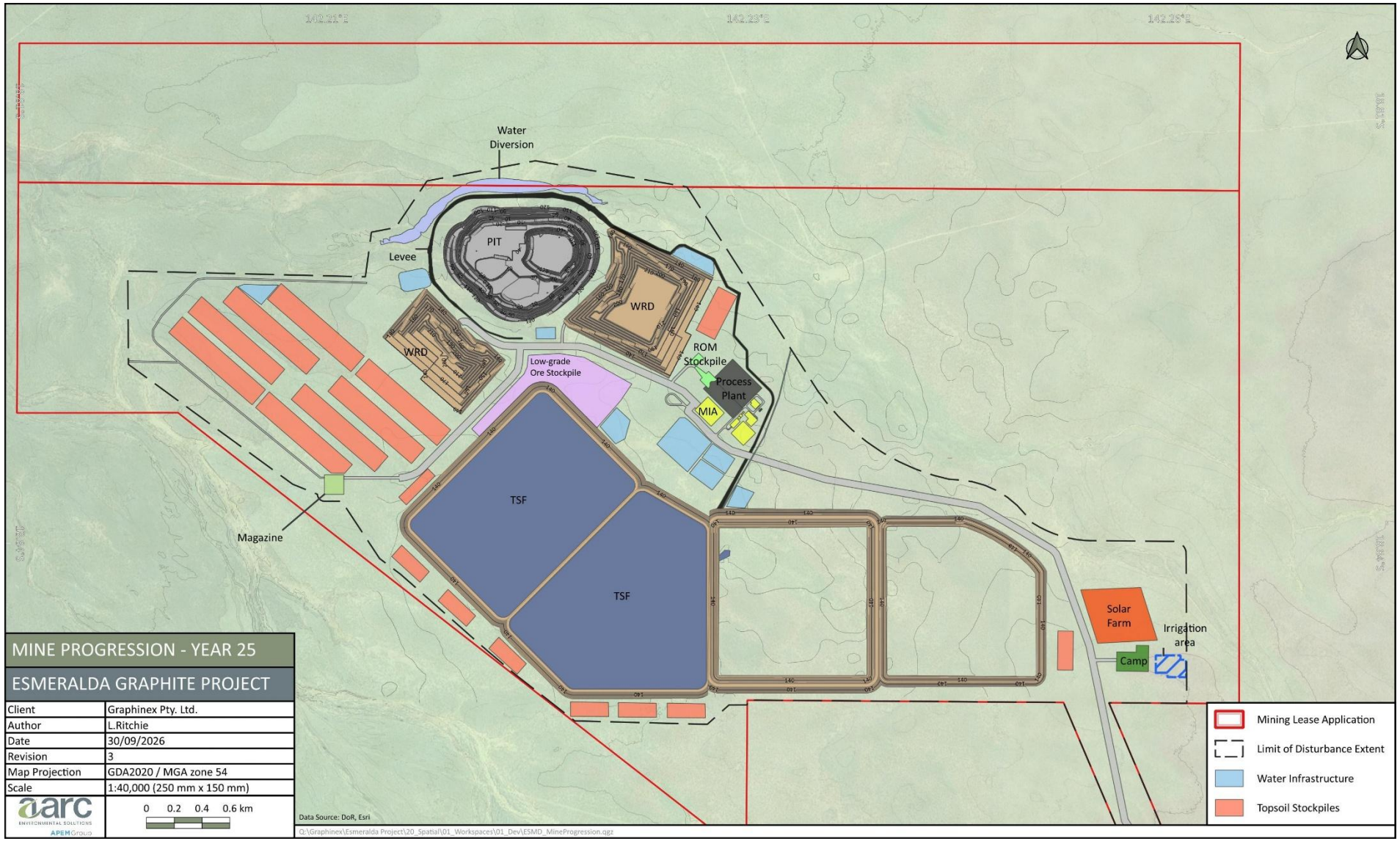


Figure 4-27: Mine progression Year 25

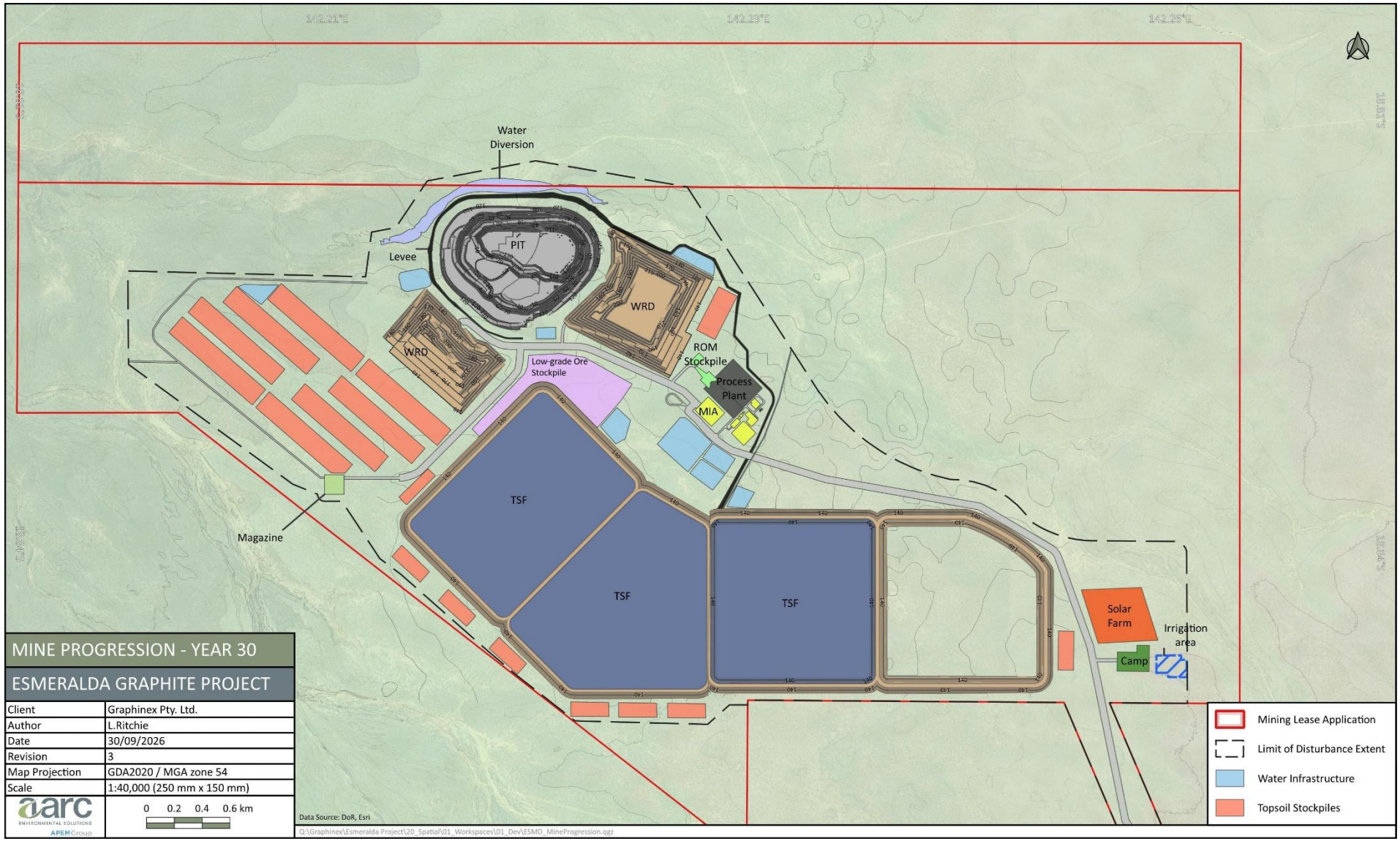


Figure 4-28: Mine progression Year 30

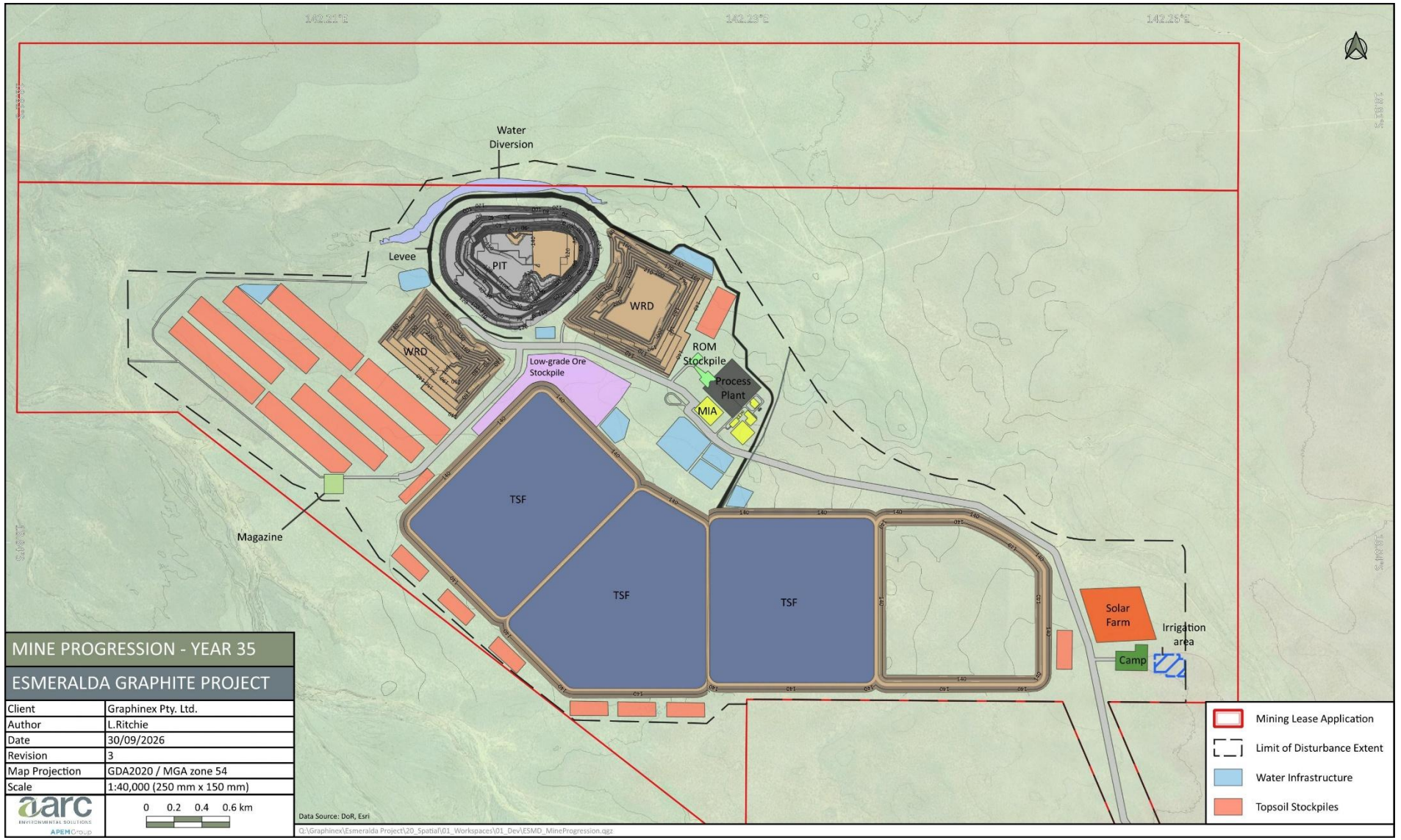


Figure 4-29: Mine progression Year 35

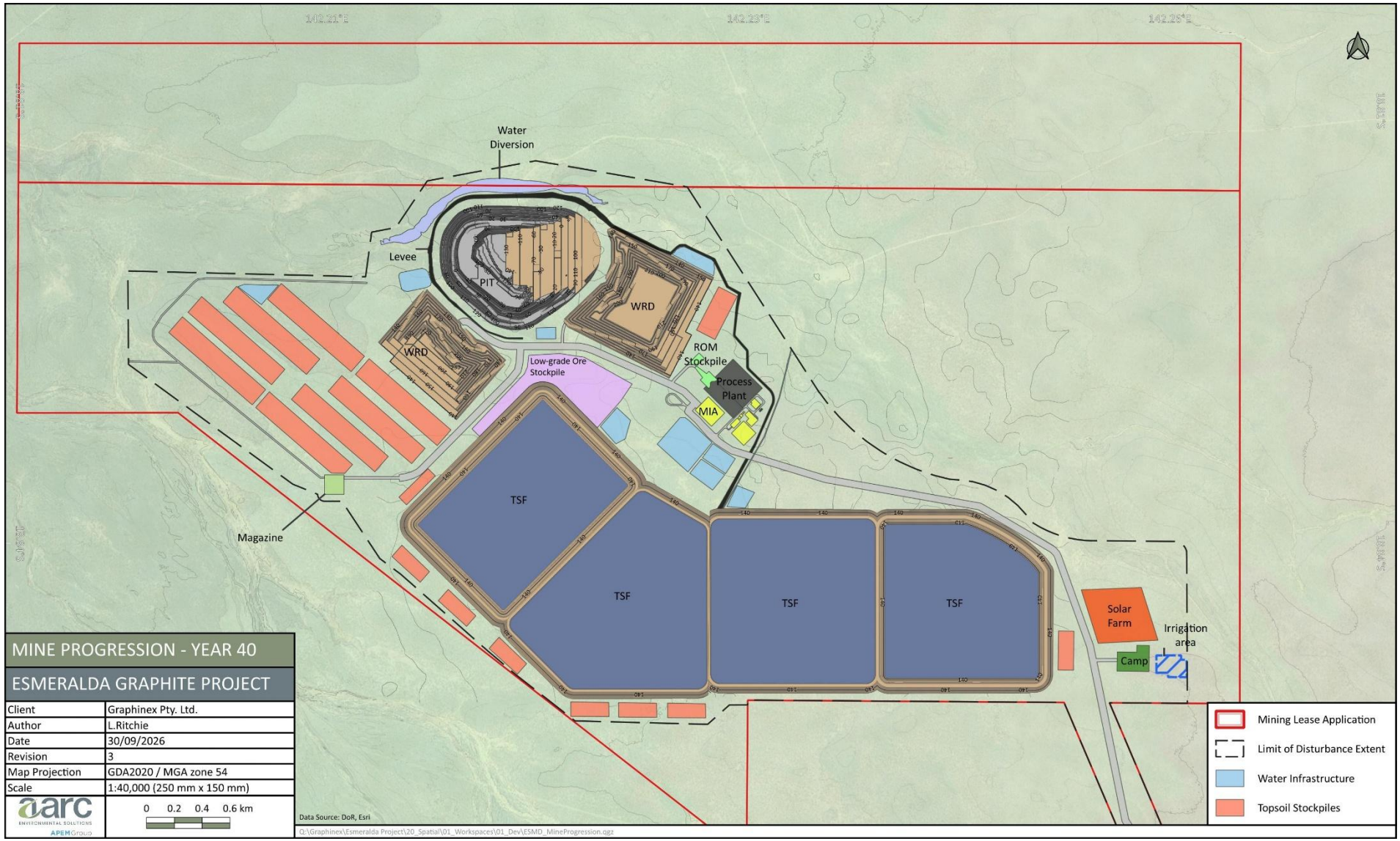


Figure 4-30: Mine progression Year 40

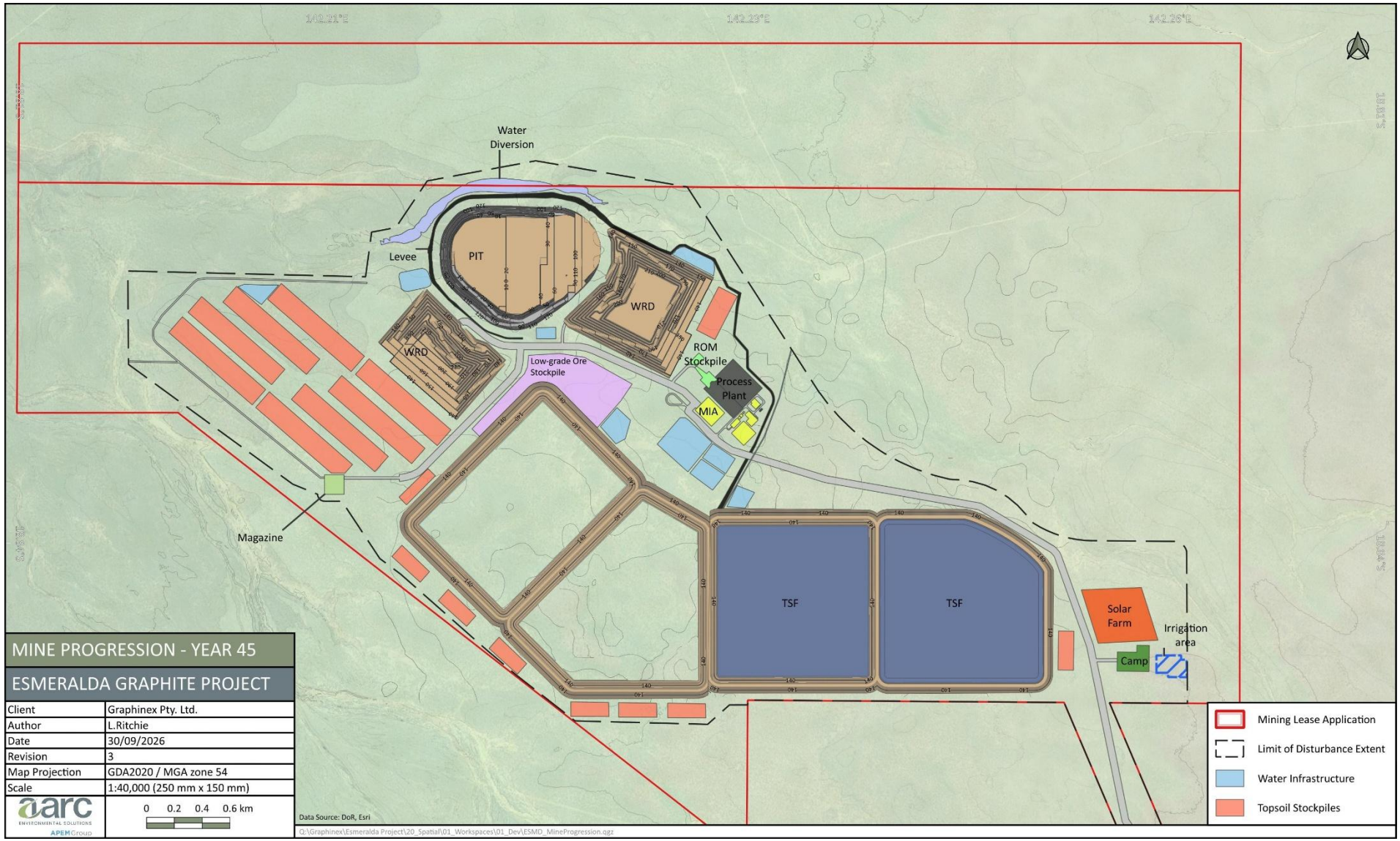


Figure 4-31: Mine progression Year 45

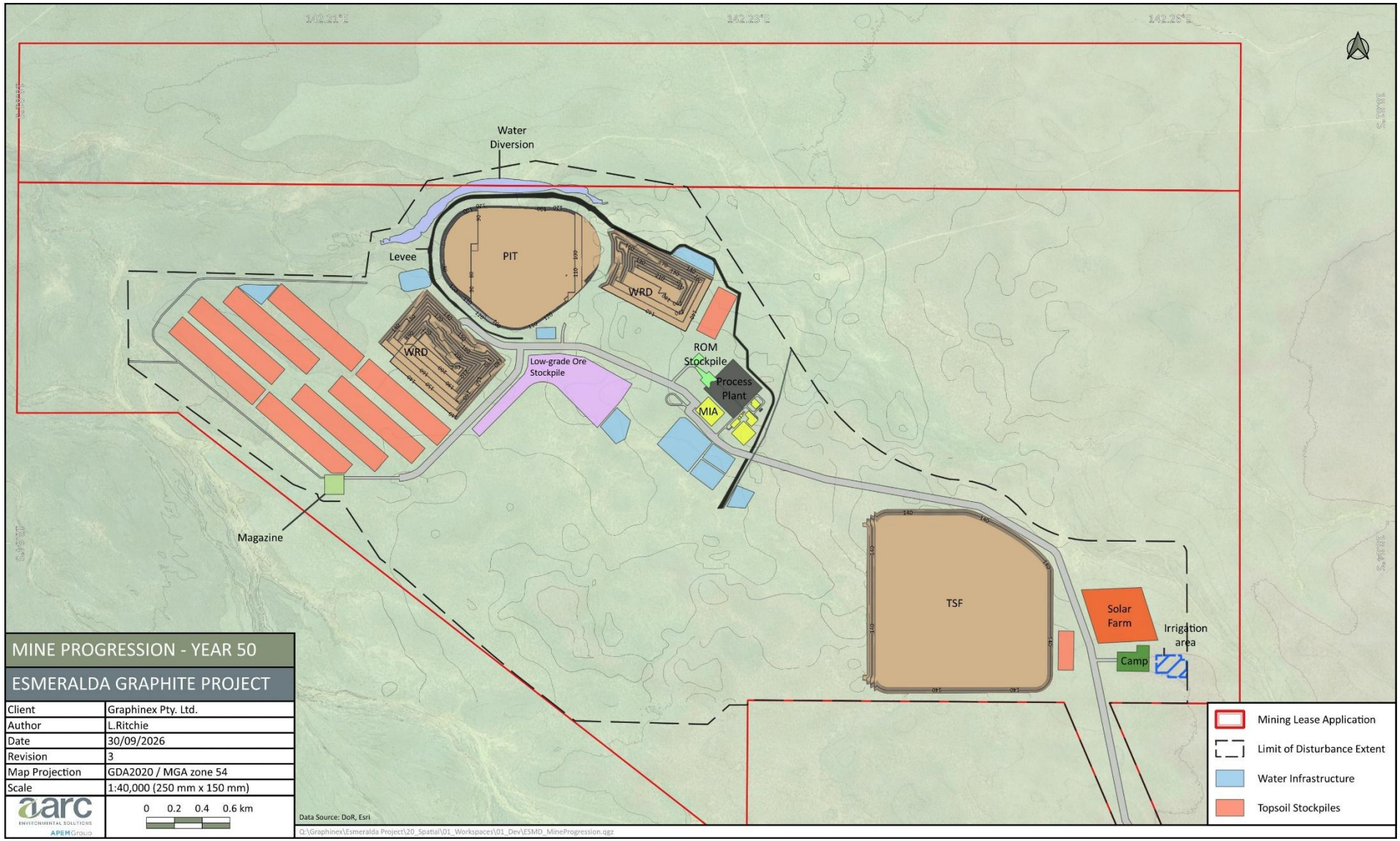


Figure 4-32: Mine progression Year 50

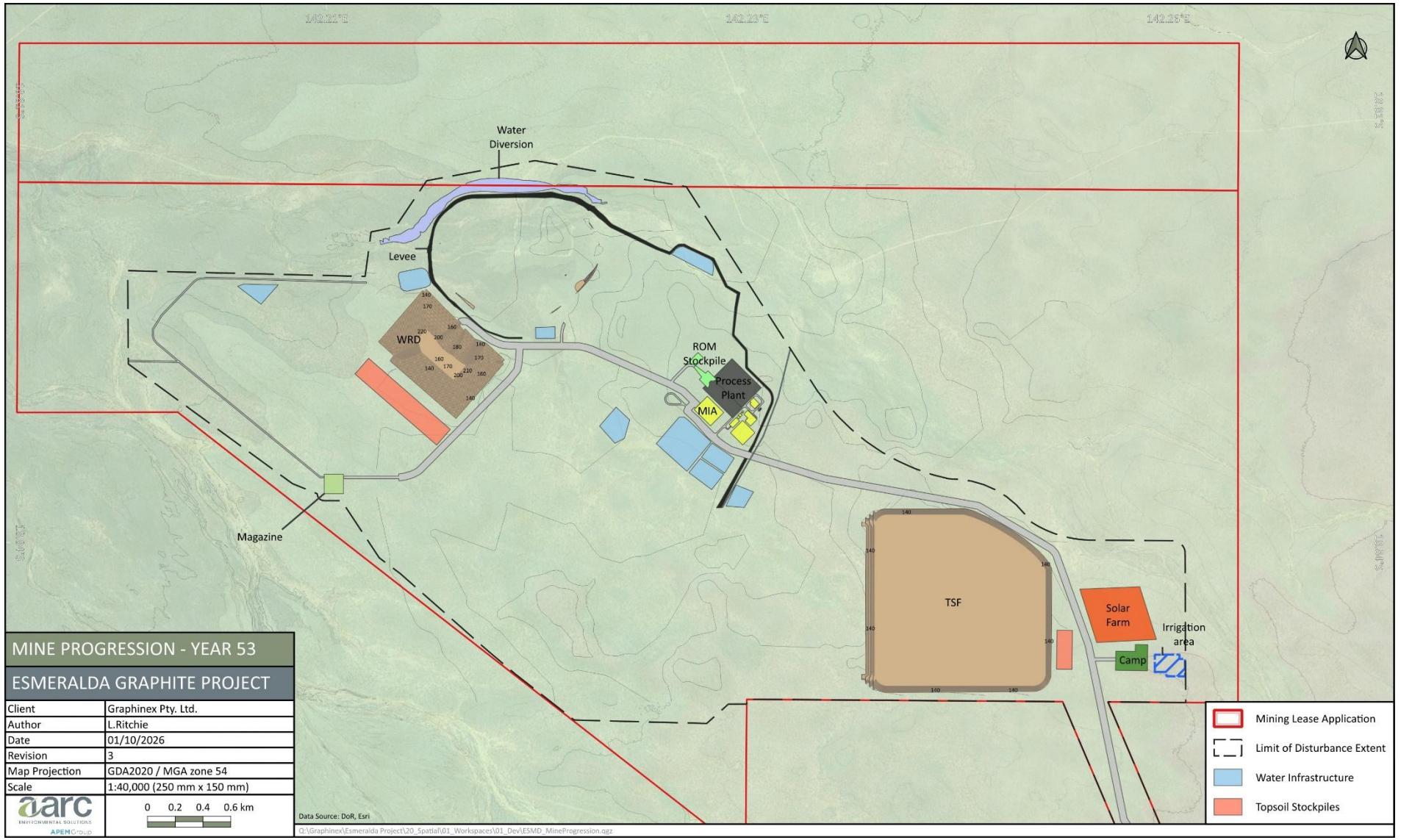


Figure 4-33: Mine progression Year 53

4.3.2.2 Mining method

Mining is proposed via conventional truck and excavator methods, to a depth of 250 m below ground level. A cross-section of the pit at year 30, target resource, and adjacent geology is presented in Figure 4-13. Open pit mining has been identified as the optimal mining method for accessing the graphite resource body. Resource extraction would necessitate the implementation of controlled blasting techniques. Mining rates would ramp up to 3.5 Mtpa ROM over the first three years and remain relatively consistent thereafter.

Excavated overburden and non-ore-bearing material would be deposited in out-of-pit waste dumps located adjacent to the mining void, as shown in Figure 4-18 to Figure 4-33. The majority of waste movement would occur within the first 18 years of the mine life, with a total of 188.05 Mt estimated to be moved over the production life of the Project. High-grade graphite ore (>~ 6% total graphite) would be trucked or conveyed to the on-site mineral processing plant for stockpiling and processing. Lower grade ore would be stockpiled for processing in the later stages of the mine life.

