



Works Approval Number	W5977/2016/1	
Works Approval Holder	Tianqi Lithium Australia Pty Ltd	
Works Approval Holder ACN Number	612 085 364	
Registered business address	578 Murray Street WEST PERTH WA 6005	
Address for notifications	578 Murray Street WEST PERTH WA 6005	
Duration	Commencement date	Expiry Date
	26/09/2016	25/09/2019
Prescribed Premises	Category Number 44 - Metal smelting or refining	
Premises	Lithium Hydroxide Processing Plant 12 Mason Road KWINANA BEACH WA 6167 Part of Lot 12 on Plan 39572 Certificate of Title Volume 2230 Folio 45	

This Works Approval is granted to the Works Approval Holder, subject to the following conditions, on 21/09/2016, by:

Date signed: 21 September 2016

Jonathan Bailes

A/Senior Manager - Industry Regulation (Process Industries)

an officer delegated under section 20 of the Environmental Protection Act 1986 (WA)

Premises Description

The **Works Approval Holder** is proposing to construct a lithium hydroxide processing plant on Part of Lot 12 on Plan 39572 in Kwinana Beach, WA. The proposed works will be located within a leased portion of the land parcel at that address.

The **Works Approval Holder** will be carrying out work on the premises that fall within Category 44, and as such the **Premises** is deemed a Prescribed Premises under the **EP Act**.

The **Premises** is situated within the Kwinana Industrial Area, with other industrial premises directly adjacent. The nearest residential area is approximately 2.35 km to the south-east.

Conditions

Environmental compliance

1. The **Works Approval Holder** must comply with the **EP Act** and all regulations prescribed under the **EP Act** and applicable to the Premises, including:
 - (a) The duties of an occupier under s 61;
 - (b) The duty to notify the **CEO** of discharges of waste under s 72; and
 - (c) Not causing, or doing anything that is likely to cause, an offence under the **EP Act**

except where the **Works Approval Holder** does something in accordance with a **Condition** which expressly states that a defence under s 74A of the **EP Act** may be available.

Premises

2. The **Works Approval Holder** must carry out the Works within the **Premises** in accordance with the requirements set out in Schedule 2.
3. The **Works Approval** applies to the **Premises** defined in the Premises Description Table, and as depicted in the Premises Map in Schedule 1.

Table 1: Premises Description Table

Premises Description	
General Location	Legal land description, reserve or tenement (all or part)
12 Mason Road KWINANA BEACH WA 6167	Part of Lot 12 on Plan 39572 Certificate of Title Volume 2230 Folio 45

Location of Works

4. The **Works Approval Holder** must locate the Works generally in accordance with the Site Plans in Schedule 1.

Infrastructure and Equipment

5. Subject to Condition 7, at least 10 business days prior to the commencement of the Works, The **Works Approval Holder** must provide to the **CEO** engineering or building certification from a suitable qualified professional confirming that the detailed construction drawings and plans for the Works include each item of infrastructure or component of infrastructure specified in column 1 with the

requirements specified in column 2, as set out in Table 2.

6. Subject to Condition 7, on completion of the Works, the **Works Approval Holder** must provide to the **CEO** engineering or building certification from a suitably qualified professional confirming each item of infrastructure or component of infrastructure specified in column 1 with the requirements specified in column 2, as set out in Table 2 below have been constructed with no material defects.
7. The **Works Approval Holder** must not depart from the requirements specified in column 2 of Table 2 except:
 - (a) where such departure does is minor in nature and does not materially change or affect the infrastructure; or
 - (b) where such departure improves the functionality of the infrastructure and does not increase risks to public health, public amenity or the environment;
 and all other **Conditions** in this **Works Approval** are still satisfied.
8. If Condition 7 applies, then the **Works Approval Holder** must provide the **CEO** with a list of departures which are certified as complying with Condition 7 at the same times, and from the same professional, as the certifications under Conditions 5 and 6.

Table 2: Infrastructure Requirements

Column 1	Column 2
Infrastructure	Requirements (design and construction)
Limestone Delivery, Spodumene Delivery, and Spodumene Stockpile	- Enclosed and equipped with rapid opening and closing automatic doors to allow the unloading and stockpiling of spodumene concentrate and limestone in a sealed environment.
TAS Storage, TAS Pelletising Plant, and Filters	- Enclosed and equipped with rapid opening and closing automatic doors to allow the stockpiling, pelletising, and loading of aluminosilicate and neutralisation agent (gypsum/limestone mixture) in a sealed environment.
First Stage Pyro Operations and First Stage Hydro Operations	<ul style="list-style-type: none"> - Stacks with a minimum stack height as follows: <ul style="list-style-type: none"> • Calciner stack: 34.6 m • Acid roast kiln stack: 27 m • Acid roast scrubber stack: 24 m • Spodumene mill stack: 25 m • Acid leach stack: 20 m • Steam generator stack: 12 m • Sodium sulphate stack: 25 m - All stacks must be fitted with sampling ports that are compliant with the requirements of AS4323.1 and the CEMS Code to allow periodic emissions monitoring and installation of CEMS. - A calciner baghouse filter capable of: <ul style="list-style-type: none"> • minimising particulate matter emissions from the calciner to less than 30 mg/m³ (STP dry) during normal operating conditions; and • detection and isolation of broken bags, without requiring a baghouse bypass situation to exchange or replace the broken bags. - Spodumene mill baghouse filter capable of: <ul style="list-style-type: none"> • minimising particulate matter emissions from the spodumene mill to less than 30 mg/m³ (STP (dry) during normal operating conditions. - An acid roast off-gas scrubber train as follows: <ul style="list-style-type: none"> • Venturi scrubber; • Entrainment separator;

Column 1	Column 2
Infrastructure	Requirements (design and construction)
	<ul style="list-style-type: none"> Wet electrostatic precipitator; Pressurised emergency water quench vessel; Duty and standby pumps for all duties; and capable of minimising sulphur acid emissions to less than 20 ppm during normal operating conditions .
Lithium Hydroxide Bagging Building	<ul style="list-style-type: none"> Automated packaging equipment and storage located within an enclosed room inside the warehouse. Enclosed and equipped with rapid opening and closing automatic doors to allow the bagging and handling of lithium hydroxide in a sealed environment.
Sodium Sulphate Storage Warehouse	<ul style="list-style-type: none"> Enclosed and equipped with rapid opening and closing automatic doors to allow the storage and handling of sodium sulphate in a sealed environment.
Conveyors	<ul style="list-style-type: none"> All conveyors are to be enclosed
Stationary Equipment	<ul style="list-style-type: none"> All compressors must have a purpose built enclosures for noise attenuation. All stationary items of equipment exceeding a manufacturer specified sound pressure level of 85 dBA at 1 m must be located within a building or otherwise within a noise attenuating enclosure.
Stormwater System	<p>Designed in accordance with the Schedule 1: Stormwater Plan including:</p> <ul style="list-style-type: none"> Stormwater from the Northern site road, Stage 1 Pyro Area and Stage 1 Hydro Area must be designed to direct runoff to Wedge Pit 1 and/or Wedge Pit 2. Wedge Pits must: <ul style="list-style-type: none"> be concrete lined and designed to capture suspended solids by sedimentation; have a treatment chamber designed for storage requirements based on a 1 in 1 year ARI storm of 1 hour duration ; and allow machinery (Bobcat) access for removal of accumulated solids. Storage Tanks 'TK A' and 'TK B' for the storage of treated water from Wedge Pits 1 and 2 respectively must be sized to store a 1 in 2 year ARI storm of 72-hour duration.
Chemical Storage	<ul style="list-style-type: none"> Acid and caustic storage areas must be provided with a sealed bunded capacity of 110% volume capacity of the maximum stored volume.
Disposal of wastewater to SDOOL	<ul style="list-style-type: none"> Nominal 1,600m x DN80 GRE or DN100PE wastewater pressure main. Wastewater storage tanks capable of storing 120 kL during periods when discharge to SDOOL is unavailable. Wastewater storage tanks are to be fitted with water level sensors, temperature probes and sealed emergency overflow sumps. Waste pump station comprising due/standby pumpsets designed to operate at a minimum duty of 5 L/s. A magnetic continuous flowmeter must be installed to monitor the volume of wastewater discharged to SDOOL. A wastewater monitoring point comprising an auto sampler with instrumentation capable of: <ul style="list-style-type: none"> periodically monitoring the quality of wastewater discharged to SDOOL; and continuously monitoring temperature, conductivity, turbidity and pH.

Fugitive Dust Management

The **Works Approval Holder** must undertake the minimum requirements in

9. Table 3 for the purposes of managing fugitive dust emissions from the **Premises**.

Table 3: Fugitive dust management requirements

Description	Operation details
Water carts	Operate when visible dust is generated from external ground surface areas on the Premises. Operate proactively subject to weather forecasting over a 24 hour period. Operate when visible dust is reported by site personnel.
Dust suppressants	Apply proactively. Re-apply proactively subject to visual inspection and weather forecasting over a 24 hour period.
Vehicles	Defined haul routes for vehicles to traverse unsealed surfaces or unformed roads. Vehicle speeds less than 25 km/hr on areas of unconsolidated or unsealed road.
Cessation of activities	Cease an activity causing visible dust lift-off during high wind conditions where dust management requirements have not prevented visible dust lift.

Clearing of Native Vegetation

10. The **Works Approval Holder** must not clear more than 1.17 hectares of native vegetation within the area cross-hatched yellow in Schedule 1: Clearing of Native Vegetation Plan 7198/1.

Records and Information

11. The **Works Approval Holder** must maintain accurate records including information, reports, and data in relation to the Works.
12. All information and records required under this Works Approval must:
- be legible;
 - if amended, be amended in such a way that the original and subsequent amendments remain legible or are capable of retrieval; and
 - be retained for six years after the expiry of this Works Approval

Reports

13. If requested by the **CEO** from time to time, the **Works Approval Holder** must provide the **CEO** with reports or information relating to the Works, the Premises or any **Condition** in this **Works Approval** (including data from any monitoring **Conditions**, environmental risk assessment studies).
14. Reports or information must be in such form as the **CEO** may require in a **CEO Request**.

Requests for Information

15. The **Works Approval Holder** must comply with a **CEO Request** within 7 days from the date of the **CEO Request** or such other period specified in the **CEO Request**.

Definitions and Interpretation

Definitions

In this Works Approval, the following terms have the following meanings:

AS4323.1 means Australian Standard 4323.1 *Stationary source emissions – Selection of sampling positions*.

AS/NZS5667.11 means Australian/New Zealand Standard 5667.11 *Water quality-Sampling-Part 11: Guidance on sampling of groundwaters*.

CEMS means continuous emissions monitoring system.

CEMS Code means the current version of the *Guideline: Continuous Emission Monitoring System (CEMS) Code for Stationary Source Air Emissions*, Department of Environment Regulation, Government of Western Australia.

CEO Request means a request made by the CEO to the Works Approval Holder in writing, sent to the Works Approval Holder's address for notifications as described at the front of this Works Approval, in relation to:

- (a) information, records or reports in relation to specific matters in connection with this Works Approval including in relation to compliance with any conditions and the calculation of fees (whether or not a breach of a condition or the EP Act is suspected); or
- (b) reporting, records or administrative matters:
 - (i) which apply to all works approvals granted under the EP Act; or
 - (ii) which apply to specified categories of works approvals within which this Works Approval falls.

Condition means a condition to which this Works Approval is subject under s 62 of the EP Act, and as set out in section 2 of this Works Approval.

NATA means National Association of Testing Authorities, Australia.

NATA accredited means in relation to the analysis of a sample that the laboratory is NATA accredited for the specified analysis at the time of the analysis.

Premises refers to the premises to which this Works Approval applies, as specified at the front of this Works Approval and as shown on the map in Schedule 1 to this Works Approval.

SDOOL means Sepia Depression Ocean Outlet Landline.

TAS means Tianqi aluminosilicate.

Works Approval refers to this document, which evidences the grant of the works approval by the CEO under s 57 of the EP Act, subject to the conditions.

Works Approval Holder refers to the occupier of the premises being the person to whom this Works Approval has been granted, as specified at the front of this Works Approval.

Interpretation

In this Works Approval:

- (a) the words "including", "includes" and "include" will be read as if followed by the words "without limitation";
- (b) where any word or phrase is given a defined meaning, any other part of speech or other grammatical form of that word or phrase has a corresponding meaning;
- (c) where tables are used in a Condition, each row in a table constitutes a separate Condition; and
- (d) any reference to an Australian or other standard, guideline or code of practice in this Works Approval means the version of the standard, guideline or code of practice in force at the time of granting of this Works Approval and includes any amendments to the standard, guideline or code of practice which may occur from time to time during the course of the Works Approval.

Works Approval document history

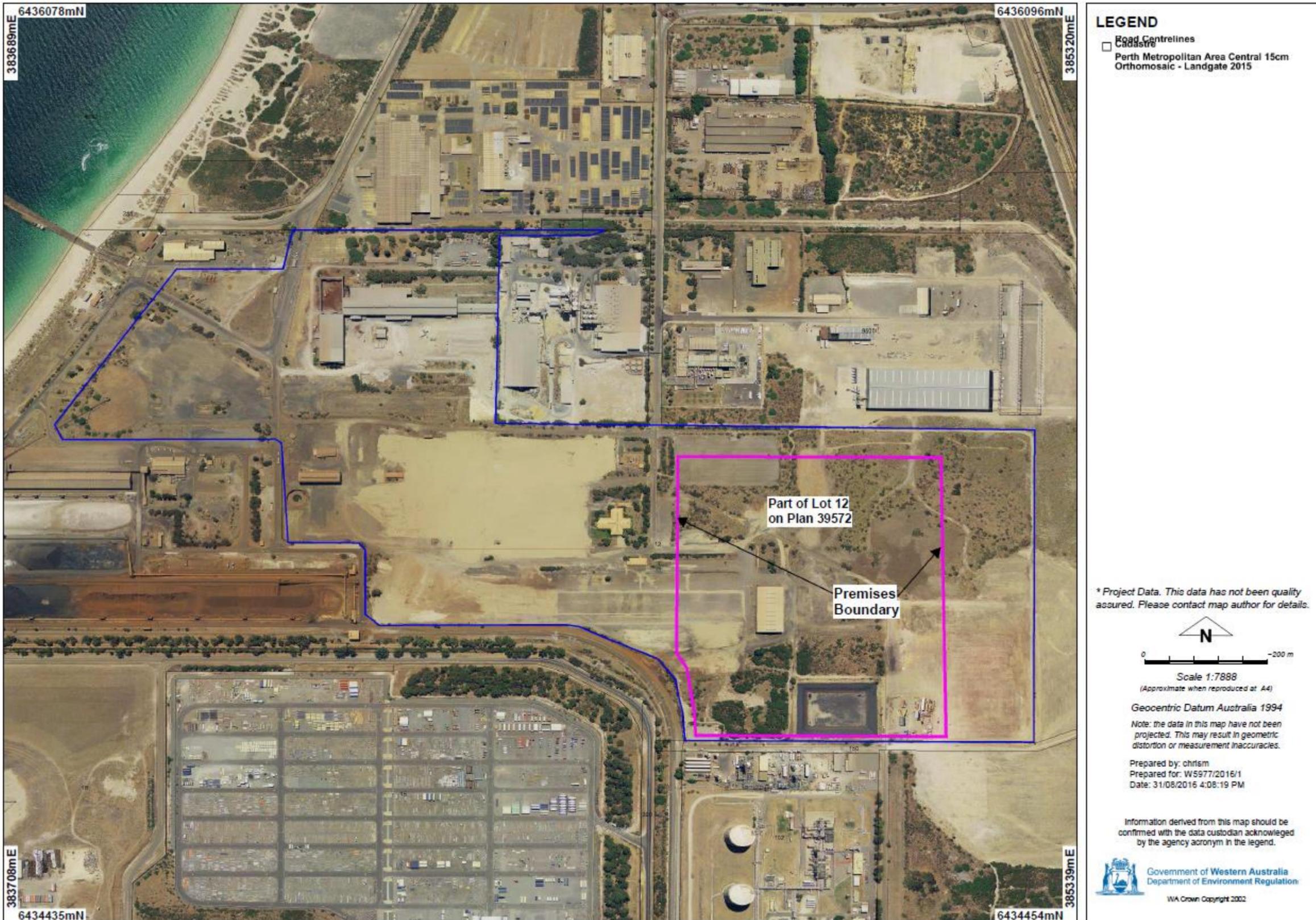
Where this Works Approval has been amended, and revised Works Approvals have been issued, the document history is set out below.

