GROUNDWATER ENTERPRISES

LEI LITHIUM PROSPECT Preliminary Groundwater Assessment

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1 Introduction

1.1 Background

Lithium Plus Pty Ltd are in the planning stage of an underground mine development at the Lei lithium deposit, located 30 km south of Darwin on mineral exploration lease EL31091. The Lei deposit is one of a series of discrete, lithium yielding pegmatite deposits located in the West Arm–Mt Finniss pegmatite belt. The Lei deposit is located approximately 2.5 km south of the BP33 lithium deposit, which Core Lithium is progressing to mining in 2023.

Proposed mining activities at the Lei deposit are in the design phase with detailed plans still in development. The lithium deposit at Lei is hosted in two discrete pegmatites separated by approximately 180 m of host rock. The pegmatites are in the order of 10 m wide, 240 m long and dip steeply to the east. Preliminary mine plans include a surface box-cut with a portal providing access to a spiralling decline located between the two pegmatite bodies. The total depth of the underground workings is yet to be determined.

Lithium Plus has engaged Groundwater Enterprises to undertake a desktop review of hydrogeological information available at the Lei deposit. The review is required to identify groundwater values around the site, to identify potential risks and impacts from proposed mining activities and to provide recommendations for works to address data gaps and allow for characterisation of potential impacts.

1.2 Purpose of this Report

The purpose of this report is to provide a summary of the current groundwater information, hydrogeological setting and potential groundwater values, with an aim to develop a groundwater monitoring network which can provide an enhanced understanding of groundwater conditions and risks at the Lei deposit.

1.3 Data information and Sources

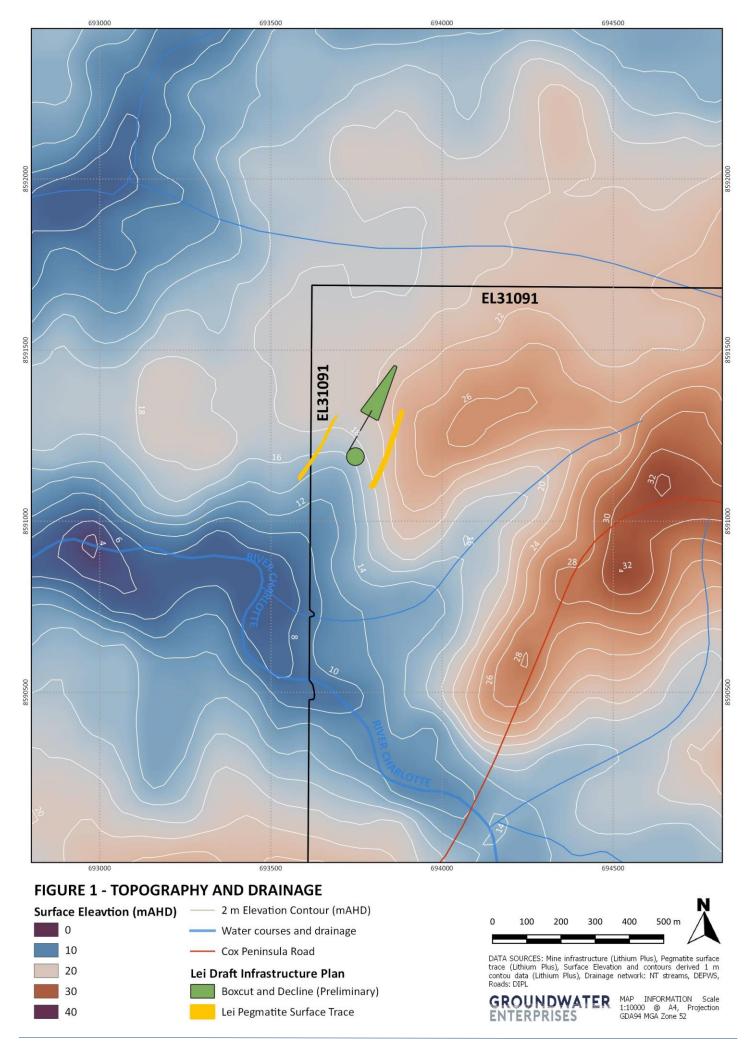
A listing of data and information accessed as part of the review presented in this report is provided in this section. No groundwater studies have been undertaken by Lithium Plus at the Lei deposit and much of the assessment relies on publicly available references from the surrounding area. Key information sources for the report include:

- ▼ NTEPA, 2019. Assessment Report 89 Grants Lithium Project, Core Lithium Limited. Northern Territory Environmental Assessment Agency, June 2019.
- NTEPA, 2022. Assessment Report 84 Finnis Lithium Project BP33 Underground Mine, Supplementary Environmental Report. Northern Territory Environmental Assessment Agency, April 2022.
- ▼ Frater K. M, 2005. Tin-tantalum pegmatite mineralisation of the Northern Territory. Northern Territory Geological Survey, Report 16.
- ▼ Northern Territory Government groundwater bore data sourced from the NR Maps web portal <u>https://nrmaps.nt.gov.au/nrmaps.html</u>. Accessed on July 10, 2023.
- Bureau of Meteorology Groundwater Dependent Ecosystem Atlas <u>http://www.bom.gov.au/water/groundwater/gde/</u>.

2 Topography and Drainage

The Lei deposit is situated on the western side of a gentle ridge with the land gradient falling to the southwest toward the Charlotte River (Figure 1). The area to the north of the deposit and proposed box-cut and decline is flatter lying and falls gently to the north-west toward a small, ephemeral drainage line that joins a tributary of the Charlotte River. Locally, the highest elevations (32 mAHD) occur along a ridge line coincident with the Fogg Bay Rd that is situated to the south-east of the deposit. The lowest elevations (4 mAHD) occur along the Charlotte River to the south-west of the Lei deposit.

The Lei deposit is located in the Finniss River region and falls within the Bynoe Harbour catchment. The area is drained by the Charlotte River, located 300 m south-west of the Lei pegmatite at its closest point. The Charlotte River is a small, ephemeral water course that drains a sub-catchment of approximately 170 km². The Charlotte River rises in land to the south-east and drains south-west flowing into Bynoe Harbour 10 km downstream of the Lei deposit. Estuary conditions are mapped as extending up the Charlotte River until a point around 300 m south-west of the Lei deposit. Estuaries are transitioning environments between the land and the ocean, where fresh water coming from the river mixes with saline oceanic water.



3 Geology

The Lei lithium deposit is located in the north-west of the Pine Creek Geosyncline, a thick sequence of Proterozoic metasediments that overlie Archean basement rocks. The Pine Creek Geosyncline underwent extensive folding and uplift 1800 million years ago. After a long hiatus, during which significant weathering and erosion occurred, a thin drape of Cretaceous and Cainozoic sediments was deposited over the Proterozoic rocks.

The lithium prospect at Lei is hosted in a pegmatite, one of a swarm of complex zoned rare element pegmatites forming the 55km long by 10km wide West Arm–Mt Finniss pegmatite belt. The Finniss pegmatites were intruded into the early Proterozoic Burrell Creek Formation, which is distributed along the north-west margin of the Pine Creek Geosyncline. The Lei deposit comprises two distinct pegmatites, Lei-1 and Lei-2, which are separated in an east-west direction by 180 m of host rock. The pegmatites have a length of 220 to 240 m along strike and an exposed width of around 10 m. The Lei pegmatites strike north-north-east and dip steeply to the east. The strike of the pegmatites mirrors the foliation direction in the Burrell Creek Formation host rock.

The Burrell Creek Formation is comprised of shale, siltstone, sandstone and strongly foliated phyllite with lenses of quartz pebble conglomerate. The Burrell Creek Formation is extensively weathered at surface where it often forms a laterite horizon. The underlying shale and phyllite is typically heavily weathered and decomposed into mottled clay. Exploration drilling at Lei indicates the weathered zone in the Burrell Creek Formation is on average 65 m thick with the upper 50 m typically showing extensive weathering and the bottom 15 m showing moderate to slight weathering.