Mining activity would be supported by key supporting infrastructure including:

- haul roads;
- two out of pit waste rock dumps;
- a ROM stockpile;
- conveyor systems; and
- water management infrastructure.

4.3.2.3 Mining sequence

The proposed mining sequence includes:

- the progressive clearing of vegetation;
- the stripping and stockpiling of topsoil and subsoil for reuse in rehabilitation of mine landforms, in accordance with the Project's progressive rehabilitation and closure plan;
- the removal of overburden to the site WRD to support initial infrastructure development, or for use in rehabilitation as infill in the mine void;
- the extraction and stockpiling of low grade ore, for processing later in the mine life while backfilling of the void occurs;
- the extraction of high grade ore, trucked to a ROM pad adjacent to the mineral processing plant to sustain on-site processing of graphite concentrate; and
- backfilling of the void with tailings and waste rock to surface level, removing the final void from the post-mining landform, while processing low grade ore stockpile.

4.3.2.4 Mining schedule

An indicative mining schedule for the Project is presented in Table 4-13. Extraction and processing rates may vary depending on resource purity, and extraction technology advancements.

Table 4-13: Indicative Mine Schedule

Year	Overburden/ Waste Rock (Mt)	ROM Ore (Mt)	Total Tailings (Mt)	Void backfill (Mt)
-2	0.0	0	0	0

Year	Overburden/ Waste Rock (Mt)	ROM Ore (Mt)	Total Tailings (Mt)	Void backfill (Mt)
-1	0.1	0	0	0
1	18.5	3.5	1.2	0