Amendment Description	Date	Revision No
First issue	21/09/2016	0

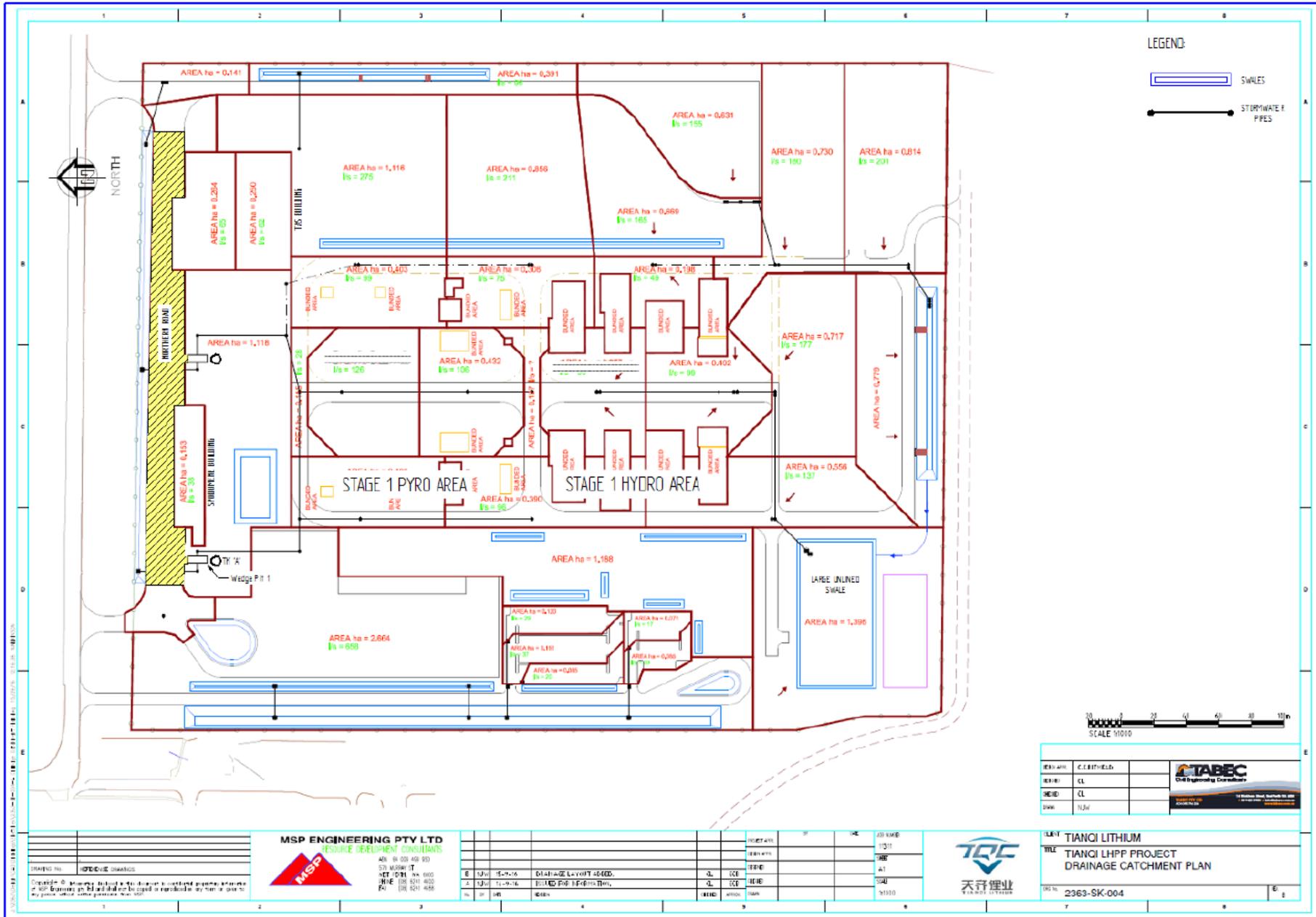
Schedule 1: Site Plans

Premises Map

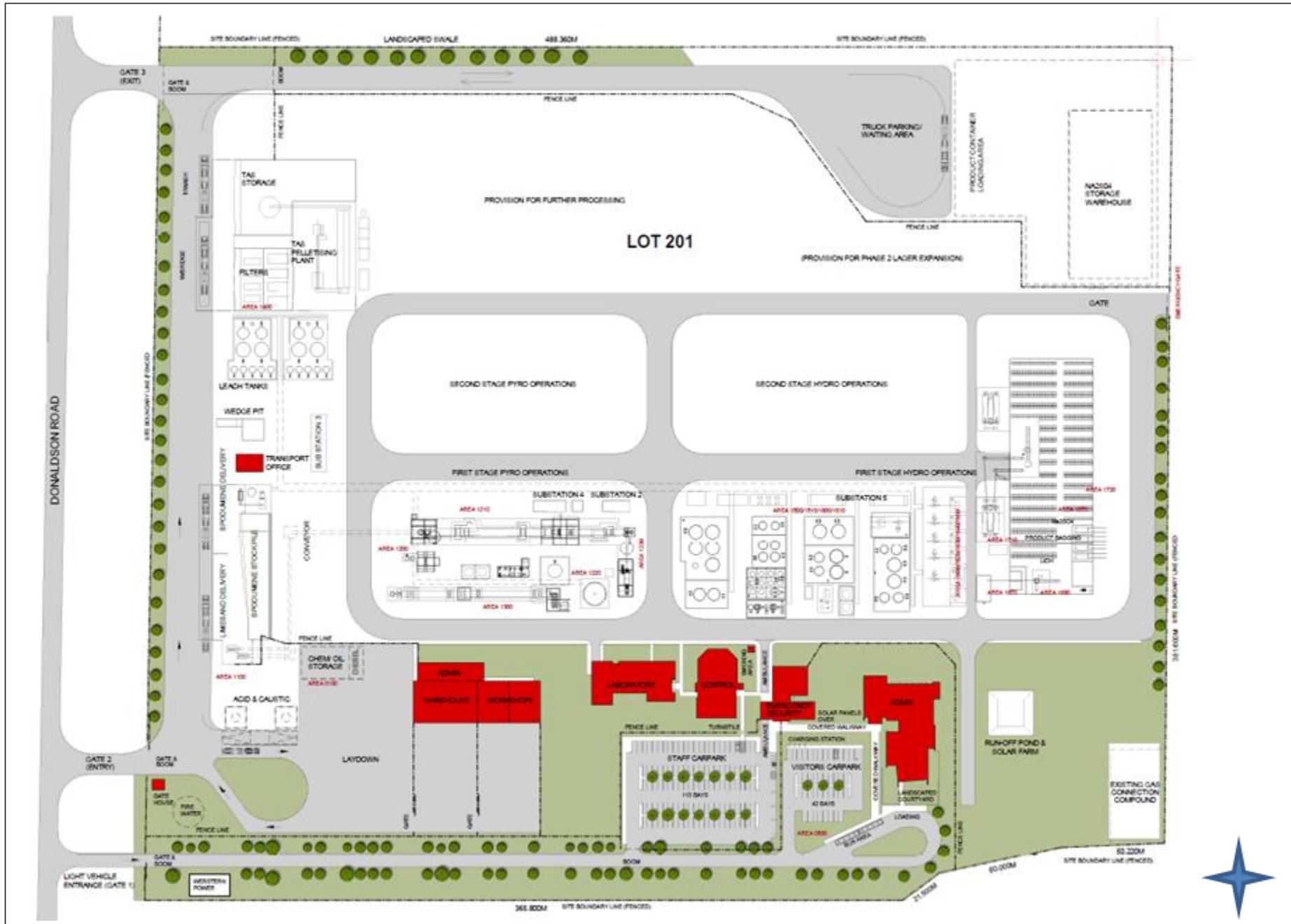
The **Premises** is shown on the map below. The pink line depicts the boundary to the **Premises** and the blue line depicts the boundary of Lot 12 on Plan 39572.



Stormwater Plan



General layout plan



Clearing of Native Vegetation Plan 7198/1



<p>Legend</p> <ul style="list-style-type: none">  Roads  Imagery  Clearing Instruments Activities  Local Government Authority 	 <p>0 200m</p>
	<p>1:4,820 (Approximate when reproduced at A4) GDA 94 (Lat/Long) Geocentric Datum of Australia 1994</p>
	<p> Date 17/8/16</p>
	<p>Officer with delegated authority under Section 20 of the Environmental Protection Act 1986</p>
	 <p>GOVERNMENT OF WESTERN AUSTRALIA WA Crown Copyright 2016</p>

Schedule 2: Works

The Works to be carried out on the Premises are specified in the table below:

Item	Works	Specifications/Drawings
1	Weighbridge	Site plans: General Layout
2	Truck wash	Site plans: General Layout
3	Lime sand Delivery, Spodumene Delivery and Spodumene Stockpile Building	Site plans: General Layout
4	TAS Storage, TAS Pelletising Plant and Filters Building	Site plans: General Layout
5	Leach Tanks	Site plans: General Layout
6	First Stage Pyro and First Stage Hydro Operations	Site plans: General Layout
7	Conveyor system	Site plans: General Layout
8	Na ₂ SO ₄ and LiOH Product Bagging Building	Site plans: General Layout
9	Na ₂ SO ₄ Storage Warehouse	Site plans: General Layout
10	Product Container Loading Area	Site plans: General Layout
11	Acid & Caustic and Chemical/Oil Storage Areas	Site plans: General Layout
12	Contingency wastewater storage tanks and connection to SDOOL	Site plans: General Layout
13	Stormwater System	Site Plan: Stormwater Plan



Application for Works Approval

Division 3, Part V *Environmental Protection Act 1986*

Applicant:	Tianqi Lithium Australia Pty Ltd
ACN:	612 085 364
Works Approval Number:	W5977/2016/1
File Number:	DER2016/001280
Premises:	Lithium Hydroxide Processing Plant 12 Mason Road KWINANA BEACH WA 6167 Part of Lot 12 on Plan 39572 Certificate of Title Volume 2230 Folio 45
Date of report:	Tuesday, 20 September 2016
Status of Report	Final

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Definitions of terms and acronyms

Term	Definition
NHMRC & ARMCANZ (2011)	Australian Drinking Water Guidelines
<i>Applicant Noise Assessment</i>	The report <i>Approvals for Lithium Processing Plant Noise Assessment</i> , MSP Engineering Pty Ltd, June 2016 that forms Appendix B in Attachment 6 of the application.
<i>Applicant Air Assessment</i>	The report <i>Approvals for Lithium Processing Plant Air Assessment</i> , MSP Engineering Pty Ltd, June 2016 that forms Appendix C in Attachment 6 of the application
ANZECC & ARMCANZ (2000)	Australian and New Zealand Guidelines for Fresh and Marine Water Quality
<i>Contaminated Site Baseline Assessment</i>	The report <i>Contaminated Site Baseline Assessment, Lithium Hydroxide Processing Plant Development Lot 8 Leath Road, Kwinana Beach</i> , Report Number: 1654886-002-R-Rev0, Golder Associates, June 2016 that forms Appendix F in Attachment 6 of the application.
DER	Department of Environment Regulation
DoH (2014)	Contaminated Sites Ground and Surface Water Chemical Screening Guidelines
EP Act	<i>Environmental Protection Act 1986</i>
EP Regulations	<i>Environmental Protection Regulations 1987</i>
Kwinana EPP	<i>Environmental Protection (Kwinana)(Atmospheric Wastes) Policy 1999</i>
KWRP	Kwinana Water Reclamation Plant.
LHPP	Lithium Hydroxide Processing Plant
NEPM	<i>National Environmental Protection (Ambient Air Quality) Measure 1998</i>
Noise Regulations	<i>Environmental Protection (Noise) Regulations 1997</i>
Premises	as defined in the EP Act. Means residential, industrial or other premises of any kind whatsoever and includes land, water and equipment
Prescribed Premises	premises of the types listed in Schedule 1 of the EP Regs.
SDOOL	Sepia Depression Ocean Outfall Line
TAS	Tianqi aluminosilicate
Victorian SEPP	<i>State Environment Protection Policy (Ambient Air Quality) 1999</i> , EPA Victoria
<i>Water Supply and Wastewater Disposal Strategy</i>	The report <i>Approvals for Lithium Processing Plant Water Supply and Wastewater Disposal Strategy</i> , MSP Engineering Pty Ltd, June 2016 that forms Appendix E in Attachment 6 of the application.

1. Purpose and Scope of Assessment

An application for works approval that includes clearing of native vegetation has been received from Tianqi Lithium Australia Pty Ltd (the Applicant) who proposes to construct a lithium hydroxide processing plant (LHPP) on a vacant brownfield site in the Kwinana Industrial Area (KIA). The application relates to Stage 1 works to commence operating the facility to produce 24,000 tonnes of lithium hydroxide per year. The hardstand pad constructed for the first stage operations will include provision for a potential future second stage processing line. Second stage operations are not within the scope of this assessment.

The scope of assessment for this Decision Report relates to:

- works associated with the construction of the LHPP with a lithium hydroxide production capacity of 24,000 tonnes per year inclusive of the first stage pyro and hydro operations;
- the risk of emissions to the environment and public health during both construction and operational phases; and
- the clearing of native vegetation.

The Applicant did not apply for a licence and did not request or provide application supporting information relating to commissioning activities. Therefore, the scope of assessment does not include:

- works associated with second stage operations and a production capacity beyond 24,000 tonnes of lithium hydroxide per year;
- commissioning activities and the risk of emissions from commissioning activities; or
- determining specific regulatory controls for a licence.

The Applicant proposes to discharge wastewater to the Sepia Depression Ocean Outlet Landline (SDOOL) which is the subject to the requirements of Ministerial Statement No. 665 (MS665) held by the Water Corporation granted under Part IV of the EP Act as outlined in section 5.1. MS665 includes a requirement that new proposals for the discharge of industrial effluent to the SDOOL are referred to the Environmental Protection Authority (EPA) prior to the acceptance of the effluent. This works approval does not assess or authorise the use of the SDOOL to discharge wastewater as this aspect will be assessed by the Water Corporation and referred to the EPA under Part IV of the EP Act.