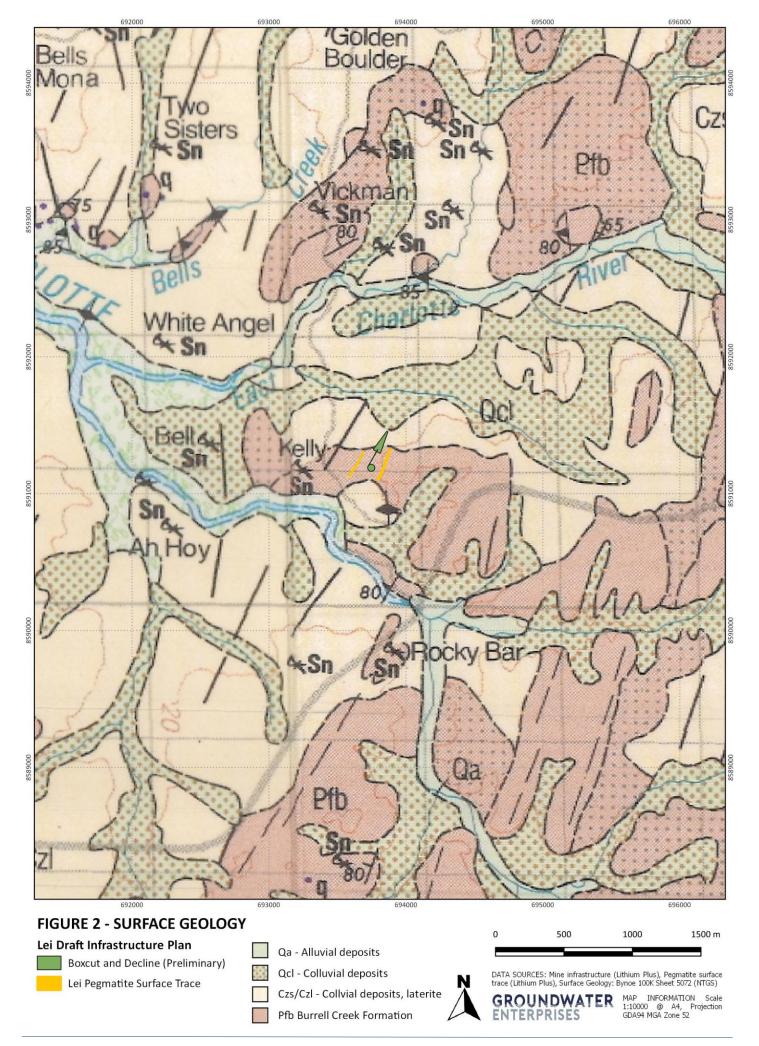
Where the Burrell Creek Formation is not exposed it subcrops beneath a thin veneer of Tertiary and Quaternary aged sediments. These include alluvial deposits (Qa) along the drainage lines, colluvium (Qcl, Czs) and laterite (Czl), the latter formed by in-situ weathering of the Burrell Creek Formation. The colluvium comprises ferruginous clayey, sandy and gravelly soils. The colluvium and laterite deposits are typically less than 4 m in thickness (Pietsch, 1986).

The alluvial deposits centre around active drainage lines. They can extend up to several kilometres in length and up to 200-300 m in width (Frater, 2005) but are typically less than 4 m in thickness (Mollemans and Hatcher, 1988). Regionally, the alluvial deposits have a generally consistent profile described by Mollemans and Hatcher (1988) that comprises the following three horizons:

- ▼ A-layer: Less than 0.5 m thick and may contain a thin band of pebbles (5–10 mm wide) at its base.
- ▼ B-layer. A minor gravel layer up to 1 m thick, directly overlying the C-layer or separated from it by thin bands of clayey sand.
- ▼ C-layer. This earliest layer consists of basal clayey sand or gravel up to 2.5 m thick, containing subangular quartz and siltstone clasts up to 200 mm in length.

In some areas the alluvial deposits have been completely reworked with black soil and typically the Burrell Creek Formation underlying the main alluvial channel is heavily weathered.

Alluvial deposits are mapped around the Charlotte River immediately south of the Lei deposit and also 1 km to the north-west along a small tributary of the Charlotte River (see Figure 2).



4 Hydrogeology

Groundwater around the Lei deposit is likely to be hosted in the Burrell Creek Formation, which underlies the area surrounding the deposit with the exception of shallow alluvial deposits around the Charlotte River.

The Burrell Creek Formation forms a marginal fractured rock aquifer with typical bore yields of less than 0.5 L/s. The limited groundwater potential is largely due to the lack of primary porosity and limited open fracturing within the formation. Higher yields are recorded where drilling intersects fracture zones or bands of quartz veining. Groundwater is typically intersected at the base of the weathering zone/transition into fresh Burrell Creek Formation. At BP33, located 2.5 km north of Lei, investigation bores typically intersected groundwater in the Burrell Creek Formation at depths of between 50 and 60 m below ground.

