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1. INTRODUCTION

Liontown Resources Limited (Liontown) plans to develop the Kathleen Valley Lithium-Tantalum Project (the Project), which is located 680 km northeast of Perth and approximately 60 km north northwest of Leinster in the Northern Goldfields region of Western Australia.

The proposed Project is expected to have a life of approximately 23 years and will consist of:

- Two small open pit mines located south of Jones Creek.
- One underground mine which will extend to about 450 m in depth. This includes ventilation shafts and will be accessed by three declines, the portal of one which will be external to the pits. Two paste plants will be constructed to provide paste fill for underground stopes.
- Processing plant including supporting activities such as a Process Water Pond, Run of Mine (ROM) Pad and low-grade ore stockpiles.
- Two tailings storage facilities (TSFs) consisting of three cells, with the second facility (third cell) being constructed about 12 years after Project commencement.
- One temporary waste rock dump (WRD). Waste rock will be used for construction of TSF embankment lifts over time and no permanent WRD will be required post closure.
- A borefield and water conveyance infrastructure.
- An integrated energy facility comprised of a natural gas power plant, solar farm and wind turbines to provide power for the Project.
- An on-site accommodation village located north of Jones Creek and the mining and ore processing facilities.
- Roads including connection from the Goldfields Highway and internal roads and tracks.
- Supporting infrastructure such as laydown areas, workshops, on-site offices, power transmission lines, a water treatment plants, landfill, magazine, surface water management infrastructure and topsoil stockpiles.

2. CONTEXT AND SCOPE

The Project is proposing to undertake four activities that require Works Approval and subsequent Licencing under the Environmental Protection Act, 1986 (WA), specifically:

- Category 5 – Processing or beneficiation of 50,000 tonnes or more per year of metallic or non-metallic ore: premises on which (a) metallic or non-metallic ore is crushed, ground, milled or otherwise processed.
- Category 52 – Electric power generation: premises on which electrical power is generated using a fuel with a generation capability of 20 MW or more in aggregate using natural gas fuel.
- Category 54 – Sewage facility: premises on which 100 m^3 of more per day of sewage is treated.
- Category 89 – Putrescible landfill site: premises on which waste (more than 20 but less than 5,000 tonnes per year) is accepted for burial.

This document is prepared as part of the Project's Works Approval Application (Attachment 3A). This Commissioning Plan provides details of commissioning which are to be assessed as part of the application. It is noted it only applies to the activities where commissioning is specifically required prior to commencement of full operations. Commissioning will specifically be required for the:

- Process Plant. Commissioning will be separate for Stage 1 and Stage 2 noting Stage 2 (increase from 2.5 Mtpa to 4 Mtpa) will occur in Year 4 to 5 of the Project.
- TSF1. CCCI and Commissioning Reports will be provided to DWER on completion of each embankment raise.
- Paste Plants. It is noted that construction of the Paste Plants will be staged with one plant required for the first three to four years and the second not required until Year 4 when production increases from 2.5 to 4 Mtpa.

As per discussions with DWER during the Scoping Meeting in March 2022, this Commissioning Plan will not apply to the two WWPT, landfill or natural gas fired power station.

Commissioning will be carried out in accordance with this Commissioning Plan.

3. COMMISSIONING PROCESS

Commissioning is a systematic process of ensuring that installed systems and infrastructure perform in accordance with their design intent and the site's operational requirements, ensuring that all plant, equipment, infrastructure and systems have been installed according to manufacturers' recommendations and the best practices and standards of the industry. The act of commissioning involves bringing multiple pieces of plant online in the correct sequence with all safety systems operational to ensure sequences, controls and functionality are correct. A commissioning team led by the Liontown's Development Manager will be established to perform this work.

Liontown's Development Manager will coordinate the pre-commissioning and the dry and wet aspects of the commissioning phases for individual infrastructure. The commissioning team will be an integrated multi-disciplinary team composed of site personnel, contract engineering personnel and supplier representatives. The responsibilities of this team will include examining and confirming plant construction to design intent and standards, hazard studies and all commissioning activities prior to operational handover.