2. Background

Tianqi Lithium Australia Pty Ltd (Applicant) submitted a works approval application, including native vegetation clearing, on 23 June 2016 for the construction of the LHPP.

The proposed facility will source spodumene concentrates from Talison's Greenbushes Lithium Operations (Licence L4247/1991 available at www.der.wa.gov.au) to convert to lithium hydroxide for export.

The Applicant applied for *Category 31: Chemical manufacturing*. The Delegated Officer has determined that *Category 44: Metal smelting or refining* also applies to the activities on the site. This was on the basis that:

- the LHPP will use spodumene- β which is a metal ore concentrate sourced from the Greenbushes lithium operations;
- spodumene- β will be refined or processed at the LHPP including the specific activity of acid roasting; and
- The production capacity to produce lithium hydroxide (24,000 tpa) exceeds the Cat. 44 threshold (1000 tpa).

Descriptions for Category 31 and Category 44 prescribed premises as defined in Schedule 1 of the *Environmental Protections Regulations 1987* are presented in Table 1.

Table 1: Prescribed Premises Category

Classification of Premises	Description	Production or design capacity (as per application)	Schedule 1 Category Threshold
Category 31	Chemical manufacturing: premises (other than premises within category 32) on which chemical products are manufactured by a chemical process	24,000 tonnes per year (lithium hydroxide)	100 tonnes or more per year
Category 44	Metal smelting or refining: premises on which metal ore, metal ore concentrate or metal waste is smelted, fused, roasted, refined or processed.	24,000 tonnes per year (lithium hydroxide)	1,000 tonnes or more per year.

The proposed site is a vacant brownfield site in the Kwinana Industrial Area. A history of industrial activities on the site was provided in section 1.2 of the *Contaminated Site Baseline Assessment* that formed part of the application. The author states that in 1952, BHP Billiton (BHP) developed a steel rolling mill on the site. Activities since then have included an operational steelworks from 1965 to 1982 (blast furnace, pig mill, sinter plant, power station, tippler, conveyor system and landfill), a bulk storage facility (1985), the Hismelt Corporation Pilot Plant (1993-1999), and the Hismelt Corporation commercial plant (2003-2011).

The section of the premises proposed for the LHPP has remained vacant since the decommissioning of the Hismelt commercial plant in 2011. A high-density polyethylene lined evaporation pond remains adjacent to the southern boundary of the site. The pond is to be decommissioned as part of the LHPP proposal and infilled to enable development.

Historical activities at the site have caused it to be classified as *Contaminated – restricted use* under the provisions of the *Contaminated Sites Act 2003*. This is further addressed in section 5.3.

3. Proposal

The Applicant has submitted the following documents and information in support of the application for works approval:

- Application Form dated 23 June 2016;
- Attachment 1A – Proof of Occupier Status;
- Attachment 1B – ASIC Company Extract;
- Attachment 2 – Premises;
- Attachment 3A – Description & Overview;
- Attachment 3B – Area to be Cleared / Site Boundary;
- Attachment 4 – Other Approvals;
- Attachment 6 – Public Health and Environmental Risks / Air modelling files;
- Attachment 7 – Siting & Sensitive Receptors; and
- Attachment 11 – Exemption from Publication.

4. Overview of Premises

4.1 Primary, Secondary and Contributory Activities

Primary, secondary, and contributory activities are defined in DER's *Guidance Statement: Licence and works approvals process*. As noted in section 2, while the Applicant applied for Category 31, the Delegated Officer has determined that the primary activity for this proposal is Category 44.

The Delegated Officer noted that various sewage treatment facilities would be constructed and

operated at the premises, in the form of four self-contained treatment units.

The main treatment unit will be a buried unit servicing toilets, wash basins, kitchens, and showers located at the administration building, emergency/security facility, control facility, laboratory, and the warehouse. Sewage treatment will be via aeration, aerobic plus anaerobic bacterial activity, and flocculation using aluminium sulphate. Treated wastewater will be disposed of via sub-surface irrigation on site. This unit will have a hydraulic load capacity of 8,000 L/day.

Three smaller treatment units will service sewage from the toilets and crib rooms associated with the gatehouse, toilet/shower room at the product warehouse, and the spodumene building crib room plus toilet block. These treatment units will be capable of treating 1,800 L/day. The treated water disposal area which consists of a sub-surface drainage system (e.g. flatbed drains which allow for drainage of the treated water) will be in grassed areas near the treatment units.

Categories 54 and 85 both apply to the activity of sewage treatment and treated sewage disposal. These categories are summarised in Table 2.

Table 2: Prescribed Premises Category

Classification of Premises	Description	Production or design capacity (as per application)	Schedule 1 Category Threshold
Category 85	Sewage facility: premises – (a) on which sewage is treated (excluding septic tanks); or (b) from which treated sewage is discharged onto land or into waters.	1.8 to 8 m ³ per day individually (13.4 m ³ per day in total for four systems)	More than 20 but less than 100 m ³ per day

The Delegated Officer determined that the proposed sewage systems are secondary activities on the basis that:

- they are an activity within Category 85;
- the activity falls below the prescribed thresholds for both categories; and
- the activity does not contribute to the nature and type of emissions from the primary activity of lithium hydroxide production under Category 44.

As per DER's *Guidance Statement: Licence and works approvals* process, secondary activities are not subject to conditions in works approvals and/or licences for prescribed premises. The works approval and licence for this premise will not have regard to regulatory controls for the sewage treatment units.

4.2 Infrastructure

4.2.1 Prescribed Premises Infrastructure

The LHPP infrastructure, as it relates to Category 44, is detailed in Table 3.

Table 3: LHPP prescribed premises infrastructure

Infrastructure	
Prescribed Activity: Category 44	
Approximately 160,900 dry tonnes per annum of Spodumene concentrate will be received by truck and processed to produce lithium hydroxide along with waste by-products aluminosilicate, sodium sulphate, and gypsum/limestone products.	
1	Weighbridge
2	Truck wash
3	Lime sand delivery, Spodumene delivery and Spodumene stockpile building
4	TAS Storage, TAS Pelletising Plant and Filters Building
5	Leach Tanks
6	First Stage Pyro and First Stage Hydro operations ¹
7	Conveyor system
8	Na ₂ SO ₄ and LiOH product Bagging Building
9	Na ₂ SO ₄ Storage Warehouse
10	Product Container Loading Area
11	Acid & Caustic and Chemical/Oil Storage Areas
12	Stormwater System

Note 1: Infrastructure within the scope of assessment does not include second stage pyro and hydro operations to expand lithium hydroxide production beyond 24,000 tonnes per year as outlined in section 1.

4.2.2 Other Infrastructure

The Applicant will be constructing the following infrastructure that is not within the scope of this assessment.

- Sewage treatment units (x4);
- Administration office;
- Emergency-security-training building;
- Laboratory;
- Control room building, cafeteria and ablution;
- Warehouse;
- Workshop;
- Car parks; and
- Landscaping.

4.3 Operational Aspects

The Applicant, Tianqi Lithium Australia Pty Ltd, has 51% ownership of Talison Lithium Australia Pty Ltd, who owns and operates the Talison Lithium Mine in Greenbushes, Western Australia. The LHPP will source spodumene concentrates from the Greenbushes operations (Licence L4247/1991 available at www.der.wa.gov.au) to convert to lithium hydroxide for export.

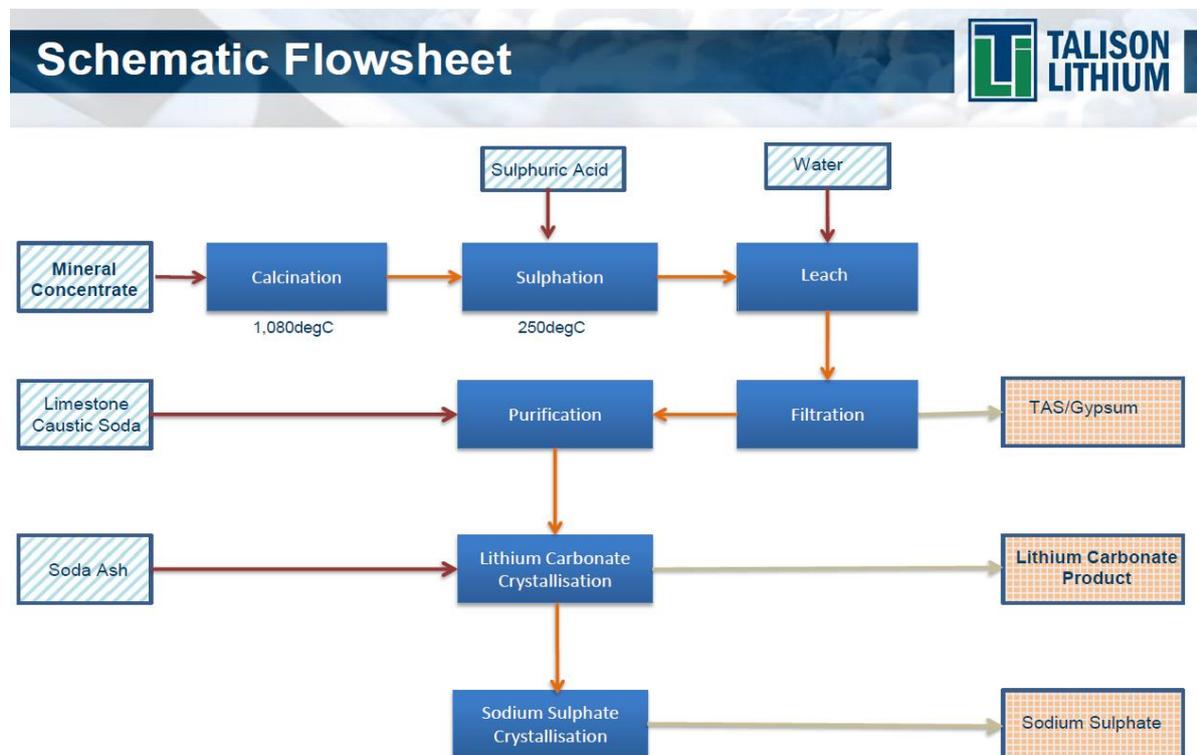
The LHPP will operate on a continuous 24-hour per day basis, with 365 days per year operation. The Applicant states that the plant is designed with a proposed plant operating factor of 83%, accounting for planned shutdown and refractory re-line on the calciner every two years.

The LHPP will process approximately 160,900 dry tonnes per annum (tpa) of spodumene concentrate to produce up to 23,950 tpa of lithium hydroxide monohydrate (LiOH.H₂O) along with three by-products:

- Approximately 43,900 tpa dry sodium sulphate;
- Approximately 175,900 tpa alumina silicates; and
- Approximately 26,100 tpa gypsum/limestone product.

Specific detail regarding the process of refining lithium hydroxide from spodumene concentration is the subject of an exemption from publication claim by the Applicant on the basis of commercial-in-confidence details (Appendix 4). The exempted information has been considered by the Delegated Officer in the assessment and determination of the application but has been excluded from the published version of this decision report. Figure 1 below provides an indicative schematic process flow.

Figure 1: Indicative schematic flowsheet for processing mineral concentrate to lithium product



Source: Kwinana Industries Council website www.kic.org.au (Presentation - 05/11/2013) accessed on 31/08/2016

Key Findings: The Delegated Officer has reviewed the information regarding the overview of the LHPP and has found:

1. The process of converting spodumene or concentrate to lithium hydroxide is prescribed Category 44; and
2. The proposed sewage treatment systems are secondary activities and will not be regulated by conditions on the works approval.

4.3.1 Wastewater Streams

Wastewater in the plant is made up of cooling tower blowdown water, boiler blowdown water, and demineralisation plant reject water. The Applicant proposes to collect this wastewater in a tank prior to discharge into the SDOOL. As outlined in section 5.1, connection and discharge to the SDOOL are subject to a referral under Part IV of the EP Act as to whether the proposal will be assessed as a significant proposal.

Sewage treatment facilities will be provided at the site. The sewage will be treated on site, and the resulting treated water will be disposed of via irrigation.

5. Legislative Context

5.1 Applicable Standards and Guidelines

5.1.1 Environmental Protection (Kwinana)(Atmospheric Wastes) Policy 1999

Environmental Protection Policies (EPPs) are statutory policies developed under Part III of the EP Act.

The *Environmental Protection (Kwinana)(Atmospheric Wastes) Policy Approval Order 1999* (Kwinana EPP) and *Environmental Protection (Kwinana)(Atmospheric Wastes) Regulations 1992* (Kwinana EPP Regulations) provide ambient air quality standards and ambient air quality limits for sulphur dioxide and particulates.

The Kwinana EPP defines three areas (Area A, B and C) where:

- Area A is the area of land on which heavy industry is located;
- Area B is outside Area A and is zoned for industrial purposes from time to time under a Metropolitan Region Scheme or a town planning scheme;
- Area C is beyond Areas A and B, predominantly rural and residential.

The proposed LHPP resides within Area A. Schedule 2 of the Kwinana EPP regulations provides emissions standards and limits identified in Table 4 and Table 5.

Table 4: Ambient air quality standards and ambient air quality limits – total suspended particulates

Item	Area	Standard ($\mu\text{g}/\text{m}^3$)	Limit ($\mu\text{g}/\text{m}^3$)	Averaging period
1	Policy Area	-	1,000	15 minutes
2	Area A	150	260	24 hours

Table 5: Ambient air quality standards and ambient air quality limits – sulphur dioxide

Item	Area	Standard ($\mu\text{g}/\text{m}^3$)	Limit ($\mu\text{g}/\text{m}^3$)	Averaging period
1	Area A	700	1400	1 hour
2	Area A	200	365	24 hours
3	Area A	60	80	1 year

The Kwinana EPP defines 'standard' as the "concentration of an atmospheric waste which it is desirable not to exceed" and 'limit' as the "concentration of an atmospheric waste which is not to be exceeded."

This assessment has had regard to the Kwinana EPP and Kwinana EPP Regulations in assessing the risk of particulate and sulphur dioxide emissions from the premises.

5.2 Part IV of the EP Act

5.2.1 Background

The Applicant proposes to discharge wastewater to the SDOOL. The wastewater will consist of cooling tower blowdown water, boiler blowdown water, and demineralisation plant reject water. Water Corporation holds Ministerial Statement No. 665 for the use of the SDOOL to dispose of treated sewage and industrial wastewaters to the Sepia Depression. EPA Bulletin 1135 (May 2004) contributed to the determination of MS665.

The key matters of Bulletin 1135 and Ministerial Statement 665 as they pertain to the proposal are discussed below.

5.2.2 Bulletin 1135

The advice provided in Bulletin 1135 has been considered by the Delegated Officer during the proposed LHPP assessment process and drafting of the works approval conditions. In particular, this advice is relevant to DER's consideration of discharges of wastewater via the SDOOL to the marine environment.

Pertinent EPA advice in Bulletin 1135 relevant to the Delegated Officer's determination of the application is summarised in Table 6.