2	0.036	3.5	2.4	0
3	14.7	3.5	3.3	0
4	4.2	3.5	3.3	0
5	16.7	3.5	3.3	0
6	3.5	3.5	3.3	0
7	16.8	3.5	3.3	0
8	0.7	3.5	3.3	0
9	9.9	3.5	3.3	0
10	6.5	3.5	3.3	0
11	8.9	3.5	3.3	0
12	12.8	3.5	3.3	0
13	11.7	3.5	3.3	0
14	11.7	3.5	3.3	0
15	3.0	3.5	3.3	0
16	0.004	3.5	3.3	0
17	0	3.5	3.3	0
18	4.1	3.5	3.3	0
19	2.8	3.5	3.3	0
20	1.4	3.5	3.3	0
21	0.3	3.5	3.3	0
22	0.1	3.5	3.3	0
23	0.02	3.5	3.3	0
24	0.09	3.5	3.3	0
25	0.9	3.5	3.3	0
26	0.1	3.5	3.3	0
27	0.1	3.5	3.3	0
28	3.0	3.5	3.3	0
29	3.0	3.5	3.3	0
30	0.2	3.5	3.3	0
31	5.4	3.5	3.4	0
32	1.1	3.5	3.4	0
33	2.2	3.5	3.3	0

Year	Overburden/ Waste Rock (Mt)	ROM Ore (Mt)	Total Tailings (Mt)	Void backfill (Mt)
34	0.1	3.5	3.3	0
35	1.9	3.5	3.3	2
36	2.7	3.5	3.3	6.5
37	5.9	3.5	3.3	6.6
38	4.5	3.5	3.3	15.1
39	0.9	3.5	3.3	0
40	4.6	3.5	3.3	0
41	2.8	3.5	3.3	5.6
42	0.1	3.5	3.3	24.6
43	0	3.5	3.3	27.1
44	0	3.5	3.3	18.3
45	0	3.5	3.3	9.7
46	0	3.5	3.3	6.4
47	0	3.5	3.3	18.6
48	0	3.5	2.3	20.1
49	0	2	1.05	20.1
50	0	0	1.05	20.1
51	0	0	1.05	20.1
52	0	0	1.05	20.1
53	0	0	1.05	4.2
Total	188.05	170	159.85	245.2

4.3.2.5 Mining equipment

The major equipment types selected for the mining operations are detailed in Table 4-14. The make and model of equipment is representative only of the classes and sizes of equipment proposed, with final selection of equipment dependent on financial analysis at the time of purchase. The selection has been based on the following principles:

- maintaining a high rate of production;
- realising economies of scale;
- using equipment proven to be operationally effective; and
- using equipment known to be efficient including in diesel consumption to reduce greenhouse gas emissions.