The Burrell Creek Formation is largely fine grained and characteristically weathers to clay. Where heavily weathered, the formation is often less permeable relative to fresh rock due to the lower likelihood of fractures staying open in the clayey, weathered phyllite. Hydraulic conductivities derived from slug tests undertaken at the BP33 range from 0.27 - 2.6 m/day in fractured Burrell Creek Formation (NTEPA, 2022). The permeability in fresh and weathered rock with negligible fracturing is two orders of magnitude lower at 0.003 - 0.08 m/day (NTEPA, 2022). Secondary permeability in the Burrell Creek is potentially anisotropic, with greater permeability along strike than across strike. This behaviour has been observed in the Burrell Creek Formation at other locations where detailed groundwater investigations have been undertaken (e.g., Power Water Corporation water supply investigations at Adelaide River and Pine Creek).

There is no information available on the aquifer characteristics of the pegmatite. Anecdotal information suggests the pegmatite is very competent and has limited potential to form an aquifer. Permeability within the pegmatite is also likely to depend on fracture development and connection.

There are no bores at the Lei deposit and groundwater conditions are not characterised. Drilling at the BP33 deposit, 2.5 km to the north, provides some guidance on expected conditions around the Lei deposit. Eleven bores have been constructed in the Burrell Creek Formation at BP33 with a yield range of < 0.1 L/s to 3 L/s. Groundwater levels are typically shallow with end of dry season levels ranging from 3.4 - 7.9 metres below ground level. Water levels appear to be shallower in the lower lying areas and deeper in the more elevated landscape positions. Groundwater levels show a large seasonal variation and increase as much as 10 m in response to wet season recharge. Groundwater from the Burrell Creek Formation at BP33 is mildly acidic with a pH range of 4.4 - 7.0 and is typically fresh with an electrical conductivity range of $60 - 330 \mu$ S/cm. Similar water quality can be expected in the immediate vicinity of the Lei deposit, however, closer to the Charlotte River groundwater may be significantly more saline due to the influence of estuarine conditions.

There is no available information to determine local groundwater elevations and flow directions around the Lei deposit. Groundwater bores at BP33 and Grants deposit (see NTEPA, 2022 and NTEPA, 2019) indicate that groundwater flow patterns broadly reflect the topography. Assuming similar conditions occur around the Lei deposit the prevailing groundwater flow direction is likely to be to the south-west toward the Charlotte River.

There is potential for groundwater to occur in alluvial deposits that fringe the Charlotte River. Drilling at BP33 suggests the alluvial deposits typically have limited thickness (< 4 m) and less spatial extent than is suggested by the surface geology map. The alluvial aquifers identified at BP33 are only saturated in the wet season and early dry season. If present near the Lei deposit, aquifers in alluvial deposits along the Charlotte River are likely to have a very local scale and be spatially restricted to the immediate area around the drainage line. However, they may be of significance in supporting riparian vegetation and potentially terrestrial groundwater dependent ecosystems in this area.

5 Groundwater Receptors

5.1 Groundwater Bores

There are no active water supply bores within 2 km of the Lei deposit. The closest registered bores (RN041798/RN041797) are located 1.8 km north of the Lei deposit. RN041798/RN041797 were drilled for Core Lithium in 2020 to provide baseline groundwater data. The bores form part of a broader groundwater monitoring network at the BP33 lithium deposit. With the exception of the BP33 monitoring bores, the closest registered bore (RN041993) is located 2.6 km south of the Lei deposit off the Fog Bay Road (see Figure 3). RN041993 was drilled in 2020 and was constructed in the Burrell Creek Formation to provide a rural and domestic water supply. All other registered water supply bores are located over 7 km from the Lei deposit.