Table 6: Summary of relevant EPA advice in Bulletin 1135

Section	EPA comment
Summary and recommendations	The proposal allows for the potential addition of further sources of industrial wastewater besides that from industries considered in the assessment, provided proposals for further industrial discharges are referred to the EPA.
Marine environment: ecological values – Toxicant loads	For new industrial discharges that are proposed for the Sepia Depression, best practice waste minimisation principles should be applied and the proposal will need to be referred to the EPA. Load limits may be reviewed should monitoring show environmental impacts are likely, or that the EQS are exceeded.
Other advice	The EPA recommends that, for industries discharging to the SDOOL, Part V licences should be standardised to include concentration and load limits on all contaminants of concern in the marine environment to facilitate monitoring of wastewater discharge to the Sepia Depression. However, notwithstanding this recommendation, the Water Corporation as proponent for the proposal is responsible for ensuring that environmental harm does not occur and that the Environmental Quality Standards (EQS) are not breached due to the combined discharges.
	Any proposal to accept industrial effluent from industries other than those nominated in this proposal or to change the character and contaminant load of effluent from the nominated industries must be referred to the EPA. The SDOOL is not subject to a licence under Part V of the <i>Environmental Protection Act 1986</i> and therefore new or changes to industrial effluent discharge cannot be regulated by that process.

5.2.3 Ministerial Statement Number 665

Ministerial Statement No. 665 contains conditions that need to be considered in the assessment of wastewater emissions to the SDOOL and the implementation of regulatory controls. These are summarised in Table 7. The conditions listed in the table reflect the Water Corporation's statutory obligations, as administrator of the SDOOL.

Table 7: Consideration of MS665 conditions relevant to this application

Condition	Requirement	Delegated Officer consideration
8-1	The proponent shall not accept industrial effluent from industries not specified in schedule 1 unless a proposal has been referred to the Environmental Protection Authority.	New proposals for industrial effluent to SDOOL must be referred to the EPA for it to determine whether it will be assessed as a significant proposal. The referral must occur before the industrial effluent is accepted. To date, no referral has been made and therefore this works approval does not authorise the discharge of wastewater to the SDOOL.
9-1	The proponent shall only accept and convey effluent from the industry participants to the Sepia Depression where industrial toxicant loads to be discharged do not exceed those authorised for discharge into Cockburn Sound by the relevant individual industry <i>Environmental Protection Act Part V</i> licences.	The Applicant has not applied for a licence under Part V of the EP Act. If an application for a licence is made, the Applicant will need to demonstrate that the discharge of wastewater to the SDOOL is acceptable under MS655 and that the proposal has been referred to the EPA. On referral, If the EPA determines that the discharge must be assessed, DER will be prevented from making a decision on the licence application until the assessment is complete.
9-2	The proponent shall not accept discharges which are not licensed under Part V of the <i>Environmental Protection Act 1986</i> into the Sepia Depression Ocean Outlet Landline for disposal to the Sepia Depression.	
Procedures	To ensure that discharge loads are not increased, the Chief Executive Officer of the Department of Environment will review from time to time the <i>Environmental Protection Act Part V</i> licences issued to industries which discharge into the Sepia Depression Ocean Outlet Landline, in order to set appropriate load limits on toxicants and on any other contaminants which may have an adverse impact on the marine environment.	Where a licence authorises LHPP discharge to SDOOL, the licence conditions including any wastewater limits will be reviewed from time to time.

Key Finding: The Delegated Officer has reviewed the information regarding *Part IV of the EP Act* and has found:

1. *The discharge of wastewater to the SDOOL is subject to the requirements of Ministerial Statement No. 665 (MS665) held by the Water Corporation.*
2. *MS665 requires the discharge of industrial effluent to the SDOOL to be referred to the EPA prior to acceptance.*
3. *To date, no referral to the EPA has been made. Therefore, this works approval does not assess or authorise the discharge of wastewater to the SDOOL.*

5.3 Contaminated Sites

The LHPP is proposed to be constructed on a portion of Lot 12 on Plan 39572 Leath Road, Kwinana Beach.

Under the *Contaminated Sites Act 2003* (CS Act), the Department of Environment and Conservation (DEC) (predecessor agency to DER) classified land at Lot 12 on Plan 39572, as shown on Certificate of Title 2230/45, as *contaminated restricted use* on 20 October 2008, and a memorial (reference number K761393ML) was placed on the Certificate of Title.

Lot 12 Leath Road is part of a larger area of land that has been subject to various heavy industrial uses since 1954 including a steel production blast furnace, powerhouse, raw material and product storage, production waste disposal, the disposal of slag, dust and demolition waste, and mixed and putrescible waste disposal. Soil investigations carried out at Lot 12 and in the wider area between 2001 and 2003 identified widespread industrial slag and cinders which contain elevated concentrations of metals. Concentrations of all metals were below the relevant health assessment levels for industrial and commercial uses.

A limestone capped area occupies the eastern portion of the site. The capped area is managed under a Site Contamination Management Plan (SCMP), prepared by Golder Associates (Golder) in 2003. Typically, the capping layer is comprised of compacted limestone of minimum 300 mm thickness overlying either historical blast furnace waste material, or other wastes including soil, rubble and crushed demolition material.

Historical groundwater investigations at Lot 12 Leath Road have identified the widespread presence of nitrate contamination at concentrations exceeding Marine Water Ecosystems criteria. The Applicant recommends that a groundwater assessment is undertaken if groundwater abstraction activities are proposed on the site.

As part of the application, the *Contaminated Site Baseline Assessment* report prepared by Golder Associates was submitted. This report was reviewed by DER's Contaminated Sites technical experts. These findings are presented in Section.9.3 of this report.

5.4 Planning Approval

The application for works approval was referred to the City of Kwinana as a direct interest stakeholder as outlined in section 6.

The proposal is subject to planning approvals from the City of Kwinana and the West Australian Planning Commission. Consistent with DER's *Guidance Statement: Land use planning*, the application for works approval will not be determined prior to the determination of relevant planning approvals.

Development Assessment Panel (DAP) Application DA8664 was considered by the Metro South-West Joint DAP at its meeting on 31 August 2016 where it resolved to approve the application. DER was provided with a copy of the DAP Determination Notice dated 6 September 2016.

Key Finding: The Delegated Officer has reviewed the information regarding the *land use planning of LHPP* and has found:

1. *The Applicant has development approval in accordance with the City of Kwinana Town Planning Scheme No. 2 and Metropolitan Region Scheme; and*
2. *Relevant planning decisions have been made and other than a time limit on substantially commencing the development, there are no relevant time limit considerations.*

5.5 Water Corporation

The application for works approval was referred to the Water Corporation as a direct interest stakeholder as outlined in section 6.

The Applicant proposes to discharge wastewater to the SDOOL which is used for the disposal of treated sewage wastewater and approved industrial wastewaters. The Water Corporation operates the SDOOL subject to the requirements of Ministerial Statement No. 665. With reference to the Water Corporation's advice in section 6, the proposal to discharge to the

SDOOL is subject to the Applicant obtaining an Effluent Services Agreement with Water Corporation.

5.6 Part V of the EP Act

5.6.1 Clearing of Native Vegetation

Clearing of native vegetation in Western Australia requires a permit from the DER unless exemptions apply. Native vegetation includes aquatic and terrestrial vegetation indigenous to Western Australia, and intentionally planted vegetation declared by regulation to be native, but not vegetation planted in a plantation or planted with commercial intent.

A works approval application which included a native vegetation clearing permit (as required under Part V of the EP Act) was submitted to the DER on 23 June 2016. The proposed project was not referred to the Commonwealth Department of Environment or the Environmental Protection Authority as any potential impacts relating to vegetation clearing could be managed under Part V of the EP Act.

Key Finding: The Delegated Officer has reviewed the information regarding the application for clearing and has found:

1. *No conservation significant or other significant flora taxa were recorded from the project area.*
2. *The entirety of the project area has been previously cleared/modified, and therefore provides low to no habitat value for any fauna species*

Clearing description

The applicant proposes to clear 1.17 hectares (ha) on Lot 12 on Deposited Plan 39572, Kwinana Beach for the purpose of building the LHPP.

The application initially involved the clearing of 4.8 ha of native vegetation, however, the applicant advised DER on 22 July 2016 that 3.63 hectares of the proposed clearing will be cleared in accordance with clearing exemptions under Regulation 5, item 1 and Regulation 5, item 12 of the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*.

The environmental impacts for the clearing of the 1.17 ha of native vegetation were assessed in accordance with DER's Regulatory Principles taking into consideration the clearing principles contained in Schedule 5 of the EP Act. The proposed clearing is unlikely to cause environmental harm and therefore authorised.

A copy of the DER Clearing Assessment Report dated 17 August 2016 is included in this Decision Report as Appendix 3.

6. Consultation

The application was advertised in *The West Australian* newspaper on 18 July 2016 seeking comments. There were no submissions received by DER during the consultation period.

In consideration of the distance to the nearest dwelling (2.35 km), the Delegated Officer did not identify any direct interest stakeholders in proximity to the proposal. The Delegated Officer identified three direct interest public authorities. The application was referred to the Water Corporation and the EPA in relation to the proposed discharge to the SDOOL. It was also referred to the City of Kwinana in relation to planning approvals. Refer to Table 8 for a summary of responses and the Delegated Officer's considerations.

Table 8: Direct interest stakeholder submissions and Delegated Officer consideration

Comments	Delegated Officer consideration
WATER CORPORATION	
The initial assessment based on preliminary modelling and considerations of loading and dilutions of the Tianqi proposal suggests there are no major concerns with the discharge quality in regards to SDOOL discharge meeting ANZECC guideline criteria as per Ministerial Statement 665.	<p>The Delegated Officer noted Water Corporation's advice that:</p> <ul style="list-style-type: none"> • it has done preliminary modelling and consideration of dilutions and does not have a major concern with discharge quality against ANZECC guidelines as per Ministerial Statement No. 665; • the Applicant will need to enter into an Effluent Services Agreement with Water Corporation, particularly relating to a SDOOL Monitoring and Management Plan; • The Applicant will need contingency for SDOOL unavailability and wastewater discharge quality issues; • Discharge to SDOOL is subject to referral to the EPA under Part IV of the EP Act.
Tianqi's wastewater will be subject to them entering into an Effluent Services Agreement (ESA) with Water Corporation pertaining to participant responsibilities for the SDOOL Monitoring and Management Plan and will require them to undertake sampling of their discharge (quarterly or as requested) and establish on-line monitoring of pH, conductivity, turbidity and temperature,	
Either through ESA or this DER licence, Tianqi will need to commit to liaising closely with Water Corporation if their discharge quality or on-line data exceeds specifications and to have a contingency plan for wastewater management in the event that SDOOL is unavailable.	
Tianqi's access to SDOOL remains subject to Water Corporation and Tianqi reaching agreement on an executing an ESA.	
The final step in approving the Tianqi proposal is endorsement by OEPA.	
ENVIRONMENTAL PROTECTION AUTHORITY	
<p>Appendix D Item 1.2 Scope of Report states – 'this report does not consider the impacts of wastewater discharged to the ocean from the SDOOL, or approval requirements associated with this disposal strategy.</p> <p>It is unclear if Water Corporation has been consulted by TLA with respect to the disposal of its wastewater via the SDOOL. There is no discussion as to whether this wastewater when combined in the SDOOL will meet Water Corporation's outfall requirements as detailed in Statement 665.</p>	<p>The Delegated Officer noted advice regarding condition 8 of Ministerial Statement 665 that requires a proposal to discharge to the SDOOL to be referred to EPA to determine if it will be assessed as a significant proposal.</p> <p>The works approval is not able to authorise works or emissions associated with discharges to SDOOL until the relevant referral has been made to the EPA under Part IV of the EP Act.</p>
<p>The implementation of Water Corporation's ocean outfall is authorised by Statement 665 published in 2004. Statement 665 places requirements on Water Corporation with respect to the acceptance of wastewater into the SDOOL in particular –</p> <p>“Condition 8 New Discharges and Changes to Industrial Wastewater Discharge</p> <p><i>8-1 The proponent shall not accept industrial effluent from industries not specified in schedule 1 unless a proposal has been referred to the Environmental Protection Authority.”</i></p>	
<p>In the first instance, TLA should consult Water Corporation to determine if it is able to accept the wastewater and continue to meet the outfall requirements of the SDOOL. Condition 8 requires the proposal to be referred to the Environmental Protection Authority which will determine if the proposal will be assessed as a significant proposal under Part IV of the <i>Environmental Protection Act 1986</i>.</p>	
CITY OF KWINANA	
<p>The proposal is subject to approval under the City's Town Planning Scheme and an application is currently with the City for assessment. The proposal is consistent with the provisions of the City's Town Planning Scheme No. 2 and it is likely that conditions regarding waste management, noise management, dust management and storm water management will be placed on the approval.</p>	<p>The Delegated Officer noted the comments and will have regard to DER's <i>Guidance Statement: Land use planning</i> in determining the application. This applies to both decision making by the City of Kwinana and South West Metropolitan Development Assessment Panel.</p> <p>Consistent with that guidance statement, the works approval will not be granted until relevant planning decisions are made.</p>
<p>The development is subject to approval by the South West Metropolitan Development Assessment Panel and the City will be providing a Responsible Authority Report to the JDAP by the 11 August.</p>	

7. Location and Siting

7.1 Siting Context

The LHPP is to be located on the Swan Coastal Plain in the suburb of Kwinana Beach in the City of Kwinana. The premises is zoned 'general industry' and is within the Kwinana Industrial Area (KIA). It is surrounded by other industrial land uses, with the nearest non-industrial receptor being the commercial Kwinana Motorplex premises approximately 700 m east.

The premises is approximately 1.2 km from Cockburn Sound. It is within Area A of the Kwinana EPP, i.e. the area of land on which heavy industry is located.

A project location figure is in Appendix 5 for reference.