The commissioning process will include the following phases (where relevant) of the respective systems:

- Pre-commissioning – comprising static checks on unpowered equipment to confirm that the infrastructure has been installed and connected according to specification.
- Dry commissioning – comprising test operation of 'empty' equipment and facilities without the addition of ore or water.
- Wet commissioning – comprising test operation of equipment and facilities where appropriate utilising water.
- Ore/tailings commissioning – comprising test operation of equipment and facilities with ore and process fluids where relevant.

The process for commissioning of the relevant prescribed activities is described in the following sections.

3.1 SCHEDULE

Subject to all approvals for the project being received, construction is scheduled to commence in August 2022 in addition to limited commissioning. Commissioning is expected to be complete by April 2024. Operation of the Project is expected to commence in Q2 2024.

Project infrastructure will be constructed, assembled and commissioned as required to support the timely commissioning of adjacent activities.

A summary of the infrastructure relevant to this Works Approval and the expected construction and commissioning timeframes are described in Table 1.

Table 1: Proposed Construction and Commissioning Schedule

Infrastructure	Construction Commencement	Construction Period (weeks)	Commissioning Commencement	Commissioning Period (weeks)
Processing Plant (Stage 1)	Quarter 3 2022	70	Quarter 4 2023	12
Processing Plant (Stage 2)	2027	52	2028	12
Power Station	Q 3 2022	65	Q4 2023	6
TSF1	Quarter 4 2022	30	Quarter 2 2023	12
Paste Plant 1 Paste Plant 2	Quarter 4 2024 2028	18 18	Quarter 4 2024 2028	12

Time limited operations will be required for at least a 16-week period post ore commissioning of TSF1 to allow sufficient time to have return water from the TSF to the Processing Plant, to ensure any commissioning issues are addressed and to obtain an Environmental Licence.

4. EXPECTED EMISSIONS AND DISCHARGES

4.1 EXPECTED EMISSIONS TO AIR

Processing of minerals in arid environments involves a significant potential for generation of dust emissions. Dust emissions generated during commissioning and operation have potential to affect environmental values. The project has potential to impact on air quality during commissioning through the generation of fugitive dust via:

- Dust emissions associated with:
  - Wind erosion from the Run of Mine (ROM) Pad.
  - Ore crushing, screening, sorting and material transfer during ore processing, albeit that several of these unit operations are conducted in the wet phase and therefore dust will be minimised at these stages.
  - Material handling and transport activities.
- Engine exhausts from construction equipment, mining equipment and light vehicles.
- Odour emissions associated with the decomposition of flotation reagents during process commissioning.

4.2 EXPECTED NOISE EMISSIONS

Potential sources of noise emissions during commissioning of the proposed infrastructure may potentially include the following:

- Construction and earthwork activities.
- Transport of ore from the open pits to the ROM Pad and feed into the crusher using mobile earthmoving equipment (excavators, trucks, front end loaders, dozer).
- Crushing of ore.
- Process Plant equipment including pumps, generators, compressors, conveyors and ore processing and sorting equipment.
- Warning alarms on mobile equipment feeding the crusher and on conveyors.
- Warning alarms on overflow detection systems and pipelines located within the Process Plant and Paste Plants.
- Transport of equipment and supplies to and from the Project during commissioning and operations.

4.3 EXPECTED DISCHARGES TO LAND AND SURFACE WATER

Potential sources of discharge to land and surface water during commissioning may originate from:

- Increased sediment load from ephemeral runoff due to ground disturbance and construction of infrastructure and TSF1.
- Hydrocarbon spills or leaks from vehicle and equipment use or maintenance activities.
- Overflow, spillage or leakage of the process water tanks.
- Overflow or loss of contents from process equipment with localised spillage.
- Spillage, leakage and seepage of hydrocarbons, chemicals and process reagents used and stored onsite.
- A breach of freeboard on TSF1.
- Spillage, leakage and seepage of tailings, paste and tailings return water from pipelines.