5.2 Environmental Receptors

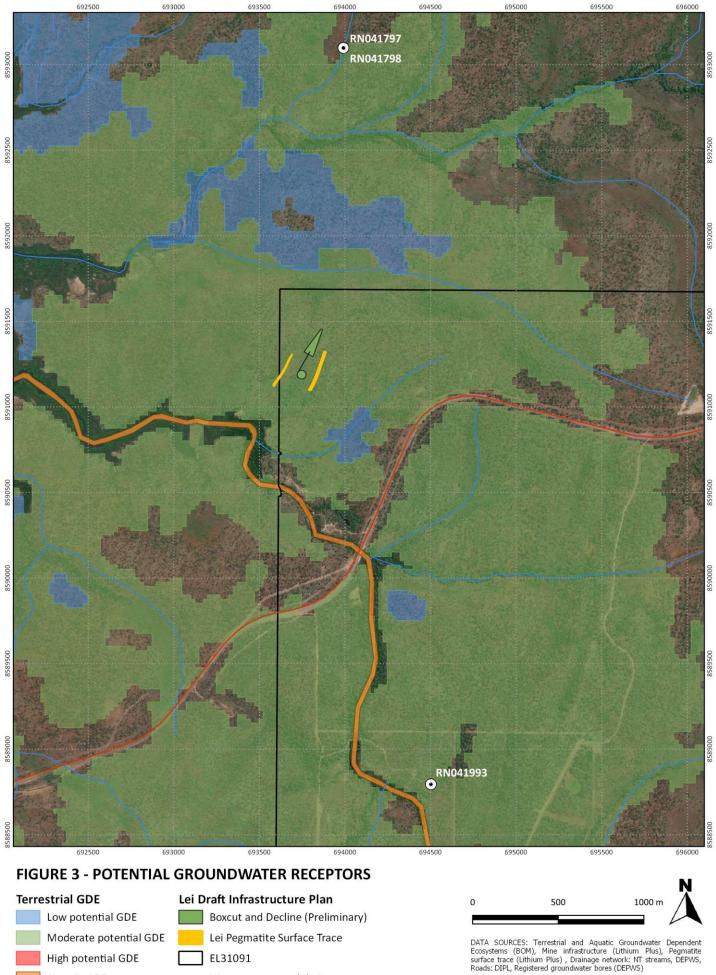
Groundwater Dependent Ecosystems (GDEs) have been identified using the GDE Atlas, a national data set of Australian GDEs developed by the Bureau of Meteorology (BOM, 2019) to assist groundwater management and planning. GDEs are divided into three categories: terrestrial, aquatic and subterranean. Terrestrial GDEs are ecosystems that rely on the subsurface presence of groundwater – including vegetation ecosystems such as forests and riparian vegetation. Aquatic GDEs are ecosystems that rely on the surface water ecosystems which may have a groundwater component, such as rivers, wetlands and springs. Subterranean GDEs include cave and aquifer ecosystems. There are no subterranean GDEs mapped in the GDE Atlas in the vicinity of the Lei deposit.

Figure 3 maps the terrestrial and aquatic GDE potential around the Lei deposit. Three mapped categories are presented for terrestrial GDEs: high, medium and low GDE potential based on a national scale assessment using remote sensing and image analysis. The Lei deposit and surrounds are mapped in an area of moderate terrestrial GDE potential (shown in green in Figure 3).

The Charlotte River, located 300 m south-east of the Lei deposit, is mapped as having a moderate potential for aquatic GDEs. The potential for Aquatic GDEs along the Charlotte River is supported by the Water Observations from Space (WoFS) imagery, which provides a temporal analysis of surface water permanence. WoFS is derived from a compilation of satellite imagery from 1987 to the present day and displays the percentage of observations in which surface water was detected (GA, 2022). No clear observations of water cause an area to appear transparent, few clear observations of water correlate with red and yellow colours, deep blue and purple correspond to an area being wet through 90%-100% of clear observations.

The WoFS image (Figure 4) highlights green to red pixels along the Charlotte River south of the Lei deposit. This suggests that surface water is present in less than 25% of the images. However, the pixel resolution of the WoFS image (25 m) is around 50% greater than the channel width (15 m) of the Charlotte River in this reach, which suggests that it may not be capturing all surface water occurrences. Around 1 km further downstream, where the channel width exceeds 30 m, darker blue pixels are present suggesting surface water is present in around 70% of images.

Due to the strong seasonality of rainfall and high evaporation rates wet season flows seldom sustain surface water bodies throughout the dry season. The possible presence of permanent water in Charlotte River in the vicinity of the Lei Deposit suggests the river may be partially sustained by groundwater discharge or alternatively is influenced by the movement of water from Bynoe Harbour due to tidal activity. Field verification is recommended to confirm the permanence and water quality attributes of surface water and groundwater along the Charlotte River adjacent to the Lei deposit.