7.2 Residential and Sensitive Premises

The distance to residential and sensitive receptors is as follows:

Table 9: Receptors and distance from prescribed activity

Residential and Sensitive Premises	Distance from Prescribed Activity
Nearest residential premises	The suburb of Medina. Closest dwelling is 2.35 km south-east (Refer to project location figure in Appendix 5)

7.3 Specified Ecosystems

Table 10: Specified ecosystems

Specified ecosystems	Distance from Prescribed Premises
Wetlands of International Significance <ul style="list-style-type: none"> Forrestdale and Thomsons Lakes 	Approx. 7.3 km northeast
Wetlands of national and regional significance <ul style="list-style-type: none"> Spectacles North 	Approx. 4.8 km east
Geomorphic Wetlands <ul style="list-style-type: none"> Six conservation category Nine resource enhancement or multiple use 	<ul style="list-style-type: none"> 1 km north-east 1.7 km south 1.9 km north-east 2 km north-east 2.2 km north 2.4 km northeast 2.7 km south-east 3 km south-east 3 km south 3.4 km south 3.8 km south-east 4 km south-east 4.3 km north 4.6 km south 4.7 km east

7.4 Groundwater and water sources

Table 11: Groundwater and water sources

Groundwater and water sources	Distance from Premises	Environmental Value
Cockburn Sound	Approx. 1.2 km west	<p>The environmental value of Cockburn Sound is described in the <i>State Environmental (Cockburn Sound) Policy 2005</i>.</p> <p><i>“It is highly valued by the community for its ecological and recreational values and is home to a vital part of the State’s economy. The Government of Western Australia is conscious of the need to protect the intrinsic values of the Sound, including it’s ecological, social, economic, scientific, educational, cultural, recreational and aesthetic values.”</i></p>
Groundwater ¹	<p>Groundwater encountered at 6m relative to ground level or 1m relative to AHD.</p> <p>Estimates may fluctuate between 0.5 m and 3m due to seasonal variation and tidal variation/influence.</p> <p>Groundwater contours indicate flow direction conservatively east to west towards Cockburn Sound.</p>	<p>Groundwater salinity (in TDS) is between 1500 and 3000 mg/L and considered brackish.</p> <p>The site is within the Kwinana Industrial Area which is described as unsuitable for domestic garden bores.</p> <p>There are no sensitive groundwater resources on or near the premises. Water is not used for potable use.</p>

Note 1: Groundwater information sourced from the Perth Groundwater Atlas (www.water.wa.gov.au)

7.5 Soil Type

The Perth Groundwater Atlas (www.water.gov.au) states that the surface geology type for the premises is ‘*Safety Bay Sand: Aeolian and beach lime sand*. DER’s GIS soils database described localised soils that include the premises as follows:

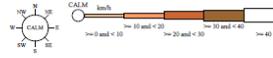
“Undulating dune landscape underlain by aeolianite which is frequently exposed; small swales of estuarine deposits are included: chief soils are siliceous sands with smaller areas of brown sands and leached sands in the wetter sites.”

7.6 Meteorology

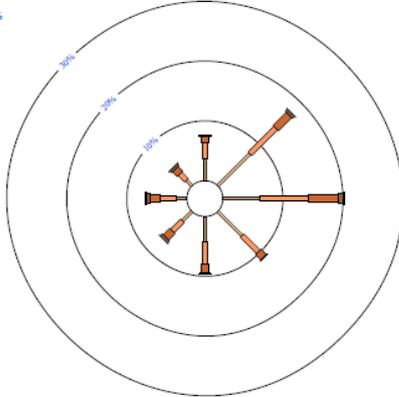
The Bureau of Meteorology provides the following wind roses for wind direction versus wind strength (9am and 3pm - 29 Mar 1942 to 28 Apr 1992) for Perth below.

Rose of Wind direction versus Wind speed in km/h (29 Mar 1942 to 28 Apr 1992)
 Custom times selected, refer to attached note for details
PERTH REGIONAL OFFICE
 Site No: 050634 • Opened Jan 1974 • Closed Apr 1992 • Latitude: -31.9599° • Longitude: 115.8697° • Elevation 19m
 An asterisk (*) indicates that calm is less than 0.5%.
 Other important info about this analysis is available in the accompanying notes.

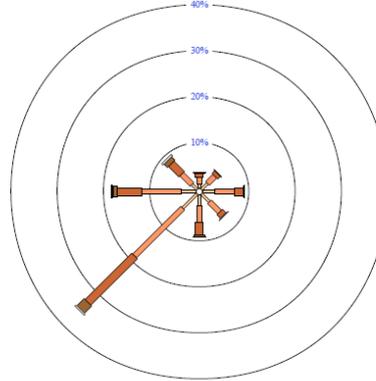
Rose of Wind direction versus Wind speed in km/h (29 Mar 1942 to 28 Apr 1992)
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 An asterisk (*) indicates that calm is less than 0.5%.
 Other important info about this analysis is available in the accompanying notes.



9 am
 18100 Total Observations
 Calm 1.5%

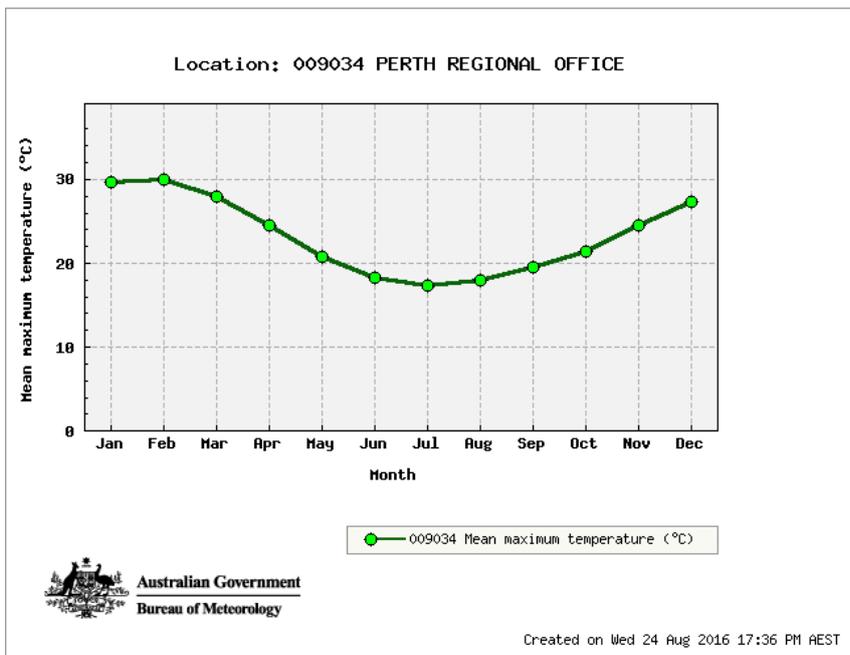
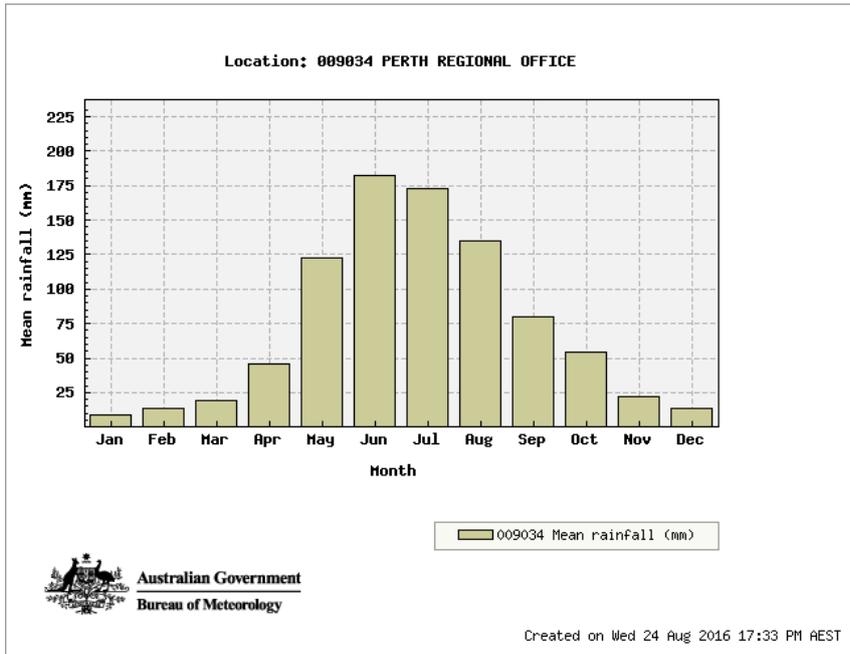


3 pm
 18099 Total Observations
 Calm 3%



7.6.1 Regional climatic aspects

Perth has a mixture of climates, with mild winters and hot, dry summers. The summer months are hot with an average temperature of 29 °C during the day, and 17 °C at night. The warm summer days are cooled down in the afternoon with the "Fremantle Doctor", a strong sea breeze that blows in from the ocean. This wind blows away the hot air trapped above the Perth Metropolitan Area and the Darling Ranges. The winter months in Perth are from June to August and are mild, with an average temperature of 18 °C during the day, and 9 °C at night. The wettest month of the year is July, with an average yearly rainfall around 880mm. The Bureau of Meteorology provides the average yearly mean rainfall and maximum temperature for the Perth below.



8. Specialist Technical Advice

8.1 Noise Modelling

The potential noise and vibration impacts for both construction and operation stages have been assessed by GHD Pty Ltd (GHD) using a point-source formula desktop assessment (construction) and acoustic modelling (operation) using Computer-Aided Noise Abatement (Cadena) which is based on the CONCAWE algorithm. The nearest noise sensitive premises are the residences in Medina, which are approximately 2350m away from the proposed project.

8.1.1 Construction

The proposed construction work will involve civil excavation and earthworks, building construction, equipment fabrication and installation, waste removal and materials transfer.

GHD proposed several noise mitigation measures, with proposed construction work planned to be carried out during daytime hours only.

8.1.2 Operation

Noise sources resulting from the operation of the LHPP are fans, stacks, burners, ball mills, generators, crusher, centrifuges, boiler, compressors, trucks, forklifts, etc.

Noise modelling has demonstrated that predicted noise levels for the LHPP during normal operations under neutral meteorological conditions (LA₁₀ noise level of 10dBA) and worst case meteorological conditions (LA₁₀ noise level of 14dBA) are well below the night assigned LA₁₀ noise level of 35 dBA at the closest noise sensitive receptors at Medina. Cumulative impacts have also been considered in the *Applicant Noise Assessment*.

GHD proposed several noise mitigation measures to be incorporated in the design of the project, such as selecting equipment and plant items to limit noise emissions, purposely building acoustic enclosures for noisier items, and constructing buildings for the spodumene delivery, spodumene stockpile, product bagging, product handling and residue.

8.1.3 DER Noise Section technical review

The *Applicant Noise Assessment* provided as part of the Application was reviewed by DER's Noise Regulation Branch.

The Noise Regulation Branch concluded that the facility is unlikely to cause any breaches of the Noise Regulations due to the large buffer distance and the size of the operation. It can be supported that construction and operational noise from the proposed project will comply with the Noise Regulations.

As the predicted operation noise level is well below the assigned noise level at Medina, it can be concluded that noise from the proposed project will not make a significant contribution to the cumulative noise emission levels from Kwinana Industrial Area (KIA) and will meet the assigned noise level at the boundary with its neighboring industrial premises.

DER's internal technical reviews identified an inconsistency in the location and stack height of the acid-roast kiln stack. As a consequence, the Applicant advised DER of the following in an email dated 8 August 2016:

- The location of the acid kiln fan stack is incorrect in the noise report; the actual impact on the noise modelling of the slightly different location will be negligible;
- The stack height of the acid-roast kiln stack in the noise report is incorrect; it should be modelled as 27m, not 60m. The effect of the stack being lower than the modelled height will be negligible on the predicted noise levels.

These claims were reviewed by DER's Noise Branch who advised that:

- The project has a large buffer to the noise sensitive premises, with the nearest residences approximately 2350m away at Medina. As such, the slight differences in equipment locations on site do not make any noticeable differences to the modelled noise levels at such a distance;
- Noise from the acid-roast kiln fan stack should be slightly lower at Medina if the modelled source height is reduced from 60m to 27m;
- The acid roast kiln fan and its stack are not considered as the major noise sources, in terms of their noise power levels. Hence the difference of the stack height will not make

any noticeable contribution to the overall predicted noise levels from the proposed project at Medina.

8.2 Ambient air modelling

Air dispersion modelling was undertaken using AUSPLUME (v 6.0), a Gaussian plume dispersion model suitable for predicting concentrations at ground emissions. All emissions were modelled as continuous stack sources. Meteorological data for this assessment was taken from the Hope Valley 1995 meteorological file, previously used for assessments in the area. This data is considered a suitably representative meteorological data set for this assessment and was used in the redetermination of the maximum permissible quantities of sulphur dioxide under the Kwinana EPP. Only one scenario was considered for this assessment, which was the LHPP operating continuously with a constant emission rate. The model developed for this assessment was based on the project layout of the LHPP as provided by MSP Engineering.

The closest sensitive receptors are residences located in the Medina locality, with the closest sensitive receptor (2350m) to the LHPP boundary used in the assessment.

Impact contributions of combustion gases and dust emissions from the proposed facility were predicted using dispersion modelling at receptor locations (facility boundaries and nearest residential area). Cumulative impacts were estimated by adding a background level to the contributions of the proposal for some, but not all relevant standards.

Background levels used for modelling assessment by the Applicant were:

- Nitrogen dioxide (1-hr): 41 $\mu\text{g}/\text{m}^3$
- Carbon monoxide (8-hr): 458 $\mu\text{g}/\text{m}^3$
- Sulphur dioxide (1-hr): 39 $\mu\text{g}/\text{m}^3$
- Sulphur dioxide (24-hr): 7.9 $\mu\text{g}/\text{m}^3$
- Particles as PM_{10} (24-hr): 20.7 $\mu\text{g}/\text{m}^3$

The most significant air quality impact is expected to result from nitrogen oxides generated by the natural gas-fired kilns used in the heat treatments. Some shortcomings in the modelling and reporting were identified. These shortcomings were not of sufficient magnitude to affect the conclusion that predicted impacts of the proposal are low compared to relevant standards. Standards used for the assessment were the Victorian SEPP and NEPM Ambient Air standards. Although the Kwinana EPP ambient standards were referred to as being relevant, these were not used by the proponent for impact assessment.

The reported SO_2 emission rate for the proposal is low compared to major emitters in the area. The Delegated Officer is of the view that this low level of emissions does not warrant triggering a redetermination of the maximum permissible quantities for the Kwinana EPP. However, these emissions will need to be included in the Kwinana EPP at the next redetermination.

It is to be noted that background concentrations contributed to the majority of modelled ground level concentrations, particularly in the case of particulates and nitrogen dioxide. Based on the provided emission figures and concentration predictions, the contributions of the proposal to impacts at Medina residential area appear to be low; approximately 5% or less of the relevant standards. Modelled predicted ground level concentrations in comparison to criteria are summarised in Table 12, Table 13, Table 14 and Table 15.

Table 12: Predicted maximum and 99.9th percentile concentrations for NO₂

Receptor	1-hour 99.9 th %ile (µg/m ³)	% of criteria	1-hour max (µg/m ³)	% of criteria
Criteria (µg/m ³)	190 (SEPP-AQM)		247 (Air NEPM)	
Medina	48	25%	54	22%
North boundary	61	32%	65	26%
East boundary	63	33%	64	26%
South boundary	66	35%	67	27%
West boundary	64	34%	67	27%
Model domain	72	38%	74	30%

Table 13: Predicted maximum and 99.9th percentile for SO₂

Receptor	1-hour 99.9 th %ile (µg/m ³)	% of criteria	1-hour max (µg/m ³)	% of criteria	24-hour max (µg/m ³)	% of criteria
Criteria (µg/m ³)	450 (SEPP-AQM)		572 (Air NEPM)		229 (Air NEPM)	
Medina	46	10%	54	9.40%	2	0.90%
North boundary	60	13%	62	11%	12.6	5.50%
East boundary	62	14%	63	11%	11.8	5.20%
South boundary	68	15%	68	12%	9.8	4.30%
West boundary	64	14%	66	12%	11.9	5.20%
Model domain	75	17%	77	13%	17.5	7.60%

Table 14: Predicted maximum and 99.9th percentile concentrations for CO

Receptor	1-hour 99.9 th %ile (µg/m ³)	% of criteria	8-hour max (µg/m ³)	% of criteria
Criteria (µg/m ³)	29,000 (SEPP-AQM)		11,254 (Air NEPM)	
Medina	471	1.60%	464	4.10%
North boundary	493	1.70%	483	4.30%
East boundary	497	1.70%	492	4.40%
South boundary	509	1.80%	491	4.40%
West boundary	502	1.70%	487	4.30%
Model domain	524	1.80%	502	4.50%

Table 15: Predicted maximum and 99.9th percentile concentrations for PM₁₀

Receptor	1-hour 99.9 th %ile (µg/m ³)	% of criteria	24-hour max (µg/m ³)	% of criteria
Criteria (µg/m ³)	80 (SEPP-AQM)		50 (Air NEPM)	
Medina	20.9	26%	20.8	42%
North boundary	21.4	27%	21.1	42%
East boundary	21.5	27%	21	42%
South boundary	21.5	27%	21	42%
West boundary	21.6	27%	21	42%
Model domain	21.7	27%	21.3	43%

8.2.2 Construction emissions

Potential air quality impacts during construction and site establishment will be emissions from heavy vehicle exhausts, and dust generation from heavy equipment during earthworks, wind erosion from disturbed soil surfaces, waste removal, and materials transfer.