- Deposition of windblown ore and/or tailings to land.

4.4 EXPECTED DISCHARGES TO GROUNDWATER

The sources of impacts to groundwater may potentially originate from:

- Greater than predicted seepage from TSF1 to groundwater.
- Spillage from process water tanks or other water storage and pipelines.
- Spillages of Process Plant slurries, tailings, paste or hydrocarbons.

5. MANAGEMENT OF EMISSIONS AND DISCHARGES

5.1 EMISSIONS TO AIR

The Project design has considered exposure to dust, greenhouse gases and odour emissions in order to minimise adverse impacts.

Liontown will implement dust control measures during construction, commissioning and operational stages of the Project to ensure compliance with occupational health and environmental standards. Adherence to best practice in relation to dust management will also assist to maintain plant aesthetics and prevent potential impacts to human health, fauna and adjacent vegetation.

The following headers describe the management measures that will be implemented during commissioning.

5.1.1 Dust

- Vehicles and earth moving equipment will keep to defined roads.
- Dust will be managed by watering unsealed roads with a water cart.
- Vehicles will be required to travel at safe operating speeds on unsealed roads and will be restricted from accessing rehabilitated surfaces except for management purposes.
- Dust minimisation measures will be implemented for the ROM pad using water carts.
- Dust suppression sprays will be fitted to the crusher and dry screen to control and minimise dust emissions.
- TSF1 will be operated using sub aerial deposition methodology. Deposition rates appropriate to climatic conditions will be employed.
- Occupational hygiene requirements for dust will be complied with in operational areas.
- Heavy machinery operators will work in air-conditioned cabins normally fitted with high-efficiency particulate arrestance (HEPA) filters and Personal Protective Equipment (PPE) will be used as required.

5.1.2 Odour

- Reagent mixing will occur in well ventilated facilities to minimise build-up of odours.

5.2 NOISE EMISSIONS

Project design has considered exposure to noise in order to minimise adverse impacts. In addition, the following management measures will be implemented during commissioning phases of the project:

- All vehicles and plant equipment will be regularly maintained to ensure they are operating efficiently and are not unduly noisy.
- Engines and generators will incorporate exhaust mufflers and where appropriate other sound attenuating measures, operated and serviced in accordance with the manufacturer's specifications.
- Process air compressors will be housed in enclosures which offer a degree of noise attenuation .
- The WWTP will be containerised in order to attenuate noise and acoustic enclosed generating sets with sound attenuating measures will be used.
- The site induction will provide information on the requirements for and appropriate use of PPE in addition to delineated noise protection areas i.e. compressor enclosures.

5.3 DISCHARGES TO LAND AND SURFACE WATER

Project design has considered local topography and the locations of drainage lines and flood levels to minimise disturbance of these.

The following management measures will be implemented during commissioning of the project:

- Hydrocarbons will be stored in impermeable bunds in accordance with Australian Standards (*AS1940* and *AS1692*).
- Diesel fuel pods (i.e. with generators) required during construction and commissioning will be self-bunded and/or placed on adequate bunding.
- Hydrocarbon wastes will be segregated from other wastes and collected for offsite disposal by a licensed contractor.
- Hydrocarbon-contaminated wastes (e.g. oil filters, rags, containers) will kept in demarcated, dedicated containers for offsite disposal by a licensed contractor.
- Minor hydrocarbon spillage occurring as a result of equipment failures will be addressed and reported through the incident reporting procedure.
- Spill kits will be located at strategic locations throughout the project area and employees trained in their use.
- Ore processing activities will be conducted within bunded areas draining to sumps with recovery pumps to feed recovered spills back into the processing circuit.
- All chemical reagents will be stored within tanks in appropriately bunded facilities whereby 110% of the largest vessel and 25% of the total volume is contained according to Australian Standards 1940 and AS1692.
- TSF construction will be verified and signed off by a suitably qualified geotechnical engineer.
- TSF1 will be operated in accordance with the TSF Operations Manual including daily inspections of the TSF, tails and return water pipelines.
- Sufficient freeboard will be maintained in TSF1 during commissioning to allow capture of rainfall from a 1% AEP 72-hour event.
- Paste plant activities will be conducted within bunded areas draining to sumps with recovery pumps to feed recovered spills back into the paste and or process circuit.
- Pipelines will be located within bunds to ensure all liquors are captured and are not released to the environment.
- Scour pits or sumps will be constructed along above-ground pipeline corridors to ensure leaks or spillages are contained within bunded areas.
- Tailings, paste and return water pipelines will be fitted with flow and leak detection sensors monitored in real time for the centrally located control room.
- Surface water management infrastructure will be constructed prior to ore commissioning commencing.
- Drainage structures will be monitored after heavy rainfall if this occurs during commissioning.
- Water level monitoring will be conducted for all constructed open water storages.