Table 4-14: Mining equipment

Unit type	Make/model	Capacity	Application	Equipment quantity		
				Year 1	Year 18	Year 37
Excavator	Komatsu PC2000	12.0-13.7m^3	Excavation and waste stripping	2	1	3
Dump Truck	Komatsu 785	91.7t	Haul ore and waste material from mining faces to various waste dumps	8	11	17
Loader	Komatsu WA480-8	5.5 m^3	ROM stockpile rehandle and backup to excavator fleet	1	2	2
Bulldozer	Komatsu 155 Track dozer	9.4 m^3	ROM stockpile, road maintenance and general support	4	3	3
Water truck	Komatsu HD785 Water Truck	60 000 litres	Dust suppression and road maintenance	2	2	2
Grader	Caterpillar 12	3.7m blade 97 Kw	General civil works, road maintenance	2	2	2
Compactor	Volvo SD200	1.78m drum width 153 Kw	General civil works, road maintenance	1	1	1
Drill	Kaishan DTH drill rig	100-125 mm	Presplit bore hole drilling 125mm	1	1	1
Drill Rig	Sandvik DI650i	115 - 203 mm	Drilling and blasting 165MM	2	2	2
Ancillary plant						
Small excavator	TBC	TBC	General handling	1	1	1
Lighting plant	TBC	TBC	Lighting	2	2	2
Small construction truck	TBC	TBC	General haulage	2	2	2
Tyre handler/forklift	TBC	TBC	Ancillary maintenance	1	1	1
Mobile crane	TBC	TBC	Ancillary maintenance	1	1	1
Fuel/service truck	TBC	TBC	Ancillary maintenance	1	1	1
Dewatering pump	TBC	TBC	Ancillary maintenance	3	3	3
Light vehicle (4x4)	TBC	TBC	Transport	10	10	10

Unit type	Make/model	Capacity	Application	Equipment quantity		
				Year 1	Year 18	Year 37
Crew transport van	TBC	TBC	Transport	2	2	2

4.3.2.6 Mineral processing and product

ROM ore extracted from the pit would be trucked or conveyed to the mineral processing plant for stockpiling and concentration via conventional flotation methods.

The processing method involves a standard and benign process. An initial crushing and milling circuit first liberate the graphite from the ROM ore as 106-micron product. Adequately sized ore would then be fed to a flotation circuit consisting of rougher, scavenger and cleaner flotation stages. A combination of standard flotation reagents would be used such as diesel and Methyl Isobutyl Carbinol (MIBC). The concentrated graphite from the cleaner flotation stages would be thickened and pumped through filters to reduce the graphite concentrate density prior to drying in a flash dryer. Once dried to a suitable moisture content and gasses have been removed via cyclone, the graphite concentrate would be stored in silos ready for transport. A detailed flowsheet is presented in Figure 4-17.

Graphite concentrate produced at the mine would be loaded into containers and transported by truck to Townsville for export.

Flotation tailings produced from the mineral processing circuit would be transferred to one of four purpose designed storage facilities, to be constructed in stages over the production life of the mine. Tailings would be pumped by thickener underflow pumps to the TSFs, and discharged via spigots around the perimeter. Water produced from the tailings as it settles would be decanted, along with rainfall, by sumps installed in the TSFs and pumped back for recycling and re-use in the MPP.

There would be radiation sources on-site, associated with mineral processing activities mainly relating to instrument recording processes. These devices are commercially available and would be managed by a radiation safety officer (RSO).

4.3.2.7 Tailings Storage Facilities

A tailings stream would be generated as a biproduct of the mineral processing circuit, with approximately 159.85 Mt of tailings generated across the life of the Project. Tailings generated from the mineral processing would be stored in four engineered tailings storage facilities (TSFs). The Project includes four purpose-built facilities – TSF 1, TSF 2, TSF3, and TSF4, which would operate independently, and include an impermeable HDPE base layer to prevent seepage. The cells would sequentially be used for the deposition of tailings fines and recovery of water to supply water demands. TSFs 1, 2 and 3 would be removed and rehabilitated as part of the pit backfill for mine closure, and TSF 4 would be capped and remain in place at closure.

Floatation tailings from the mineral processing circuit would be discharged into the TSFs via pumped discharge spigots around the perimeter of the TSF. Water produced from the tailings would settle and, along with rainfall, be decanted via a sump and pumped back for re-use in the mineral processing plant (MPP). The volume of tailings and decant water would be monitored throughout the process and checked for leakages during routine maintenance inspections.

Tailings and other mineral waste will be handled in accordance with a Mineral Waste Management Plan developed for the Project. This is detailed further in Section 17.7 of Chapter 17 (Waste).

4.3.2.8 Backfilling of the void

The mining void is proposed to be backfilled over the last 16 years of the mine operations. Initially, tailings would be excavated from the TSFs, and hauled back for disposal within the low permeability, granite, stratigraphy deeper in the pit. Only one of four TSF cells would remain in the final landform after backfilling.

Once the granite ore zone has been backfilled with tailings, an engineered cover would be installed to hydraulically isolate the tailings and reduce surface infiltration of water. Benign waste rock would be placed over the top, within the sedimentary sandstone stratigraphy known as the Gilbert River Formation. The void would continue to be backfilled to approximately 1-2 m above natural surface level, providing for some consolidation over time, and resulting in no final void.

Backfilling of the mining void significantly reduces residual risk of the Project post-mining. Key environmental benefits of backfilling include:

- removal of a final void in a potential flood zone;
- removing the need for permanent flood protection levees;
- maximising the productive use of land post-mining;
- significantly reducing the areas of TSFs to remain in the final landform; and
- significantly reducing the areas of waste dumps to remain in the final landform.

4.3.2.9 Water management infrastructure

A detailed water management system for the Project is described in Chapter 14, Water Resources, and Appendix K, Surface Water Assessment.

Mine water dams

Mine water storages would be used to contain surface water runoff, including recycled water from the processing plant, decant water returned from TSFs, and runoff from the MIA area. This water would supplement processing water demands.

Raw water

Water collected within the pit from rainfall events and groundwater ingress would be dewatered to a pit dewatering storage dam. Water collected would be preferentially used for most Project water demands, including the supply of the MPP and for dust suppression.

Sediment dams

Sediment dams are required to ensure runoff from disturbed areas is adequately captured and managed. Sediment dams form a key part of the erosion and sediment control management practices for the Project and would be managed in accordance with a site wide erosion and sediment control plan. Sediment drains would be developed adjacent to areas which may increase solids present in overland flow, including soil stockpiles and waste rock dumps.

All sediment dams have been sized to contain runoff generated by a 24-hour storm event with an Annual Exceedance Probability (AEP) of 10% plus 10% of settling volume for sediment storage.

Water collected in sediment dams would be used for dust suppression or processing water where suitable, to supplement water supply.

Clean water structures

Diversion of clean catchment, including storm water and overland flow, has been implemented to reduce the incidental harvest of clean catchment into the mine water system. Where topography allows, clean catchment is diverted via drainage features which connect upstream clean catchment with receiving waterways. A Clean Water Sump is proposed to be located on the overland catchment diversion drain, external of the flood protection levee. The sump would collect runoff from upstream natural catchments. The sump is designed to have a spillway, which in rainfall events greater than the 50% annual exceedance probability (AEP) 24hr storm, allows outflow towards the clean water diversion drain, ultimately entering unnamed stream order waterway 3. Water collected in the sump is pumped to the Raw Water dam.

Levee and diversion

As part of initial construction and site development up until approximately year 3 of operations, an interim flood protection levee would be developed around the pit and central mine infrastructure area. A flood protection levee is proposed to protect operational areas, including the pit and central mine infrastructure area, from flood ingress. It would wrap around the northern and eastern extents of the project to provide 0.1% AEP flood immunity. After year 3, the mining pit would intercept the location of the levee, and a stream order 3 waterway unnamed tributary, which is considered a watercourse under the *Water Act 2000* (Qld). To maintain a hydrologic connection between the unnamed tributary and Warrigal Creek, as well prevent inundation of the proposed mining pit, a 1.8 km long permanent watercourse diversion is proposed. The diversion would intercept the existing waterway, east of the pit and divert it around the pit's northern extent to tie back into the original waterway. The proposed diversion design and details are discussed further in Chapter 16, Flooding and Regulated Structures. The levee would be extended around this pit extent, and remain in this location until it is removed as part of site rehabilitation and closure.

The location of the diversion and levee are shown in Figure 4-2.

4.3.2.10Water supply

Due to the remote location of the Project, water security is a key factor in Project viability. Water is required to:

- run the MPP;
- facilitate dust suppression for construction and operation activities; and
- supply potable water to the accommodation facility and STP.

The Project would source of water from advance pit dewatering abstracted to enable the mining operations, as raw water, and water recovered from the processing circuit and tailings or water management infrastructure – as detailed in Section 4.3.2.9. Water supply would also be supplemented by water collected in the water storages (including sediment dams).