8.2.3 Operational emissions

Emissions from the LHPP consist of products of combustion from burning natural gas: nitrogen dioxide (NO₂), sulphur dioxide (SO₂) and carbon monoxide (CO). Particulate matter (as PM₁₀) is produced from the calcining of spodumene. The key emission sources during operation are listed below:

- Calciner stack;
- Acid roast kiln stack;
- Acid roast scrubber;
- Spodumene mill stack;
- Steam generator;
- Sodium sulphate stack; and
- Spodumene transport, delivery and storage.

Dispersion modelling of the LHPP emissions as provided in the *Applicant Air Assessment* demonstrates compliance with the relevant air quality criteria for all sensitive residential receptors. It was concluded, based on this assessment that emissions from the proposed LHPP are unlikely to impact on sensitive residential receptors in proximity to the plant.

8.2.4 DER review

Technical advice from DER's Air Quality Section (AQS) concluded that although there were some shortcomings in the modelling and reporting, they were not of sufficient magnitude to affect the conclusion that the predicted impacts of NO₂, SO₂, CO and PM₁₀ were low compared to relevant standards.

The model predicted SO₂ concentrations at Medina and the premises boundary were not compared against the Kwinana EPP Area C limits. However, 1 hour and 24-hour SO₂ contributions from the LHPP have been assessed as low (around 5% of the EPP limits or less at the nearest Kwinana EPP Areas A and C receptors).

The SO₂ emission rates were low compared to major emitters in the area and do not warrant triggering a redetermination of the maximum permissible quantities of the Kwinana EPP. It should be noted that the emissions will need to be included in the next Kwinana EPP redetermination.

Pollutants of concern considered by the consultant are SO₂, NO₂, CO and particulates as PM₁₀. Other pollutants emitted at trace levels or other atmospheric processes (e.g. particles associated with organic compounds, semi-volatile species, transient species, complex mixtures, etc.) may contribute to cumulative concentrations and impacts in the regional airshed.

8.3 Contaminated Sites

As part of the assessment process, the *Contaminated Site Baseline Assessment* prepared by Golder Associates as part of the Application was reviewed by DER's Contaminated Sites technical experts.

The proposed development footprint for the LHPP includes a portion of the limestone capped area on the eastern portion of the site which will be developed to include a truck parking area, product container loading area, and a product container handling area. Contaminated Sites

advises that all works should be carried out in accordance with the provisions of the document "Site Contamination Management Plan Capping Area (Golder Associates, November 2003)".

The review found that the provisions outlined in section 13 of Golder Associates report, while generally acceptable, were not sufficiently detailed to provide a comprehensive assessment of baseline groundwater quality. Given the location of the LHPP within the Kwinana industrial area and the presence of a number of nearby potential sources of groundwater contamination, it is recommended that a baseline groundwater quality investigation is carried out to assess the condition of groundwater at the site prior to the development of the proposed LHPP.

The objectives of the baseline groundwater assessment would be:

- to identify any pre-existing groundwater contamination, if present, that may require ongoing monitoring or management; and
- to establish pre-construction concentration ranges for potential contaminants, so as to inform the adoption of appropriate concentration limits applicable to conditions on groundwater monitoring under the operating licence for the proposed LHPP.

It is envisaged that more than three monitoring bores would be required to provide for the appropriate characterisation of groundwater quality and flow characteristics prior to development. The groundwater is recommended to be analysed for the 'full suite of analytes' referred to in section 13 of the Golder Associates report which includes all suspected potential historical contaminants, as well as potential contaminants anticipated to be present under the site's proposed use as a lithium hydroxide processing plant.

This advice is considered in the context of the risk assessment of emissions in section 9 in order to determine whether the risk of groundwater impacts warrants regulatory controls for groundwater monitoring.

9. Risk Assessment

9.1 Emission, pathway, receptor identification

Identification of key potential emissions, pathways, receptors and impacts are set out in Table 16 below. Table 16 also identifies which potential emissions and impacts will be progressed to a full risk assessment. Some potential emissions/impacts may not receive a full risk assessment if a potential receptor or pathway cannot be identified.

Table 16: Identification of key emissions

		Potential Emissions	Potential Receptors	Potential Pathway	Potential Impacts	Continued to detailed risk assessment?	Reasoning
Construction							
Source (see 4.2 for infrastructure references)	Earthworks and construction activities during construction phase	Civil earthworks, wind erosion from disturbed soil surfaces, vehicle movements and infrastructure construction	Fugitive dust	Closest dwelling 2.35 km south-east in Medina.	Air / wind dispersion	Amenity	Yes
		Civil excavation/earthworks, building construction, equipment fabrication/installation, waste removal and construction materials transfer	Noise				
Operation							
Source (see 4.2 for infrastructure references)	Raw material receipt, storage and handling (operation)	Transport of raw materials within premises	Fugitive dust	Closest dwelling 2.35 km south-east in Medina.	Air / wind dispersion	Public health impacts and amenity	Yes
			Noise			Public amenity	Yes
	Receipt and stockpiling of spodumene feed material and limestone	Fugitive dust	Closest dwelling 2.35 km south-east in Medina.	Air / wind dispersion	Public health impacts and amenity	Yes	
		Noise			Public amenity	Yes	
Processing and refining	Processing and refining of materials including transfer	Gaseous emissions (point source)	Closest dwelling 2.35 km south-east in Medina.	Air / wind dispersion	Public health impacts and amenity	Yes	

of ore concentrate (operation)	through the process	Fugitive dust			Public health impacts and amenity	Yes	
		Noise			Amenity	Yes	
		Odour			Amenity	No	Nature of raw materials, product, waste by-products, wastewater, and air emissions means that sources of odour emissions are not expected.
		Process water leaks, spills, overflows, containment ruptures including stormwater contamination	Groundwater, potential hydraulic link to marine environment (Cockburn Sound)	Discharge to land and infiltration to groundwater. Groundwater hydraulic link to Cockburn Sound	Groundwater pollution. Contamination of infiltrated stormwater. Marine ecosystem impacts	Yes	
Product and waste by-product storage and handling (operation)	Lithium hydroxide bagging, handling and storage	Fugitive dust	Closest dwelling 2.35 km south-east in Medina.	Air / wind dispersion	Public health impacts and amenity	Yes	
		Noise			Amenity	Yes	
	TAS and gypsum waste by-product storage and handling	Fugitive dust	Closest dwelling 2.35 km south-east in Medina.	Air / wind dispersion	Public health impacts and amenity	Yes	
		Noise			Amenity	Yes	
Chemical storage (operation)	Storage of concentrated sulphuric acid, caustic soda and soda ash (solid)	Breach of containment causing discharge to land or stormwater contamination	Groundwater, potential hydraulic link to the marine environment (Cockburn Sound) approx. 1.3 km west	Discharge to land and infiltration to groundwater. Groundwater hydraulic link to Cockburn Sound	Groundwater pollution. Contamination of infiltrated stormwater. Marine ecosystem impacts	Yes	
					Yes		
Wastewater Storage and discharge (operation)	Discharge of wastewater to SDOOL	Direct discharge into SDOOL which discharges to Sepia Depression	Sepia Depression (Cockburn Sound)	Direct discharge	Marine ecosystem impacts on Cockburn Sound	No	The discharge will be assessed by the Water Corporation under MS665 and referred to the EPA.

			Rupture of pipes / overtopping of holding tanks resulting in discharge to land or stormwater contamination	Groundwater, potential hydraulic link to marine environment (Cockburn Sound)	Discharge to land and infiltration to groundwater. Groundwater hydraulic link to Cockburn Sound	Groundwater pollution. Contamination of infiltrated stormwater. Marine ecosystem impacts	Yes	
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9.2 Risk Criteria

During the assessment, the risk criteria in Table 17 below will be applied to determine a risk rating set out in section 9.10.

Table 17: Risk Criteria

Likelihood	Consequence				
	Insignificant	Minor	Moderate	Major	Severe
Almost Certain	Moderate	High	High	Extreme	Extreme
Likely	Moderate	Moderate	High	High	Extreme
Possible	Low	Moderate	Moderate	High	Extreme
Unlikely	Low	Moderate	Moderate	Moderate	High
Rare	Low	Low	Moderate	Moderate	High

Likelihood		Consequence		
The following criteria has been used to determine the likelihood of the risk / opportunity occurring.		The following criteria has been used to determine the consequences of a risk occurring:		
			Public Health	Ecosystem/ Environmental
Almost Certain	The event is expected to occur in most circumstances	Severe	<ul style="list-style-type: none"> Loss of life Exposure to hazard with permanent prolonged adverse health effects expected to large population Health criteria is significantly exceeded 	<ul style="list-style-type: none"> Irreversible impact to significant high value or sensitive ecosystem expected Irreversible and significant impact on a wide scale Total loss of a threatened species expected Ecosystem criteria is significantly exceeded
Likely	The event will probably occur in most circumstances	Major	<ul style="list-style-type: none"> Exposure to hazard with permanent prolonged adverse health effects expected to small population Significant impact to amenity for extended periods expected to large population Health criteria is exceeded 	<ul style="list-style-type: none"> Long-term impact to significant high value or sensitive ecosystem expected Long-term impact on a wide scale Adverse impact to a listed species expected Ecosystem criteria is exceeded
Possible	The event could occur at some time	Moderate	<ul style="list-style-type: none"> Exposure to hazard with short-term adverse health effects expected requiring treatment Impact to amenity expected for short periods to large population Health criteria is at risk of not being met 	<ul style="list-style-type: none"> Minor and short-term impact to high value or sensitive ecosystem expected Off-site impacts at a local scale Ecosystem criteria is at risk of not being met
Unlikely	The event is unlikely to occur	Minor	<ul style="list-style-type: none"> Exposure to hazard with short-term adverse health effects expected Impact to amenity expected for short periods to small population Health criteria are likely to be met 	<ul style="list-style-type: none"> Moderate to minor impact to ecosystem component (physical, chemical or biological) Minor off-site impacts at a local scale Ecosystem criteria are likely to be met
Rare	The event may only occur in exceptional circumstances	Insignificant	<ul style="list-style-type: none"> No detectable impacts to health No detectable impacts to amenity Health criteria met 	<ul style="list-style-type: none"> None or insignificant impact to ecosystem component (physical, chemical or biological) expected with no effect on ecosystem function Ecosystem criteria met

9.3 Risk Treatment

DER will treat risks in accordance with the Risk Treatment Matrix below:

Table 18: Risk Treatment

Risk Rating	Acceptability	Treatment
Extreme	Unacceptable.	Risks will not be tolerated. DER will refuse proposals.
High	Acceptable subject to primary and secondary controls.	Risks will be subject to multiple regulatory controls including primary and secondary controls. This will include both outcome-based and management conditions.
Moderate	Acceptable, generally subject to primary controls.	Risks will be subject to regulatory controls with a preference for outcome-based conditions where practical and appropriate.
Low	Acceptable, generally not requiring controls beyond the Applicant's controls.	Risks are acceptable and will generally not be subject to regulatory controls.

The emission types have been identified with the pathways and receptors in Table 16 below.

9.4 Risk of Gaseous Emissions Impact Analysis (Operation)

9.4.1 General Hazard Characterisation and Impact

The *Applicant Air Assessment* notes that emissions from the LHPP consist of products of combustion from burning natural gas (NO₂, SO₂, CO) and particulate matter (as PM₁₀) resulting from the calcining of spodumene. Table 19 contains data extracted from the *Applicant Air Assessment* used by the Applicant for model input.

Table 19: Gaseous emission point sources and emission rates

Sources	Parameters			
	NO2 (g/s)	SO2 (g/s)	CO (g/s)	Particulates as PM10 (g/s)
Calciner	4.46	3.72	7.44	0.1115
Acid Roast Kiln	1.89	1.57	3.15	-
Acid Roast Scrubber	0.06	0.25	-	0.0038
Spodumene Mill	-	-	-	0.059
Acid Leach	-	-	-	-
Steam Generator	0.63	0.87	1.74	-
Sodium Sulphate	0.05	0.07	-	0.0021

Combustion gases (NO_x, SO_x and CO) are emitted from the calciner stack, acid roast kiln stack, acid roast scrubber, steam generator, and sodium sulphate stack. These are common pollutants produced by industrial processes and motor vehicles as a result of fuel combustion. The ratio and rate of combustion gases produced are dependent on fuel type and combustion efficiency. Both short-term exposure and long-term exposure to increased levels of NO_x and SO₂ may cause respiratory irritation and problems, particularly for people with asthma. Exposure to CO at high concentrations for short periods may affect the amount of oxygen in the bloodstream, which may lead to fatigue and dizziness.

Particulate matter may be emitted from the calciner stack, acid roast scrubber, spodumene mill, and sodium sulphate stack. Particulate matter has the potential to impact public health and affects the respiratory and cardiovascular systems following both long and short term exposures. Long-term repeated exposure is more detrimental than sporadic short-term exposure, the most severe effects being reduced life expectancy due to long term exposure. Particulate matter up to PM₁₀ poses greater health risks as it may be drawn deep into the lungs, while larger particulates are typically trapped in the nose, mouth or throat. In addition to particle size, the health impacts of particulate matter are influenced by the chemical composition of the particles, the mass concentration of airborne particles and duration of exposure.

9.4.2 Criteria for Assessment

The assessment criteria for combustion gases and ambient air quality standards are detailed in the NEPM and are shown in Table 20.

Table 20: NEPM standards

Pollutant	Averaging period	Maximum concentration (µg/m ³)
NO ₂	1-hour	247
	Annual	62
CO	8-hour	11,254
SO ₂	1-hour	572
	24-hours	229
	Annual	57
Particulates as PM ₁₀	24-hours	50
	Annual	25

The Premises is within Area A of the Kwinana EPP, and the nearest receptor (dwelling in Medina) is within Area B of the Kwinana EPP. The Kwinana EPP sets assessment criteria for total suspended particulates and SO₂ that are summarised in Table 21.