Water courses and drainage

Fog Bay Road

Aquatic GDE

Registered Bore

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GROUNDWATER ENTERPRISES MAP INFORMATION Scale 1:20000 @ A4, Projection GDA94 MGA Zone 52

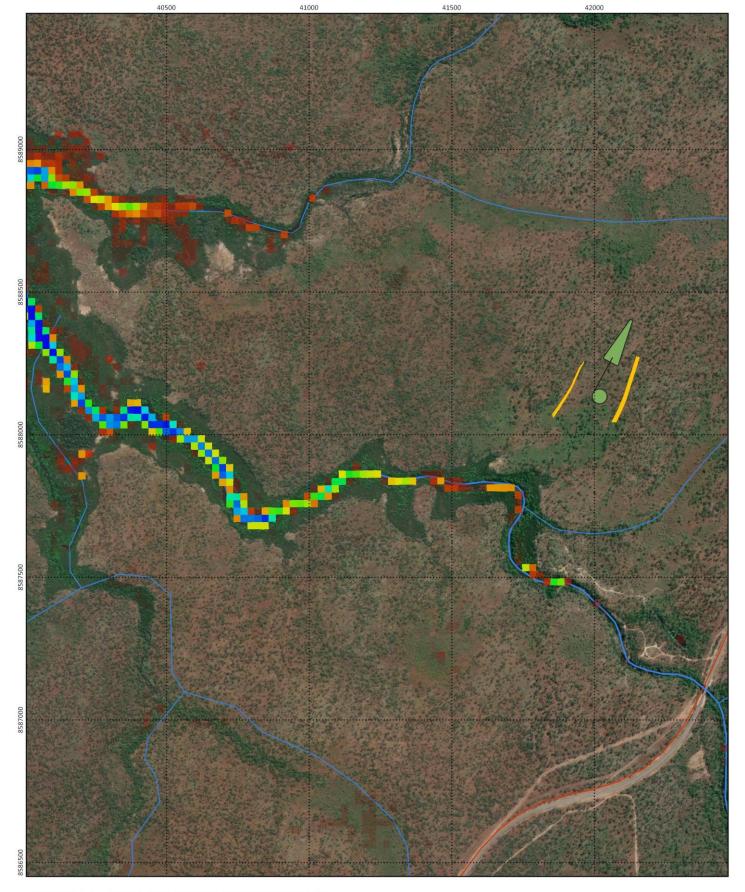


FIGURE 4 - SURFACE WATER PERMANENCE

Lei Draft Infrastructure

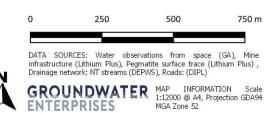
- Fog Bay Road

Lei Pegmatite Surface Trace

Water courses and drainage

Water Observations from Space (25 m)

Boxcut and Decline (preliminary) 20 50 80 5 1 % of Time Water Detected



Groundwater Enterprises I Lei Lithium Prospect Preliminary Groundwater Assessment

6 Preliminary Groundwater Impact Assessment

Table 1 provides a summary of mine related activities with potential to impact groundwater around the Lei deposit and the likely direct effect on groundwater availability and quality. As site data is extremely limited Table 1 also provides a summary of key knowledge gaps associated with understanding these impacts.

The preliminary assessment does not consider potential groundwater impacts from surface infrastructure including waste rock dumps, run of mine and mine water supply and storage, as the location and design of these features is still in progress.

Activity	Direct Impact	Description	Knowledge Gaps
	Groundwater Level and Quantity	Dewatering activities will result in a lowering of groundwater levels in the aquifer surrounding the mine and may lead to a reduction in groundwater availability to terrestrial/aquatic GDEs along Charlotte River (if present) and a groundwater supply bore to the south of the deposit. While the Burrell Creek Formation has typically low permeability, there is potential for the mine and the Charlotte River to be connected by fracture networks due to its proximity and location along strike. If this occurs the river may act as a constant source of water to the underground mine and increase dewatering requirements.	 The groundwater system is not locally characterised. Key data gaps include: Aquifer occurrence and distribution Groundwater levels and gradients Aquifer parameters Presence, location and nature of GDEs
Dewatering of box-cut, decline and underground workings	Groundwater Quality	As a result of dewatering activities groundwater gradients will be towards the underground mine during its operational and recovery phase. There is potential for poorer quality groundwater to migrate towards the underground mine. This is particularly relevant if groundwater quality around the Charlotte River is influenced by tidal flows from Bynoe Harbour. The migration of poorer quality groundwater has potential to impact on the health of terrestrial GDEs (if present) and the beneficial use of the groundwater resource. Beneficial uses have been declared over the area which falls in the Darwin Rural Water Control District and include agriculture, aquaculture, public water supply, environment, cultural, industry, rural stock and domestic, mining activity, and petroleum activity (NTG, 2019).	 Groundwater quality Surface water persistence Surface water quality Presence, location and nature of GDEs