The *Mineral Resources Act 1989* (Qld) (MR Act) entitles the holder of a mining lease to take or interfere with underground water as part of approved mining operation. This entitlement is termed the mining lease holder's 'underground water rights'. Groundwater that is taken or interfered with while exercising the underground water rights is termed 'associated water'. The holder of a mining lease or mineral development licence is entitled to use associated water for any purpose. In order to exercise the underground water rights for the project, the proponent must:

- apply for an EA under the EP Act;
- comply with the notification requirements under Section 334ZP(6) of the MR Act by notifying the Department of Environment, Science, Tourism and Innovation (DETSI) of the exercise of its underground water rights; and
- comply with its monitoring and reporting obligations under Section 334ZP(5) of the MR Act and Chapter 3 of the Water Act 2000 (Qld). Section 334ZP(5) of the MR Act requires that the volume of associated water taken is measured and reported. The proponent's obligations under Chapter 3 of the Water Act 2000 (Qld)

would include undertaking baseline assessments of the groundwater regime and water supply bores, providing ongoing assessment and reporting of groundwater take and, where necessary, entering into 'make good agreements' with owners of affected water supply bores.

In accordance with the MR Act the proponent would notify DETSI of its exercise of underground water rights on the Project site immediately after it starts exercising the rights. The proponent would report the annual associated water volume taken to the Department of Resources in accordance with the Queensland guideline - Q*uantifying the volume of associated water taken under a mining lease or mineral development licence* (Department of Natural Resources, Mines and Energy, 2020).

The water supply has been modelled as part of the Surface Water Impact Assessment (Engeny 2026, Appendix K). This considers a site water balance, measuring expected inflows (including rainfall, pit inflows) and outflows (including evaporation and usage). The water management system has been modelled to have no median annual shortfalls to supply water demands in 95% of years during mine operation years. This is detailed further in Chapter 14, Water Resources. In the event of a reduction in water availability across any period, the Project can respond operationally to reduce water demand accordingly.

Potable water supply would be supplied through an installed on-site water treatment plant (Reverse Osmosis Plant). This plant would treat water sourced from the pit-dewatering process and/or importing water to site to supplement as needed.

4.3.2.11 Power supply

The Project has an expected peak operational power demand of approximately 16 MW, including mining, accommodation, administration and processing demand.

Power to the mine would be supplied by an onsite 10 MW (or 21.3-megawatt peak (MWp)) solar farm and associated 1.6 MWh battery energy storage system (BESS). Diesel power generation would be required to provide supply supplementary loading for the remaining demand, with generator sets located in close proximity to the processing plant – which is the largest power draw on-site.

Infrastructure for distribution would include transmission-lines and an onsite switching/substation located adjacent to the mine infrastructure area.

4.3.2.12 Lighting components

Artificial lighting for the operation of the Project would be designed, installed, operated and maintained in accordance with 'AS 4282:1997 Control of the Obtrusive Effects of Outdoor Lighting' (Standards Australia 1997) to minimise light spill.

Controls stipulated in this standard include consideration of the location and orientation of lighting with respect to surrounding sensitive receptors and environmental values, as well as the selection and maintenance of luminaries. Any further mitigation (e.g. shielding, further restriction on use of lighting) would be implemented on an as-needed basis. Lighting impacts and mitigation are discussed further in Chapter 28, Visual Amenity.

4.3.2.13 Telecommunications

Satellite services are available and would be considered for the Project. Radio communication between heavy machinery and light vehicles would be used to support safe vehicle movements across the Project area.

4.3.2.14 Waste

Municipal waste

A designated on-site waste collection area would allow for the temporary collection, segregation and storage of general waste prior to disposal off-site. This would occur across all Project phases. Skips, bins and other

receptacles would be located at appropriate locations around the site to facilitate the collection and segregation of waste streams, prior to transfer to the waste collection area. General waste would be segregated into non-recyclable and recyclable streams.

All non-recyclable general waste, including putrescible and non-recyclable/refurbishable wastes would be collected in front-lift bins for weekly collection by a licensed waste management contractor. Waste would be stored securely to prevent attraction of, and access by, scavenging fauna.

A recycling program would be established and promoted to encourage the recycling of waste materials, including paper, cardboard, ferrous and non-ferrous metals and air filters. The recycling program would utilise coloured bins and signage for waste segregation. Waste oils are expected to be recycled by a licensed, regulated waste contractor and may be reused. Ferrous and non-ferrous metals would be recycled where possible. Where practicable, timber and air and oil filters would be recycled. Cardboard and general recyclables would be taken in bulk by waste contractors to a licensed recyclable facility.

Final disposal of waste would be undertaken by a registered contractor to a licensed waste facility that is suitable for the type and quantity of waste. Local facilities which may be considered for the final disposal of wastes are the Croydon Landfill Facility. Where local facilities are unable to accept Project waste types or quantity, it may be transported to larger facilities in Mt Isa.

Waste may be disposed of on-site, however this will only be for waste generated on-site, in accordance with ERA 60 (Section 4.4) - and limited to:

- waste rock;
- concrete;
- tailings;
- tyres; and
- generate waste, including construction and demolition waste, green waste, putrescible waste and commercial waste.

A Non-Mineral Waste Management Plan will be developed and implemented across all Project phases to handle waste as detailed in this section, and include:

- a description of the activity that may generate waste; and
- waste management control strategies including:
    - recording of the types and amounts of wastes generated by the activity; and
    - segregation of the wastes; and
    - storage of the wastes; and
    - transport of the wastes; and
    - disposal of waste; and
    - monitoring and reporting matters concerning the waste; and
- the hazard characteristics of the wastes generated, including disposal procedures for regulated wastes; and
- a program for reusing, recycling or disposing of all wastes; and
- how the waste will be dealt with in accordance with the waste and resource management hierarchy, including a description of the types and amounts of waste that will be dealt with under each of the waste management practices in the waste management hierarchy (i.e. avoidance, reuse, recycling, energy recovery, disposal); and
- where waste is to be disposed of on-site, how the waste will be treated, handled and disposed of in a proper and effective manner;

- where waste is to be removed to a facility that can lawfully accept the waste, how the waste will be stored, handled and transferred in a proper and effective manner; and
- procedures for identifying and implementing opportunities to minimise the amount of waste generated, promote efficiency in the use of resources and improve the waste management practices employed; and
- procedures for dealing with accidents, spills, and other incidents that may impact on waste management; and
- details of any accredited management system employed, or planned to be employed, to deal with the waste; and
- how often the performance of the waste management practices will be assessed; and
- indicators or other criteria on which the performance of the waste management practices will be assessed; and
- staff training and induction to the waste management program.

A Mineral Waste Management Plan will be developed for the Project for mineral waste, including tailings and waste rock – as mentioned in Section 4.3.2.7.

Sewage

The Project would construct a package Sewage Treatment Plant (STP) at the on-site accommodation facility. Sewage generated at the accommodation facility and MIA would be pumped to the STP by way of underground sewage pump stations and underground rising mains. Due to the remote location of the Project, the disposal method of choice for the sewage effluent generated on-site from the STP is via land application through irrigation.

Prior to site development (i.e. the accommodation facility and STP), sewage effluent generated during the construction phase would be managed and disposed of by private contractors, including temporary storage and removal by truck.

4.3.2.15 On-going resource definition and technical drilling

During the construction and operational phases of the Project, ongoing exploration activities would continue within the ML area and other proponent held EPMs. Drilling of additional groundwater monitoring bores may also be undertaken over the life of the mine.

Drilling and exploration disturbances which are not within the future mining footprint would be rehabilitated within 12 months, including capping of open bores, in accordance with the requirements of the Queensland Government's Eligibility Criteria and Standard Conditions for exploration and mineral development projects (ESR 2016/1985).

4.3.3 Decommissioning and rehabilitation

In Queensland, mine rehabilitation is required under the EP Act. Amendments to the EP Act in late 2018 implemented key elements of the State Government's Mined Land Rehabilitation Policy (Queensland Government 2018) which intends to ensure that, for land disturbed by mining activities:

- the land is safe and structurally stable;
- there is no environmental harm being caused by anything on or in the land; and
- the land can sustain a post-mining land use.

These three objectives inform the rehabilitation goals for the Project.

A progressive rehabilitation and closure plan (PRCP, Appendix T) has been developed for the Project in accordance with the requirements of the EP Act.

The PRCP covers rehabilitation of all disturbed land from operational activities and associated infrastructure areas on the mine site, including the open-cut mining area, waste rock dumps, stockpile areas, mine infrastructure areas, tailings storage facilities, and water management infrastructure.

Decommissioning and rehabilitation of the Project site is detailed in the following subsections. Additional detail is provided in Chapter 13, Rehabilitation and Closure, and Appendix T (PRCP).

4.3.3.1 Post-mine land use strategy

In accordance with the Queensland Government's objectives defined in the Mined Land Rehabilitation Policy (Queensland Government 2018), the general post-mining rehabilitation goals for the Project are to leave an area that is safe, stable, does not cause environmental harm and is able to sustain the PMLU.

The intent of the Proponent is to reinstate the existing land use of low intensity grazing on native vegetation as much as practicable, by returning the majority of the site to similar vegetation type and land class suitability to that existing prior to disturbance.

The proposed PMLUs have been developed jn consideration of the existing local and regional land use, consultation with local community, the *Croydon Shire Planning Scheme* (Croydon Shire 2019), local ecological values, natural site characteristics and the landform features proposed to remain at closure.

The proposed PMLUs are detailed in the following sub-sections and shown in Figure 4-34 and Figure 4-35.

Grazing native vegetation (low intensity)

A PMLU of low intensity 'grazing native vegetation' is a feasible land use for most of the Project site. The current land use for the Project area is low intensity cattle grazing on predominantly native pastures. However, the current land use is one that demonstrably sustains a viable, grazing land use of sufficiently low intensity to address the limitations identified within the land suitability assessment. Although the majority of the disturbance area is mapped as ALC A1 land, the current prevailing land use across the Project area is cattle grazing. As such, the rehabilitated landform with a PMLU of grazing native vegetation is intended to achieve a post-mining land suitability classification similar to the pre-mining context.

Rehabilitated areas, including the mine infrastructure areas, levee, the disturbance footprint of the southeast waste rock dump (WRD) and tailings storage facilities 1, 2 and 3 (TSFs) following their removal, would be reshaped and revegetated to support low-intensity cattle grazing. The open cut pit would be backfilled and revegetated with native pasture species suitable for the target PMLU.

Reinstatement of the prevailing low intensity grazing land use is considered a feasible PMLU for most of the Project site.