Table 21: Kwinana ambient air quality standards and limits for TSP and SO₂

Area	TSP standard (µg/m ³)	TSP limit (µg/m ³)	SO ₂ standard (µg/m ³)	SO ₂ limit (µg/m ³)	Averaging period
Policy Area	-	1000	-	-	15-minutes
A	-	-	700	1400	1-hour
	150	260	200	365	24-hours

Area	TSP standard ($\mu\text{g}/\text{m}^3$)	TSP limit ($\mu\text{g}/\text{m}^3$)	SO ₂ standard ($\mu\text{g}/\text{m}^3$)	SO ₂ limit ($\mu\text{g}/\text{m}^3$)	Averaging period
B	-	-	500	1000	1-hour
	90	260	150	200	24-hours
C	-	-	350	700	1-hour
	90	150	125	200	24-hours

9.4.3 Assessment of Applicant Controls

Table 22 contains a summary of point source emission sources and their corresponding emissions points, pollution abatement devices (if proposed) and respective controls.

Table 22: Air emission source pollution equipment and controls

Source / Emission Point	Stack height (m)	Pollution Abatement Device	Description / Controls
Calcliner stack	34.6	Baghouse filter	<p>Baghouse filter with excess capacity to allow isolation of broken bag chamber and continual operation.</p> <p>Broken bag detection system.</p> <p>Baghouse filter dust fed back to the calciner.</p> <p>Enclosed system feeding calcined spodumene to the spodumene ball mill.</p> <p>Sulphur dioxide emissions minimised by the low sulphur content of spodumene.</p>
Spodumene Mill stack	25	Baghouse filter	Baghouse filter dust fed back into milled product bin.
Acid Roast Kiln stack	27	None	Indirect natural gas fired kiln, meaning inner tube holds the product and outer tube heats the inner tube so that only products of gas combustion are emitted.
Acid Roast Scrubber stack	24	Off-gas scrubber train	<p>Both ends of the acid-roast kiln are sealed, with fugitive acid fumes extracted for treatment.</p> <p>Venturi scrubber, entrainment separator and wet electrostatic precipitator ($\text{H}_2\text{SO}_4 < 20 \text{ ppm}$, $\text{PM}_{10} < 50 \mu\text{g}/\text{m}^3$).</p> <p>Pressurised emergency water quench vessel.</p> <p>Dust/standby pumps for all duties.</p>
Acid Leach stack	20	None	Slurry collected in a slurry tank from the acid roasting kiln and slurry goes through a leach circuit. The process is enclosed.
Steam Generator	23	None	Products of natural gas combustion.
Sodium Sulphate	25	Wet scrubber	<p>Three stage evaporation, crystallisation, and solution process to create LiOH crystals.</p> <p>The process is enclosed with condensate reused within the process.</p> <p>Sodium sulphate within leftover liquid from the crystallisation process is fed to a fluidised bed dryer with a wet scrubber for particulate emissions.</p>

9.4.4 Key Findings

The Delegated Officer has reviewed the information regarding the gaseous emissions to air impacts from the premises and has found:

1. *Air emissions have the potential to impact on health and amenity of a receptor.*
2. *There were some shortcomings in the modelling and reporting identified. These shortcomings were not of sufficient magnitude to affect the conclusion that predicted impacts of the proposal are low compared to relevant standards.*
3. *The process is largely enclosed limiting emissions to products of combustion and/or particulates except for fugitive acid gas fumes from the acid roast kiln seals. Applicant controls are proposed.*
4. *The low level of SO₂ emissions does not warrant triggering a redetermination of the maximum permissible quantities for the Kwinana EPP. However, these emissions will need to be included in the Kwinana EPP at the next redetermination.*
5. *Conditioning of Applicant controls in the works approval will be considered subject to the risk assessment outcomes.*

9.4.5 Consequence

The Delegated Officer considered the following in determining the consequence of gaseous emissions to air:

- The separation to the nearest sensitive receptor;
- The *Applicant Air Assessment* summary and analysis in section 8.2 including predicted ground level concentrations at receptors;
- The hazard characterisation; and
- Applicant controls.

The Delegated Officer considered the consequence to be **Insignificant**.

9.4.6 Likelihood of Consequence

The LHPP is operated 24 hours a day, 7 days a week. Review of the *Applicant Air Assessment* indicates that ground level concentrations at receptors are low (approximately 5% or less of the relevant standards) and are not expected to impact on health or amenity of receptors. The Delegated Officer has determined that the likelihood of an insignificant consequence will occur in most circumstances. Therefore, the Delegated Officer considers the consequence to be **Almost Certain**.

9.4.7 Overall rating

The Delegated Officer has compared the consequence and likelihood ratings described above through the Risk Matrix (Table 17) and determined that the overall rating for the risk of gaseous emissions to air on sensitive receptors during operation is **Moderate**.

9.5 Risk of Fugitive Dust Impact Analysis (Construction)

9.5.1 General Hazard Characterisation and Impact

Fugitive dust emissions can occur during construction from activities such as civil earthworks, wind erosion from disturbed soil surfaces, vehicle movements, and infrastructure construction. The majority of construction will occur between 7am and 7pm Monday to Saturday over an 18

to 24 month period.

Particulate matter has the potential to impact public health and affects the respiratory and cardiovascular systems following both long and short term exposures. Long-term repeated exposure is more detrimental than sporadic short-term exposure. The most severe effect is reduced life expectancy due to long term exposure. Particulate matter of PM₁₀ or less poses greater health risks as they may be drawn deep into the lungs, while larger particulates are typically trapped in the nose, mouth or throat. In addition to particle size, the health impacts of particulate matter are influenced by the chemical composition of the particles, the mass concentration of airborne particles and duration of exposure.

The Applicant stated that PM₁₀ would have a maximum impact in light winds and stable atmospheric conditions. These conditions most frequently occur overnight and very early in the morning and therefore, become significant only if construction operations extend outside typical working hours. Particulate matter greater in size than 10 microns generally impacts on amenity. Amenity impacts are generally higher in high wind conditions.

9.5.2 Criteria for Assessment

Assessment criteria for total suspended particulates (TSP) and PM₁₀ are available in the Kwinana EPP and NEPM. Refer to section 9.4.2.

9.5.3 Assessment of Applicant Controls

The Application states a comprehensive range of mitigation measures for the management of dust emissions will be developed as a part of construction dust management measures. This will form part of the Applicant's yet to be developed Construction Environmental Management Plan.

The *Applicant Air Assessment* listed controls that may be used, but the applicant did not provide any commitment or certainty around implementing these controls.

- All construction and maintenance equipment/vehicles to be operated and maintained to manufacturers' specifications in order to minimise exhaust emissions.
- Defined haul routes to be used wherever it is necessary for vehicles to traverse unsealed surfaces or unformed roads.
- Vehicular speeds would be limited to 25 km/h in areas of unconsolidated or unsealed soil associated with the project.
- Stabilisation of surface silt content through application of localised water sprays, or the use of appropriate chemical dust suppressants (suitable for access roads which are traversed less frequently).
- Control of mechanically induced dust emissions (from clearing, excavation, loading, dumping filling and levelling activities) by application of water sprays.
- Awareness of operational areas more frequently exposed to higher winds and the predominant wind directions in these areas at various times of the year. Temporary wind barriers may be employed where necessary.
- Review of daily weather updates from BoM or a private meteorology service provider, to give warning of likely strong winds to assist with daily management of windblown dust from unconsolidated soil surfaces and material stockpiles.
- All haulage vehicles are to have their loads covered while transporting material to or from the work area through off-site routes that may have sensitive receptors.

9.5.4 Key Findings

The Delegated Officer has reviewed the information regarding the fugitive dust impacts from the premises during construction and has found:

1. *Construction fugitive dust has the potential to impact on the amenity of sensitive receptors. The Applicant was not specific as to proponent control for construction dust.*
2. *Conditioning regulatory controls in the works approval will be considered subject to the risk assessment outcomes.*

9.5.5 Consequence

The nearest sensitive receptor is the suburb of Medina with nearest dwelling in Medina approximately 2.35 km south-east. Construction fugitive dust has the potential to impact on the amenity of a large population for a short period. Therefore, the Delegated Officer considers the consequence of construction dust to be **Moderate**.

9.5.6 Likelihood of Consequence

Construction

The Delegated Officer considered:

- the distance to the nearest sensitive dwelling;
- the Applicant controls; and
- the period over which construction works will occur.

The Delegated Officer has determined that a moderate consequence could occur at some time. Therefore, the Delegated Officer considers the consequence to be **Possible**.

9.5.7 Overall rating

The Delegated Officer has compared the consequence and likelihood ratings described above through the Risk Matrix (Table 17) and determined that the overall rating for the risk of fugitive dust impacts on sensitive receptors during construction is **Moderate**.

9.6 Risk of Fugitive Dust Impact Analysis (Operation)

9.6.1 General Hazard Characterisation and Impact

Activities that may cause fugitive dust emissions during the operation phase of the LHPP include:

- Receipt, storage and handling of raw materials (spodumene, limestone and gypsum); and
- Storage and handling of lithium hydroxide product and by-products (TAS, sodium sulphate, gypsum/limestone).

Particulate matter can impact on human health and amenity as indicated above. In the absence of information in the application to inform the hazard of fugitive dust, publically available Material Safety Data Sheet (MSDS) information was reviewed for spodumene concentrate, lithium hydroxide, aluminosilicate, and sodium sulphate. Hazard descriptions apply to the substance generally unless otherwise specified. The information was considered in the context of the purpose of an MSDS which includes safety precautions for workers, responders, or those who come into direct contact with the substance. An MSDS will address

all potential health impacts including worst case. Human health hazards for these substances can be summarised as follows:

- Lithium hydroxide - hazardous in terms of both potential acute and chronic human health effects. Routes of entry include eye contact, inhalation, and ingestion. The substance is toxic to lungs and mucous membranes. It is hazardous in the case of skin contact (irritant), ingestion, and inhalation. It is soluble in water and highly corrosive (pH 14).
- Spodumene concentrate – Talison Lithium Australia Pty Ltd (LHPP spodumene concentrate feed material) MSDS indicates that it is not hazardous to human health and has no known ecotoxicity.
- Aluminosilicate – a mineral composed of aluminium, silicon, and oxygen plus counter cations such as sodium, potassium or calcium. Can cause respiratory irritation through direct inhalation and skin irritation through direct contact.
- Sodium sulphate – direct exposure through inhalation, ingestion, or skin contact may cause irritation to the respiratory system, digestion system or skin respectively.

There are 38 truck movements per day estimated to be required for the delivery of spodumene concentrate and soda ash, removal of TAS residue and kiln dust, delivery of product and by-product to Fremantle, and other short distance vehicle movements within the KIA (i.e. delivery of sulphuric acid).

9.6.2 Criteria for Assessment

Assessment criteria for total suspended particulates (TSP) and PM₁₀ are available in the Kwinana EPP and the NEPM. Refer to section 9.4.2.

9.6.3 Assessment of Applicant Controls

Table 23: Applicant Controls for Fugitive Dust (operation)

Control	Description
Siting	Location within the Kwinana Industrial Area with 2.35 km separation to nearest dwelling.
Engineering	<ul style="list-style-type: none"> • An enclosed building for unloading and stockpiling spodumene concentrate and limestone feed materials. Truck entry and exit points are fitted with automated roller door systems that are closed during tipping activities. • An enclosed building for stockpiling and loading aluminosilicate (TAS) and neutralisation agent (gypsum/limestone mixture) waste by-products into trucks. Truck entry and exit points are fitted with automated roller door systems that are closed during tipping activities. • Enclosed conveyor system. • An enclosed building for sodium sulphate waste by-product storage. <p>LiOH packaging</p> <ul style="list-style-type: none"> • Fully automated bag filling system to package LiOH into rated product bags. Each bag filling line comprises a loading silo, robotic bag placer, empty bag/reel stack system, weighing system, bag heat sealing system, sampling system, labelling system and conveying system. • Due to caustic nature of material, equipment is located in an enclosed room inside the warehouse which during normal operations; personnel only enter to reload the empty bag reel, obtain sample bags, and routine checking of equipment.

Control	Description
	<ul style="list-style-type: none"> All storage and packaging equipment fully enclosed to prevent contact with CO₂ gas in the atmosphere (source of contamination), and a nitrogen purge of equipment may be employed to assist further. Outside of the LiOH packaging room, a palletising robot will palletise the sealed 25 kg bags onto pallets which are dispensed by a pallet dispensing machine. A plastic wrap turntable will automatically wrap the pallet of 25 kg bags. 450 kg bags are double stacked, via a forklift, onto a pallet and then plastic wrapped by the same plastic wrapping device. Sealed areas within the product warehouse are used for loading of product pallets into sea containers. Electric pallet movers are used for loading of product pallets into sea containers. Sealed areas closed off via electric powered roller doors to prevent ingress of debris into the product warehouse.
Mobile equipment	<ul style="list-style-type: none"> Spodumene will be transported to the site in covered trucks. TAS will be removed from the site in covered trucks.
Procedures / Management	Spodumene will be delivered with an approximate 8% moisture content.

9.6.4 Key Findings

The Delegated Officer has reviewed the information regarding the fugitive dust impacts from the premises during operation and has found:

- Operational fugitive dust risk primarily relates to sources associated with the receipt, stockpiling, and handling of raw materials, product and waste by-products. The key Applicant control measure is process enclosure.*
- Conditioning of Applicant controls in the works approval will be considered subject to the risk assessment outcomes.*

9.6.5 Consequence

The nearest sensitive receptor is the suburb of Medina with the nearest dwelling in Medina approximately 2.35 km south-east. Operational fugitive dust has the potential to impact on the amenity of a large population for a short period and in the case of lithium hydroxide, may present an exposure hazard with short-term adverse health effects. Therefore, the Delegated Officer considers the consequence of operational noise to be **Moderate**.

9.6.6 Likelihood of Consequence

The Delegated Officer considered:

- the distance to the nearest sensitive dwelling;
- the nature of operations (24/7); and
- the Applicant controls.

The Delegated Officer has determined that a Moderate consequence is unlikely to occur, and therefore the consequence to be **Unlikely**.

9.6.7 Overall rating

The Delegated Officer has compared the consequence and likelihood ratings described above through the Risk Matrix (Table 17) and determined that the overall rating for the risk of fugitive dust impacts on sensitive receptors during operation is **Moderate**.

9.7 Risk of Noise Impact Analysis (Construction)

9.7.1 General Hazard Characterisation and Impact

Construction may generate noise and vibration from activities including civil excavation/earthworks, building construction, equipment fabrication/installation, waste removal, and materials transfer. Construction noise emissions would largely occur for the 18 to 24-month estimated construction duration between the hours of 7am to 7pm Monday to Saturday. The Applicant indicated that work outside of these times might occur in relation to special construction tasks or to recover lost time due to project delays. Construction noise has the ability to impact on the amenity of sensitive receptors. Construction vibration has the ability to cause structural damage to properties in close proximity of the LHPP.

The *Applicant Noise Assessment* submitted with the application was summarised in section 8.1 including technical review findings of the predicted noise impacts and assessment of proposed controls. It was concluded that construction noise would comply with the Noise Regulations.

9.7.2 Criteria for Assessment

The Noise Regulations apply to both construction and operation of the LHPP.

Regulation 13 of the Noise Regulations relates to 'construction work' on 'construction sites' where those terms are defined. The sole or principal activity carried out at the premises during the construction phase will be construction work.