7 Conclusions and Recommendations

7.1 Conclusions

Lithium Plus are scoping an underground mining operation at their Lei deposit, located 30 km south of Darwin. The proposed mining activities at Lei are in the design phase but are likely to involve surface access through a box-cut with a portal to a decline, and underground mine. The decline and the underground mine will require dewatering during the construction and mining phases of the project. The proposed mine targets lithium hosted in two narrow, steeply dipping pegmatites that are intruded into the Burrell Creek Formation, a sedimentary unit largely comprising siltstone and phyllite. Alluvial deposits consisting of sand, gravel and clay are mapped to the south-west and north-west of the Lei deposit along the Charlotte River and its tributaries.

There are no registered groundwater bores onsite to inform local groundwater conditions, however, information from the BP33 prospect 2.5 km north of Lei, suggests that groundwater is likely to occur in a marginal fractured rock aquifer within the Burrell Creek Formation. A shallow aquifer could potentially occur in alluvial sediments that flank the Charlotte River to the south-west and north-west of the site. Groundwater flow directions are unknown but are likely to follow the topographic gradient with groundwater moving from the more elevated ground around the Lei deposit south-west toward the Charlotte River.

There is one registered water supply bore located 2.6 km to the south of the Lei deposit. All other bores within a 7 km radius of the Lei deposit are either abandoned or are used for non-consumptive purposes (i.e., groundwater monitoring).

Regional scale GDE mapping suggests a moderate potential for terrestrial GDEs across the Lei site and a moderate potential for aquatic GDEs along the Charlotte River to the south/south-west. Satellite imagery suggests there may be permanent water in the Charlotte River to the south-west of the Lei deposit, which is often a pre-cursor for GDE presence. If water in these features has a groundwater discharge component there is a risk that dewatering of the underground mine will lower groundwater levels in this area and reduce groundwater availability to potential GDEs. This is of particular significance given the Charlotte River is both along strike and in close proximity to the Lei deposit, which increases the likelihood that the river is connected to the groundwater system at Lei through open fracture networks.

Groundwater is potentially of good quality beneath the Lei deposit but may be more saline near the Charlotte River due to tidal influence. There is potential for poorer quality groundwater to migrate towards the underground mine due to changes in groundwater gradients caused by dewatering. This process could impact on the health of terrestrial GDEs (if present) and the beneficial use of the groundwater resource.

7.2 Recommendations

It is recommended that a drilling and testing program is undertaken to characterise groundwater conditions around the Lei deposit, to establish groundwater infrastructure for the collection of baseline monitoring data and to assess impacts on potential groundwater receptors. The investigation should include:

- The drilling and installation of a series of monitoring bores into both the Burrell Creek Formation and the alluvial aquifer. Drilling should be completed by a Northern Territory licensed and registered driller in accordance with national minimum bore construction guidelines (NUDLC, 2020).
- Hydraulic testing of completed groundwater bores at a minimum this should involve slug tests but where bore yields allow, pumping tests should also be conducted. Pumping tests will be critical to

gain insight into fracture connectivity across the site. Test durations, rates and monitoring targets should be determined on the basis of drilling results.

- Groundwater sampling and groundwater level monitoring should be undertaken on completed groundwater bores.
- All completed bores should be surveyed to Australian Height Datum (mAHD).
- Water quality sampling, level monitoring and surveying is recommended along the Charlotte River to the south and south-west of the Lei deposit and also at a waterhole located just north of the where the Charlotte River crosses the Fog Bay Road.