Grassland

Due to the slope, and relative risks associated with the retained waste rock dump and final cell of the TSF, these landforms are not considered amenable to a 'grazing native vegetation' PMLU - and are instead proposed to have a 'grassland' PMLU designation. This would allow for additional management controls commensurate with the identified potential risks. Grassland is considered as a variant of the low intensity cattle grazing land use, applied where slopes exceed those typically suited to the proposed land use, and therefore requiring careful management controls. This PMLU is proposed for TSF4 (retained) and the southwestern WD as these landforms would be elevated with slopes greater than 15%, making them unsuitable for safe or sustainable grazing.

The circumference of the retained waste rock dump and TSF would have cattle-proof fencing erected, to ensure no grazing is undertaken on the landforms. This fencing would be designated as "retained infrastructure".

Riparian ecosystem

An unnamed tributary (stream order 3) reporting to Warrigal Creek intersects the proposed Project mining pit location. To maintain hydrologic connectivity between the unnamed tributary and Warrigal Creek, and to prevent inundation of the mining pit, the Project includes a proposed 1.8 km long permanent diversion. A riparian ecosystem PMLU for the permanent diversion, would aim to achieve similar conditions to the existing riparian environment.

As noted at Section 4.2.11, the current land use of the regional area is low intensity cattle grazing on predominantly native pastures. While there are some minor identified areas of riparian vegetation, these are still subject to grazing pressures as no fencing infrastructure exists to exclude cattle. This may similarly occur in the areas of rehabilitated riparian ecosystem post-closure and site relinquishment.

Retained infrastructure

Retained infrastructure would include roads, tracks and buildings that are complementary to the predominant grazing PMLU proposed, or for access and safety reasons.

Project infrastructure components proposed for retention to support the grazing PMLU and to be transferred to the landholder upon surrender include:

- sealed roads, access tracks and haul roads;
- the airfield and helipad;
- camp;
- solar array;
- Diesel station;
- HV substation; and
- cattle-proof fencing erected around the retained WRD and TSF.

A signed agreement has been received by Graphinex, indicating that the landholder:

- consents to the permanent infrastructure identified in this letter remaining on the Land after the cessation of mining activities for the Project; and
- undertakes to accept responsibility, liability and ongoing maintenance obligations for the permanent infrastructure following the surrender of the MLAs.

Retained water storages

Sediment dam 3 would also be retained post-closure. The intended PMLU for the retained water storage is to provide a water source meeting the required objectives for stock watering, and which is complementary to the broader grazing native vegetation land use. The remaining water storage structures (process water dam, pit dewatering dam, MAW water storage, other sediment dams) would be decommissioned and made safe and suitable for the low intensity grazing native vegetation PMLU.

The Water Plan (Gulf) allows the capture of overland flow for any purpose using works that allow the taking of overland flow water and have a capacity of not more than 250 ML. Sediment dam 3 has a capacity of approximately 80 ML.

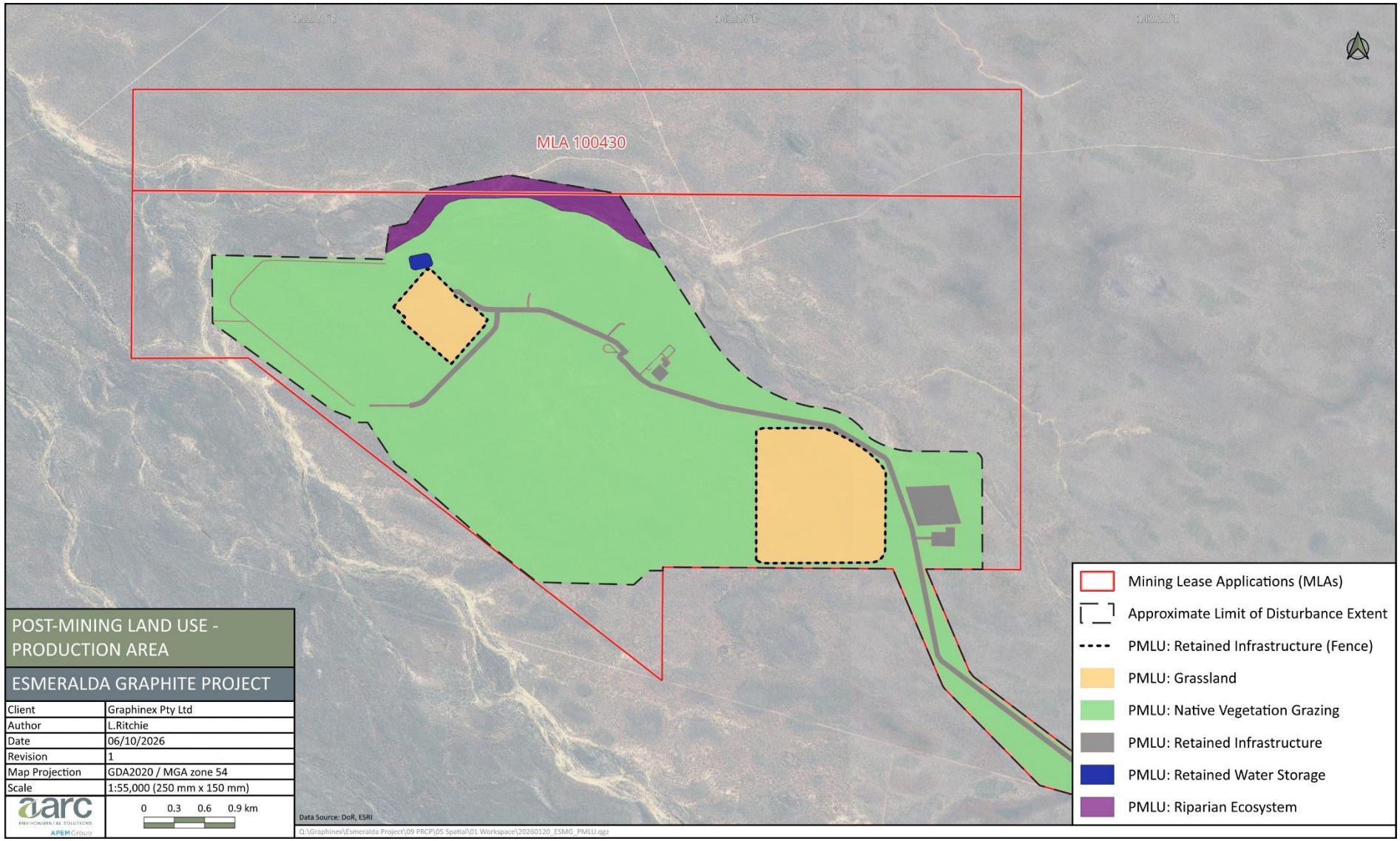


Figure 4-34: Post-mining land use - production area

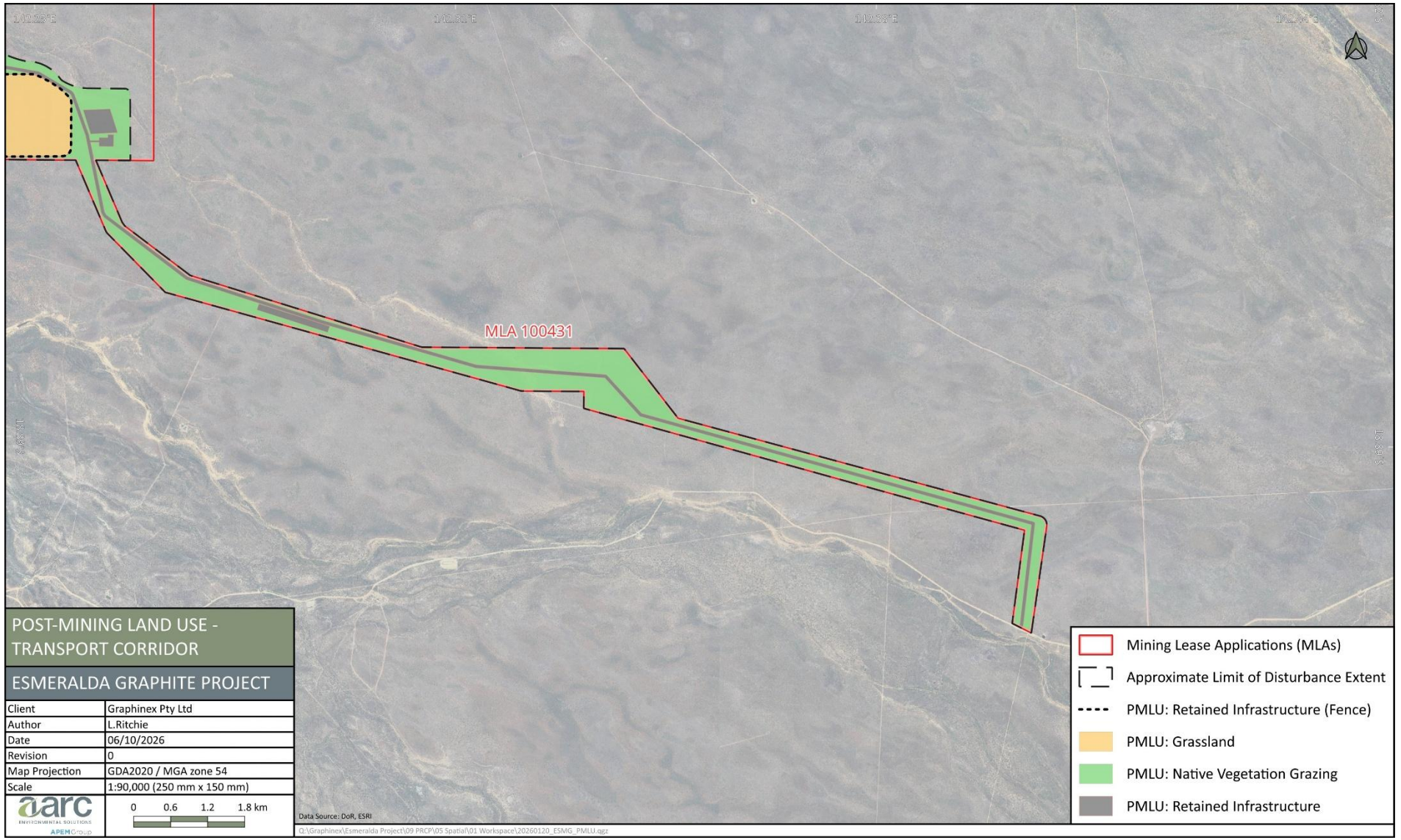


Figure 4-35: Post-mining land use - transport corridor

4.3.3.2 Rehabilitation methodology

Decommissioning and rehabilitation would occur according to milestones and completion criteria in the PRCP. Milestones must be achieved as soon as practicable after land becomes available for rehabilitation. Land is considered to become available for rehabilitation at the completion of mining, except where land is being used for operating infrastructure, placement of topsoil stockpiles or is identified as being retained infrastructure post-closure.