5.4 DISCHARGE TO GROUNDWATER

The following management measures will be implemented to manage potential discharges to groundwater during commissioning:

- Monitoring bores will be installed around TSF 1prior to commissioning.

- Water level and quality in TSF monitoring bores will be monitored prior to and during commissioning to allow detection of changes in water quality.
- Hydrocarbons will be stored in impermeable bunds in accordance with Australian Standards (*AS1940* and *AS1692*).
- Minor hydrocarbon spillage occurring as a result of equipment failures will be addressed and reported through the incident reporting procedure.
- Spill kits will be located at strategic locations throughout the project area and employees trained in their use.
- The proposed monitoring schedule as detailed in Table 2 will be implemented.

6. MONITORING

A monitoring plan for the commissioning phase of the Project is provided in Table 2.

Table 2: Commissioning Monitoring Plan

Aspect	Frequency/Format
Processing Plant	
Integrity of all reagent, process solution, process water lines, tanks and bunds	Daily inspection log
Evidence of process liquor, ore or product spills to ground and their clean-up	Daily log for minor spills Incident report for larger spills
Reagent storage, pond freeboard levels, bund integrity	Weekly audit
Ore and water input/throughput volumes	Daily record
Discharge tailings volume and density	Daily record
TSF and Paste Plants	
Routine inspection for all components of the TSF and Paste Plants including: • Pumps, valves • Tailings and paste pipelines • Water return pipelines • TSF discharge locations and beaching performance • Location and size of TSF decant pond • Position of the TSF supernatant pond in relation to the water recovery system • General integrity of TSF embankment and perimeter containment embankment • Seepage downstream of TSF embankments • Monitoring infrastructure and instrumentation	Daily / weekly inspection log
Groundwater level in TSF bores Basic field testing of water quality (EC, pH and temperature)	Monthly
Groundwater monitoring (comprehensive) in TSF bores prior to and during commissioning. Samples to be submitted to a NATA-accredited laboratory for analysis.	Quarterly
Sediment Control Dams SCD01 and SCD02 - water quality	Monthly

TSF monitoring bores will be installed downstream of each embankment to facilitate early detection of changes in groundwater level and/or quality. Each monitoring bore station will consist of one shallow bore extending to a depth of approximately 5 m, and one deep bore terminating in the groundwater table (approximately 10 to 15 m depth). The shallow bore is intended to detect any seepage from the TSF flowing within the surface sediments, whilst the deep bore is designed to monitor groundwater level and chemistry. Each bore will be cased and screened over an interval set in the field during installation and sealed back to surface with low permeability grout. Monitoring bores will be constructed before commissioning of the TSF in order to accumulate baseline data specific to the TSF location. Proposed monitoring bore locations are shown in the TSF design report (Appendix 1 of Attachment 3B) and are reproduced in Figure 1.

All water quality monitoring will be undertaken in accordance with the AS/NZS 5667 series of standards and *Water Quality Protection Guidelines for Mining and Mineral Processing – Minesite Water Quality Monitoring*. All samples will be submitted to a NATA-accredited laboratory for analysis. Monitoring data will be reviewed by a competent person as soon as it is available, to identify any trends of concern or exceedances of typical baseline values.