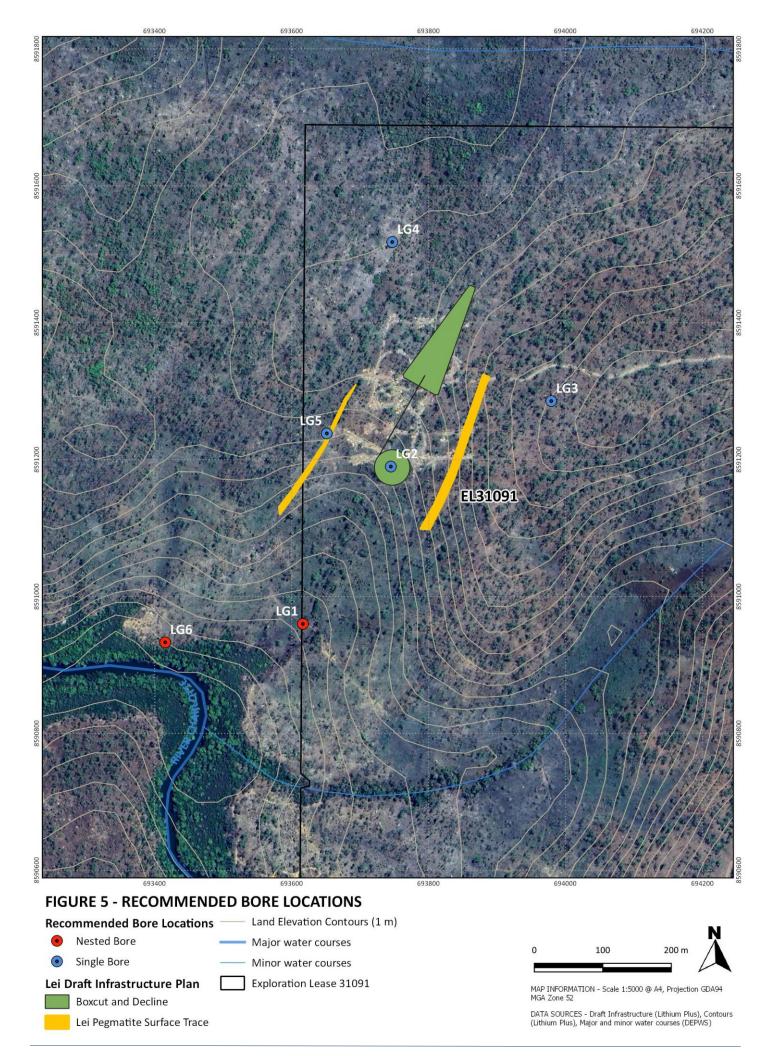
The drilling sites and investigation rationale are detailed in Table 2, with locations shown in Figure 5.

Note that site LG6 is located on an adjacent exploration lease (EL29698), held by Core Lithium. Additional clearances and permissions will be required to drill at this location.

Site	East GDA94 Z52	North GDA94 Z52	Site Type	No. Bores	Nominal Depth(m)	Rationale
LG1	693615	8590960	Nested bore	2	70 10	 Assess groundwater conditions down gradient south-west of the mine. Down strike observation bore for pumping tests (conditions permitting) to determine fracture connectivity. Establish on-lease nested monitoring site to assess potential impacts between mine workings and the Charlotte River.
LG2	693745	8591190	Single bore	1	100	 Investigate groundwater conditions at the site of the decline. Potential production bore for pumping test (conditions permitting) to assess hydraulic parameters and fracture connectivity
LG3	693980	8591290	Single bore	1	70	• Assess groundwater conditions up gradient to the east of the mine
LG4	693760	8591530	Single bore	1	70	 Assess groundwater conditions to the north of the mine and potentially down gradient from the box-cut
LG5	693650	8591240	Nested	1	70	 Investigate groundwater conditions within the pegmatite. Across strike observation bore for pumping tests (conditions permitting) to assess fracture connectivity.

Table 2 Recommended drilling locations, depths and rationale

Site	East GDA94 Z52	North GDA94 Z52	Site Type	No. Bores	Nominal Depth(m)	Rationale
LG6 Off lease	693415	8590930	Nested	2	70 10	 Investigate groundwater conditions adjacent to the Charlotte River down gradient of mine workings including establishing presence of alluvial aquifer and groundwater quality in close proximity to the water course.



8 References

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