Milestones that involve revegetation activities, including monitoring of revegetation, include provisions for unfavourable growing seasons and unforeseen events such as droughts or storms that could negatively impact vegetation establishment. Including contingency for complex management requirements, and to develop a dataset supporting successful rehabilitation, it is expected that the rehabilitation of the Project site would conclude approximately 10 years after mining operations cease.

Rehabilitation activities include:

- disconnection and removal of all infrastructure including buildings, machinery, equipment, road base, concrete slabs, water management structures, pipelines, and fences not part of a PMLU;
- topsoil is to be stripped and stockpiled to maximise the long-term viability of the growth media;
- investigation of potentially contaminated land and where necessary, remediation activities undertaken;
- landform development where backfilling, reprofiling, reshaping and/or compaction works are required;
- revegetation involving topsoil application, ripping and seeding (or planting) and the application of soil ameliorants, as required;
- sediment dams (excluding sediment dam 3) to be re-profiled and seeded;
- the mine affected water dams would be subject to sediment removal, and re-profiling and seeding of the dam banks;
- tailings storage facilities 1, 2, and 3 will:
    - have the tailings material transported by truck to the base of the pit when suitable to do so;
    - the TSF structure (i.e. the rock walls) would be backfilled into the pit with other waste rock; and
    - the footprint of the TSFs would be remediated in line with other landform and revegetation works as required.
- tailings storage facility 4 to be retained in the landscape, including:
    - capping with a low-permeability layer to minimise water infiltration;
    - cover layer of waste rock and growth medium to facilitate revegetation;
    - revegetation of top and sides of TSF to a PMLU of grassland; and
    - fenced with cattle-exclusion fencing to prevent grazing.
- open cut pit would be backfilled with process tailings, capped with an engineered design layer to hydraulically isolate the tailings, backfilled with waste-rock to surface, and treated with appropriate surface preparation;
- any retained waste material stockpiles would be recontoured including grading and compaction to create stable landforms that are compatible with the surrounding landform. The geotechnical stability of waste rock dumps would be assessed;
- ongoing monitoring of the physical and chemical stability of rehabilitated areas; and
- certification of rehabilitated areas meeting and/or exceeding completion criteria.

Rehabilitation indicators and visual observations gathered as part of an annual monitoring process would be used to identify any aspects of the rehabilitated area that are of concern or suggest that rehabilitated land is at risk of not meeting the required PRCP completion criteria. These may include:

- evidence of active erosion;
- inadequate vegetation cover or growth;
- invasive weed or pest species;
- soil dispersion / instability; and
- soil infertility.

Following an annual monitoring process, areas of rehabilitation would be assessed against milestones, or for maintenance. An annual visual inspection of all rehabilitated areas would be undertaken to provide an overview of the status of the rehabilitation and identify any noticeable issues such as erosion or inadequate vegetation cover or growth. This information, along with monitoring results, would be used to inform the maintenance schedule. Maintenance may include repairing areas of excessive soil erosion or undertaking supplementary plantings or seeding to increase floristic diversity and cover to assist in achieving completion criteria. If issues re-occur, an investigation would be carried out to determine the reason and allow for remediation. Modification of rehabilitation methods and specifications may be required, and rehabilitation and maintenance planning updated accordingly.

4.3.3.3 Final landform design

The final landform topography of the Project area is shown in Figure 4-36. At closure, the backfilled pit would have a final landform similar to the existing landform, sitting slightly proud of the existing surface to allow for settlement back to surface level. The retention of a single remaining TSF cell and waste rock dump post-closure would alter the existing topography, however the revegetation and sloping of these landforms would not create a significant landform impact. The permanent diversion would also alter the final topography; however it would have a maximum main channel depth of approximately 1 m, with the design criteria intentionally mimicking the functionality of the existing watercourse, and therefore not resulting in significantly different landform outcomes.

The remaining rehabilitation areas that would exist at closure would have a landform similar to the pre-existing landform. These include:

- the mine infrastructure area;
- retained infrastructure, including; mine access roads, the airstrip, sediment dam 3, fencing, and the accommodation facility;
- the retained TSF and WRD;
- supporting service activities area;
- rehabilitated water management infrastructure;
- the rehabilitated waste rock dump footprint; and
- the rehabilitated TSF footprints.

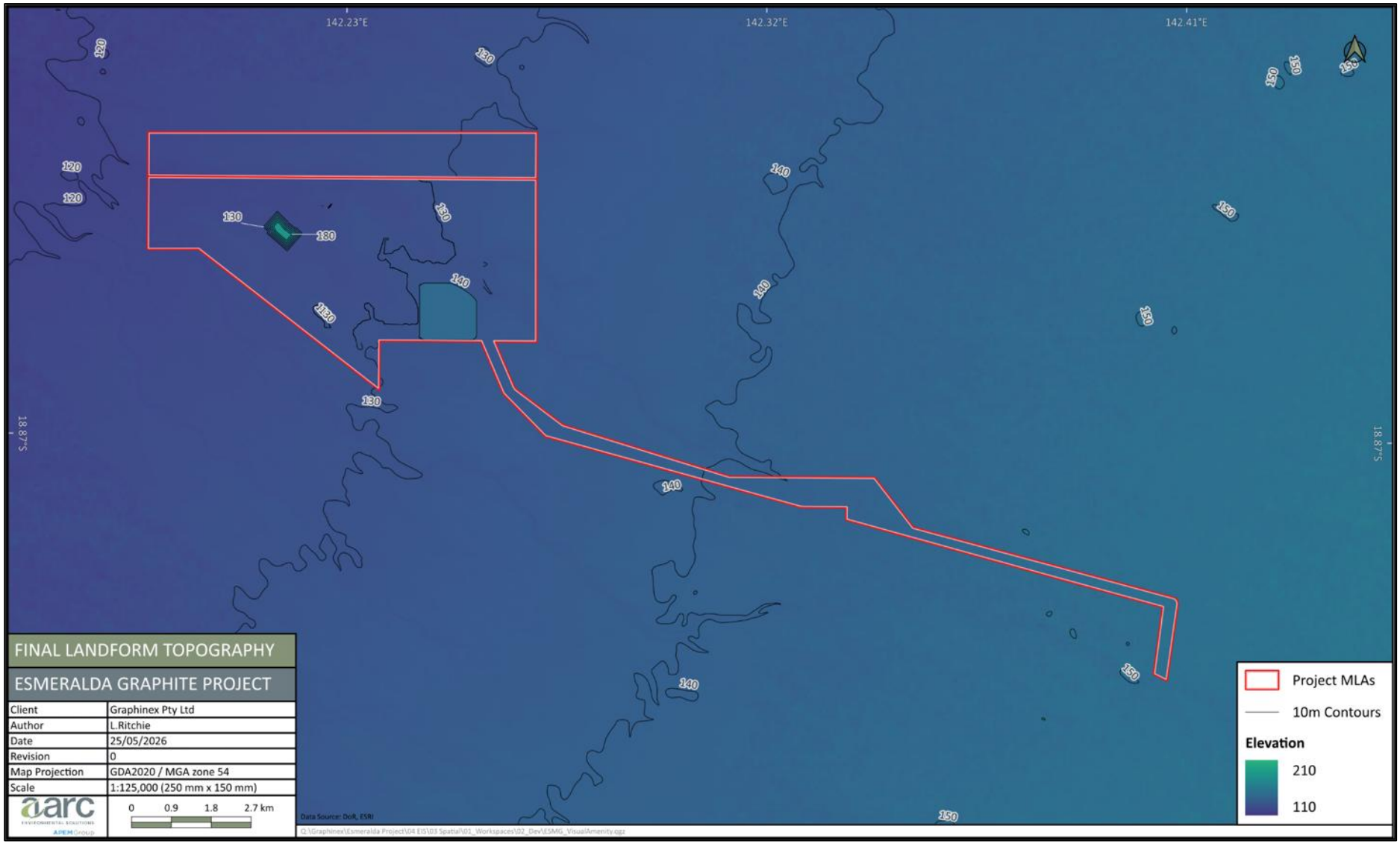


Figure 4-36: Final landform design

4.4 Environmentally relevant activities

Environmentally Relevant Activities (ERA) include resource activities or other activities as defined by the EP Act. Prescribed ERAs and resource activities are specified in Schedules 2 and 3, respectively, of the EP Regulation.

The Project proposes mining under ERA 21 of Schedule 3 of the EP Regulation, as well as the ancillary ERAs outlined in Table 4-15.

Table 4-15: Applicable ERAs for the Project

Environmentally Relevant Activity	Description	Activity Summary
Schedule 2 of the EP Regulation		
8(3)(1)(c) Chemical storage	Chemical storage (the relevant activity) consists of storing more than 500 m^3 of class C1 or C2 combustible liquids under AS1940 or dangerous goods class 3.	Chemicals will be located within the MIA area in appropriately bunded, designated areas. Chemicals may include: • Flotation reagent • Flocculant • Methyl isobutyl carbinol (MIBC). • Organic solvent • Organic diluent • Ammonia • Hydrochloric acid • Ammonium sulphate
14(3)(2)(a) Electricity generation	Generating electricity by using a fuel, other than gas, at a rated capacity of 10 MW electrical to 150 MW electrical.	The Project may utilise approximately 16x1250 kVA diesel generators as supporting power supply, at a rated total electrical capacity of 16 MW. This will support an on-site solar farm and batteries.
31(2)(b) Mineral processing	Processing, in a year, the following quantities of mineral products, other than coke (b) more than 100,000 t.	Mineral processing to produce up to 200 ktpa of graphite concentrate.
33(1) Crushing, milling, grinding or screening	Crushing, milling, grinding or screening (the relevant activity) consists of crushing, grinding, milling or screening more than 5,000 t of material in a year.	The mineral processing methodology includes the physical separation of gangue material of more than 5,000 t of feed material in a year.
60(1)(a) Waste disposal	Operating a facility for disposing of waste: (d) more than 200,000 t in a year.	The Project may dispose of waste, such as tyres and concrete, in waste rock dumps or the backfilled pit. Tailings and waste rock will also be disposed of in TSFs, WRDs, and the backfilled pit.
63(3)(1)(b)(i) Sewage Treatment	Operating a sewage treatment works at a site that has a total daily peak design capacity of more than 100 but not more than 1500 equivalent persons.	A sewage treatment plant would accommodate an approximate peak of 200 equivalent persons.

Environmentally Relevant Activity	Description	Activity Summary
Schedule 3 of the EP Regulation		
21 A mining activity	A mining activity that is an ineligible ERA, other than a mining activity mentioned in items 9 to 20	The Project would mine ore containing graphite.

4.5 Notifiable activities

Activities that have been identified as likely to cause land contamination are required under Schedule 3 of the EP Act to be listed as notifiable activities. Any person undertaking these notifiable activities must notify the Queensland Department of Environment, Tourism, Science and Innovation (DETSI), with the land to be recorded on the Environmental Management Register (EMR). The notifiable activities listed under Schedule 3 of the EP Act relevant to the Project are provided in Table 4-16 .

Table 4-16: Notifiable activities for the Project

Notifiable activity	Notifiable activity description
Schedule 3 of the EP Act	
7 Chemical storage	Storing more than 10 t of chemicals (other than compressed or liquefied gases) that are dangerous goods under the dangerous goods code.
24 Mine wastes	a) Storing hazardous mine or exploration wastes, including, for example, tailing dams, waste rock or waste rock dumps containing hazardous contaminants; or b) Exploring for, or mining or processing, minerals in a way that exposes faces, or releases groundwater, containing hazardous contaminants.
29 Petroleum product or oil storage	Storing petroleum products or oil: c) In above ground tanks: a. for petroleum products or oil in class 3 in packaging groups 1 and 2 of the dangerous goods code – more than 2,500 L capacity; or b. for petroleum products or oil in class 3 in packaging groups 3 of the dangerous goods code – more than 5,000 L capacity; or c. for petroleum products that are combustible liquids in class C1 or C2 in Australian Standard AS 1940, 'The storage and handling of flammable and combustible liquids' published by Standards Australia – more than 25,000 L capacity.
37 Waste storage, treatment of disposal	Storing, treating, reprocessing or disposing regulated waste including operating a sewage treatment facility with onsite disposal facilities.

4.6 TOR Reconciliation table

Terms of reference - Content requirements of the EIS		EIS Section
Section 4 - Project description		
Proposed development		
4.1	Clearly define the project footprint and total disturbance area in hectares (including buffer zones). Define the broader project site, if applicable.	Section 4.1.2
4.2	Provide a description of the project's phases (e.g. pre-construction, construction, operations, decommissioning and rehabilitation), including likely timing and sequencing of phases and the physical layout of the project during each project phase. If the delivery of the project is to be staged, describe the nature and timing of proposed stages, including triggers and hold points.	Section 4.1.6
4.3	Describe project activities across each project phase and identify whether any of the activities are located off lease.	Section 4.3
4.4	Describe the proposed mine life, the annual and total quantity of run-of-mine (ROM) ore, waste rock material to be mined, and ore to be processed onsite.	Section 4.1.1
4.5	Describe the resource base, including total seam/ore body thickness and seam/ore body depths.	Section 4.1.1
4.6	Describe the proposed methods, equipment and techniques for extraction and resource separation, beneficiation and processing, including chemicals to be used and expected by products.	Section 4.3.2.2 Section 4.3.2.3 Section 4.3.2.4 Section 4.3.2.5 Section 4.3.2.6
4.7	Describe the project costs, including across each of its phases.	Section 4.1.4
4.8	Describe the proposed delivery model for the project and commercial arrangements for delivery of the project.	Section 4.1.3
4.9	With regards to external/enabling infrastructure, identify and describe: d) existing infrastructure that would be impacted by the project across each of its phases (e.g. roads, ports, water, wastewater, stormwater, electricity transmission and supply, telecommunications, waste disposal, housing, etc.) e) any external/enabling infrastructure upgrades proposed as part of the project (to be assessed as part of the EIS) f) any external/enabling infrastructure upgrades not proposed as part of the project, and how project-related impacts on this infrastructure would be managed.	Section 4.2.4
4.10	Describe any project components subject to change or refinement through detailed design. Discuss alternative options that remain under consideration.	Section 4.1.2
4.11	Describe any project components or activities that are proposed to be assessed separately to the EIS process, including details of the assessment and approvals process.	Section 4.1.2
4.12	Identify whether any project infrastructure or facilities would be shared with other developments.	Section 4.1.5
Site description		

4.13	Describe and illustrate with suitably scaled maps the existing environment and features within the project footprint and surrounding area, including: a) property descriptions, easements, underlying tenure (including existing, historic and under application resource authorities), land use and ownership information for all land impacted by the project footprint and adjacent properties, including detail of any special attributes of land and/or waters b) all existing infrastructure and services relevant to the project, including transport corridors, private roads, local and state-controlled roads, pipelines, energy and gas infrastructure, sewerage, stormwater, communications, rail, air services, maritime, etc.5 c) waterways as defined by the Fisheries Act 1994; and lakes, springs, aquifers, floodplain areas (including wetlands), unmapped features, watercourses, and drainage features as defined by the Water Act 2000 (Water Act).	Section 4.2.1 Section 4.2.2 Section 4.2.3 Section 4.2.4
4.14	Describe and map, in both plan and cross-section view, the geology, topography and landforms of the project area and any relevant areas within the project surrounds (including the boundaries of water catchment areas). Show geological structures (such as aquifers and faults), economic resources (such as agricultural, timber, quarries, mining and gas (including historic)), and any other relevant projects and known development proposals that could have an influence on, or be influenced by, the project and its construction and operational activities.	Section 4.2.6 Section 4.2.8
4.15	Describe, map and illustrate soil types and profiles of the project area including added fill and/or exposed ground surface at a scale relevant to the proposed project and in accordance with relevant guidelines. Identify soils that would require specific management due to wetness, erosivity, sodicity, depth, acidity, salinity or other features.	Section 4.2.10
Project footprint		
4.16	Within the context of the existing environment,6 define and map the location and boundaries of the project footprint, including all infrastructure elements, extent of disturbance (including clearing of vegetation), any off lease infrastructure requirements, and development necessary for the project. Show all key aspects including excavations, spoil and waste dumps, stockpiles, subsidence areas, services infrastructure, plant locations, levees, water storages and dams, tailings storage facilities, existing and proposed groundwater bores, drainage systems, spill containment bunds, buildings, waterway crossings (including type), watercourse and surface water diversions, haul and access roads (identifying sealed and non-sealed), causeways, stockpile areas and loading and unloading facilities, airfields, on-site accommodation, sewage treatment plant and disposal location. Include a discussion of any environmental design features of these facilities (for example, bunding of plant and storage facilities).	Section 4.3.1.8 Section 4.3.1.1 Section 4.3.2.9 Section 4.3.1.4 Section 4.3.1.3
4.17	Describe with concept and layout plans, in both plan and cross-section views, requirements for constructing, upgrading or relocating all infrastructure to service the project. Show the locations and dimensions (including clearing) of any necessary infrastructure easements on the plans, including infrastructure such as roads, rail (and the rail corridor), tracks and pathways, environmental no-go areas, fencing, dams and weirs, bores, energy transmission infrastructure, power lines and other cables, wireless technology (such as microwave telecommunications), pipelines for any services.	Section 4.3.1
Project phases		
4.18	Describe for each project phase (pre-construction, construction, operation, decommissioning and rehabilitation) and stage (if relevant): d) timing and sequencing of activities, and any implications where project staging is proposed e) disturbance areas for each project component, including buffer zones f) workforce numbers expressed as annual average full-time equivalent positions and proposed shifts, as applicable g) anticipated workforce recruitment and rostering arrangements, including proposed travel to and from work, such as fly-in, fly-out7 and drive-in, drive-out h) where and how personnel are to be accommodated	Section 4.1.6 Section 4.1.7 Section 4.3.1

	i) the type, quantity, origin, routes, delivery modes, storage and laydown requirements/locations for materials j) the precise location (within and outside the project footprint) of works to be undertaken, structures to be built or components of the project that may have relevant impacts k) how the works are to be undertaken and design parameters for aspects of the structures, or components, of the project that may have relevant impacts l) requirements for new infrastructure, or the upgrading, retention, relocation and/or decommissioning of existing infrastructure on and offsite to service the project.	
4.19	For the pre-construction phase, include a description of: a) results of pre-disturbance surveys and how this information is or would be used in the final design and construction of the project b) proposed development, upgrades, modifications, realignments, relocation, deviation or restricted access to roads and other infrastructure including water, power and telecommunications	Section 4.3.1.1
4.20	For the construction phase, include a description of: a) proposed hours of construction (including night-time works) b) the construction program/stages and key work streams c) the proposed construction methodology d) any temporary construction areas, and how and when temporary construction areas would be rehabilitated e) any resource requirement (e.g. water supply, quarry material, construction materials and components, electricity supply, etc.) and the quantity, source and proposed timing of requirement of each resource f) any supporting developments that are required, within and outside the project area, such as quarries, borrow pits, water storage, site offices, laydown areas, roads, etc. g) any project construction components proposed to be shared with other projects.	Section 4.3.1.10 Section 4.3.1.9
4.21	For the operation phase, include a description of: a) proposed hours of operation b) proposed operational workforce, including proposed shifts and transport demand c) with appropriately scaled maps, mining sequence of each seam/ore body/structural unit and cross-sections showing profiles and geological strata and faults d) type, quality and quantity of resources mined or extracted at each major stage of the project e) water supply requirements and sources f) energy demand and sources g) other operational service requirements including sewer, waste and stormwater.	Section 4.3.2
4.22	For the decommissioning and rehabilitation phase, include a description of: a) the strategy for decommissioning and rehabilitation of all components of the project consistent with the progressive rehabilitation and closure plan b) if any infrastructure is proposed to remain on site, identify the owner of this infrastructure and describe long-term use and relevant approvals required (e.g. landholder agreements, council approvals, etc.) c) proposed timing and extent of rehabilitation works (including progressive rehabilitation) and where relevant, restoration works[8] with maps at suitable scales showing the location of disturbance areas d) the site after final rehabilitation, including mapped final landforms, post-mining land uses and any non-use management areas.	Section 4.3.3