9.7.3 Assessment of Applicant Controls

The *Applicant Noise Assessment* details recommended and proposed Applicant controls for noise and vibration during the construction phase and noise during the operational phase as summarised in Table 24 and Table 25 respectively.

Table 24: Applicant controls for construction noise

Control	Description
Siting	Location within the Kwinana Industrial Area with 2.35 km separation to nearest dwelling.
Mobile plant and equipment	Equipment used will be the quietest reasonably available.
Procedures / Management	<ul style="list-style-type: none">Construction to be carried out in accordance with the control of environmental noise practices set out in AS2436-2010 <i>Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites</i>.Construction hours limited to 7am to 7pm Monday to Saturday. Works outside these times would only occur if required for special tasks or to recover lost time due to project delays. Where possible, activities that could result in elevated noise levels will be scheduled during normal construction hours.Construction Environment Management Plan (not provided with application)

Control	Description
	<ul style="list-style-type: none"> Complaints management

9.7.4 Key Findings

The Delegated Officer has reviewed the information regarding the noise impacts from the premises during construction and has found:

- 1. Construction noise has the potential to cause amenity impacts on sensitive receptors and construction vibration has the potential to cause structural damage on adjacent premises.*
- 2. Review of the Applicant Noise Assessment concluded that the construction noise from the proposed LHPP will comply with the Noise Regulations.*
- 3. The Applicant made general statements consistent with regulation 13 of the Noise Regulations, however did not specifically detail how construction work will be in accordance with AS 2436-2010 or the specifications that make construction equipment the quietest reasonably available. The Applicant is required to comply with assigned noise levels in Regulation 7 of the Noise Regulations during construction.*
- 4. Conditioning of Applicant controls in the works approval will be considered subject to the risk assessment outcomes.*

9.7.5 Consequence

The nearest sensitive receptor is the suburb of Medina with the nearest dwelling in Medina approximately 2.35 km south-east. Construction noise has the potential to impact on the amenity of a large population for a short period. Construction vibration has the potential to cause structural damage to neighbouring industrial sites. Therefore, the Delegated Officer considers the consequence of construction noise to be **Moderate**.

9.7.6 Likelihood of Consequence

The Delegated Officer considered:

- the distance to the nearest sensitive dwelling;
- the *Applicant Noise Assessment* summary and analysis in section 8.1; and
- proposed Applicant controls.

The Delegated Officer has determined that the likelihood of a moderate consequence will be unlikely to occur. Therefore, the Delegated Officer considers the consequence to be **Unlikely**.

9.7.7 Overall rating

The Delegated Officer has compared the consequence and likelihood ratings described above through the Risk Matrix (Table 17) and determined that the overall rating for the risk of construction noise emissions on sensitive receptors is **Moderate**.

9.8 Risk of Noise Impact Analysis (Operation)

9.8.1 General Hazard Characterisation and Impact

Operational noise sources identified by the Applicant include:

- Calciner fan
- Calcined spodumene mill
- Steam generator fan
- Calcine oversize crusher
- Limestone mill
- Spodumene delivery
- Product handling building
- Calciner burner
- Pregnant liquor evaporator fan
- Compressed air plant
- Acid leach extraction fan
- Cooling tower fans and pumps
- Spodumene stockpile
- Acid roast kiln fan
- Anhydrous sodium sulphate fan
- Lithium hydroxide crystallizer fans
- Lithium hydroxide bagging fan
- Centrifuges
- Residue building

Operational noise has the ability to impact on the amenity of sensitive receptors.

The *Applicant Noise Assessment* submitted with the application was summarised in section 8.1 including technical review findings of the predicted noise impacts and assessment of proposed controls. It was concluded that operational noise would comply with the Noise Regulations.

9.8.2 Criteria for Assessment

The Noise Regulations apply to both construction and operation of the LHPP.

During the operational phase, the Applicant is required to comply with the specified assigned levels in Regulation 8 of the Noise Regulations.

9.8.3 Assessment of Applicant Controls

Table 25: Applicant controls for operational noise

Control	Description
Siting	Location within the Kwinana Industrial Area with 2.35 km separation to nearest dwelling.
Engineering	<ul style="list-style-type: none"> • Purpose built enclosures provided where required for large plant items in order to achieve noise levels of less than 85 dBA at 1 m, consistent with occupational health and safety requirements. • Selection of equipment and plant items to limit noise emissions. Where practical and feasible, motor drives, gearboxes, pumps, etc. would be specified and selected to achieve a noise level of less than 85 dBA at a distance of 1 m. • Purpose built enclosures for compressors.
Mobile plant and equipment	<ul style="list-style-type: none"> • Selection of plant, equipment and vehicles to limit noise emissions including servicing and fitment of mufflers where appropriate. • Plant, equipment and vehicles found to be excessively noisy to be removed from the site or stood down until repairs or modifications made.

Control	Description
Procedures / Management	<ul style="list-style-type: none"> Complaints management

9.8.4 Key Findings

The Delegated Officer has reviewed the information regarding the noise impacts from the premises and has found:

- Operational noise has the potential to cause amenity impacts on sensitive receptors.*
- Review of the Applicant Noise Assessment by DER noise experts concluded that the operational noise from the proposed LHPP will comply with the Noise Regulations.*
- The Applicant is required to comply with the assigned levels in Regulation 8 of the Noise Regulations during the operational phase.*
- Conditioning of Applicant controls in any future licence will be considered subject to the risk assessment outcomes.*

9.8.5 Consequence

The nearest sensitive receptor is the suburb of Medina with the nearest dwelling in Medina approximately 2.3 km south-east. Operational noise has the potential to impact on the amenity of a large population for a short period. Therefore, the Delegated Officer considers the consequence of construction noise to be **Moderate**.

9.8.6 Likelihood of Consequence

The Delegated Officer considered:

- the distance to the nearest sensitive dwelling;
- the *Applicant Noise Assessment* summary and analysis in section 8.1 including predicted noise impacts at sensitive receptors; and
- proposed Applicant controls.

The Delegated Officer has determined that the likelihood of a Moderate consequence will be unlikely to occur. Therefore, the Delegated Officer considers the consequence to be **Unlikely**.

9.8.7 Overall rating

The Delegated Officer has compared the consequence and likelihood ratings described above through the Risk Matrix (Table 17) and determined that the overall rating for the risk of operational noise emissions on sensitive receptors is **Moderate**.

9.9 Risk of Stormwater Contamination and Discharges to Land Impact Analysis (Operation)

9.9.1 General Hazard Characterisation and Impact

Spodumene concentrate feedstock is received and stockpiled in an enclosed shed at the premises. Lithium hydroxide product is bagged and consolidated within an enclosed shed for loading into trucks for transfer to the port for shipment. By-products including Talison aluminosilicates, sodium sulphate, and gypsum/limestone are stored pending removal from the premises. Chemical additives including soda ash (solid), sulphuric acid, and caustic soda

are stored at the premises.

Groundwater contaminated with these materials may impact ecosystem health or impact on the beneficial use of groundwater if permitted to travel off site. The primary cause of impacts is likely to be small-scale occasional incidents or emergencies resulting in direct discharge to land caused by spills, overflows, or infrastructure leaks, and infiltration to groundwater. Contaminant contact with infiltrated stormwater may also result in groundwater contamination.

The site has an existing classification of *Contaminated – restrict use* under the *Contaminated Sites Act 2003* as a consequence of historical activities. A limestone capped area occupies the eastern portion of the site. The capped area is managed under a Site Contamination Management Plan (SCMP), prepared by Golder Associates (Golder) in 2003. Typically, the capping layer is comprised of compacted limestone of minimum 300 mm thickness overlying either historical blast furnace waste material, or other waste including soil, rubble and crushed demolition material. Historical groundwater investigations at Lot 12 Leath Road have identified the widespread presence of nitrate contamination at concentrations exceeding Marine Water Ecosystem criteria. There is a groundwater abstraction restriction that:

“No groundwater may be abstracted from the site without carrying out analysis in accordance with Department of Health guidelines to determine its suitability for use.”

The premises is located within the Kwinana Industrial Area, and there are a number of nearby potential sources of contamination (both current and historical). There is limited up to date information on current groundwater quality conditions at the site to establish baseline groundwater quality conditions prior to development and operation of the LHPP.

The proposed development footprint for the LHPP includes a portion of the limestone capped area on the eastern portion of the site. The *Applicant Contaminated Site Baseline Assessment* indicates that no excavation is proposed within the limestone capped area. Infrastructure in this area will include a truck parking area, product container loading area and product container handling area.

9.9.2 Criteria for Assessment

There is a range of relevant land and groundwater quality criteria including:

- ANZECC & ARMCANZ (2000) – freshwater and marine waters criteria;
- NHMRC & ARMCANZ (2011) – drinking water guidelines;
- DoH 2014 – non-potable groundwater use

9.9.3 Assessment of Applicant Controls

Table 26: Applicant controls for contaminated stormwater management and discharges to land (operation)

Control	Description
Siting	Location within the Kwinana Industrial Area with 2.3 km separation to nearest dwelling.
Engineering	<ul style="list-style-type: none"> • Hardstand, bunding and grading of materials handling and processing areas will be hardstand with bunding and graded towards the contaminated stormwater catchment system. • The Stage 1 Hydro Area is contained and fully bunded. Stormwater runoff from outside the bunded areas directed to a swale. • Stormwater catchments delineated and designed to manage stormwater

Control	Description
	<p>depending on the risk of contamination.</p> <ul style="list-style-type: none"> • Stormwater catchment from the south-eastern site area will runoff into the southern swales. The remainder of the eastern site area will runoff into two eastern swales. The western site area will runoff into two western swales and smaller swales internal to this area. Stormwater catchments from the northern site area (between the pyro areas and the spodumene building) will runoff into the western swale within this area. • Stormwater runoff from the northern site road (delivery of raw materials and exit of waste-by products), Stage 1 pyro area and Stage 1 hydro area will be directed to wedge pits to facilitate the removal of suspended solids. This stormwater is harvested for reuse as process water. • Two concrete lined wedge pits will facilitate sedimentation then direct water back into a secondary tank and pumped to a storage tank for future use as process water. The wedge pits are capable of settling out approximately 90% of suspended solids. • The treatment chamber of the wedge pits will be sized for storage requirements based on a 1 in 1 year ARI storm of 1 hour duration. The pits will treat the first 20mm of rainfall which occurs within each sub-catchment during a storm event. The low-intensity storms will wash the areas and prevent sediment from entering the environment. • Storage Tanks A and B to store treated stormwater from the wedge pit. The Applicant was unable to provide certainty on tank sizing. If tanks are sized to store a 1 in 2 year ARI storm of 72-hour duration, then Tank A would require a capacity of 895 m³ while Tank B would require a capacity of 1,120 m³. The Applicant proposes to confirm the capacity of tanks and associated transfer pumps at the detailed design stage. • Design principal that any stormwater that may come into contact with the spodumene delivery system or any areas where there is an opportunity for process spillage will be contained and delivered to the process water tank. • Immediate areas around tanks and pumping equipment are designed with bunds to contain any spillage from those specific units and have sump pumps to return that material to the normal process stream. • Fuel storage – a small scale package unit with inbuilt bund. • Acid and caustic storage – small scale storage at atmospheric pressure with bund for full tank contents.
Management / procedures	<ul style="list-style-type: none"> • In summer, basins/wedge pits will dry out, and small loaders will be used to remove and salvage/recycle the sediment/product.

9.9.4 Key Findings

The Delegated Officer has reviewed the information regarding the stormwater contamination and discharges to land impacts from the premises and has found:

1. *The design principles for stormwater will result in a closed system for all areas where stormwater will be contaminated or may be contaminated from prescribed activities on the premises.*
2. *Spills, leaks, overflows and other incidents involving liquid discharge are likely to be small-scale incidents or emergencies and within the closed system for contaminated or potentially contaminated stormwater collection.*
3. *The site is classified as contaminated – restricted use under the Contaminated Sites Act 2003 due to historical land uses. There are a number of nearby sources of contamination (current and historical) that highlight a need to establish up to date groundwater quality conditions prior to operating the LHPP.*
4. *Conditioning of Applicant controls in the works approval will be considered subject to the risk assessment outcomes.*

9.9.5 Consequence

Based upon the hazard characterisation, the absence of localised beneficial groundwater use and environmentally sensitive receptors, and the likely nature and scale of events that may cause impact, the Delegated Officer has determined there will be insignificant impact the ecosystem component (physical, chemical or biological) expected with no effect on ecosystem function. Therefore, the Delegated Officer considers the consequence to be **Insignificant**.

9.9.6 Likelihood of Consequence

The LHPP is a 24 hour a day, 7 days a week operation and there are reasonable Applicant controls proposed to prevent access of contaminated or potentially contaminated stormwater, spills, leaks and overflows to land. The Delegated Officer has determined an insignificant consequence will only occur in exceptional circumstances. Therefore, the Delegated Officer considers the likelihood of an insignificant consequence to be **Rare**.

9.9.7 Overall rating

The Delegated Officer has compared the consequence and likelihood ratings described above through the Risk Matrix (Table 17) and determined that the overall rating for the risk of contaminated stormwater and discharges to land on sensitive receptors during operation is **Low**.

9.10 Summary of Risk Assessment and Acceptability

The risk items identified in section 7.8 including the application of risk criteria and the acceptability with treatment are summarised in Table 27 below.

Table 27: Risk rating of emissions

	Emission		Pathway and Receptor	Applicant controls	Impact	Risk Rating	Acceptability with treatment (conditions on instrument)
	Type	Source					
1.	Gaseous emissions to air (operation)	Calcliner, acid roast kiln, acid roast scrubber, spodumene mill, acid leach, steam generator and sodium sulphate	Air/wind dispersion Closest dwelling 2.35 km south-east in Medina	Infrastructure controls	Health impacts from inhalation of combustion gases and particulate matter	Insignificant consequence Almost Certain Moderate risk	Acceptable subject to Applicant controls conditioned and regulatory conditions Works approval and licence
2.	Fugitive dust (construction)	civil earthworks, wind erosion from disturbed soil surfaces, vehicle movements and infrastructure construction	Air/wind dispersion Closest dwelling 2.35 km south-east in Medina	Siting and management / procedures (specific controls unknown)	Amenity	Moderate consequence Possible Moderate risk	Acceptable subject to works approval conditions
3.	Fugitive dust (operation)	Raw materials receipt, storage and handling. Processing and refining. Product and waste by-product storage handling and loading.	Air/wind dispersion Closest dwelling 2.35 km south-east in Medina	Infrastructure	Health impacts from inhalation of fine particulate matter and amenity impacts	Moderate consequence Unlikely Moderate risk	Acceptable subject to Applicant controls conditioned
4.	Noise emissions (construction)	Civil excavation / earthworks, building construction, equipment fabrication / installation, waste removal and materials transfer	Air/wind dispersion Closest dwelling 2.35 km south-east in Medina	Siting, mobile plant / equipment, management / procedures	Amenity and structural damage	Moderate consequence Unlikely Moderate risk	Acceptable subject to Applicant controls conditioned
5.	Noise emissions (operation)	Refer to list in section 9.8.1	Air/wind dispersion Closest dwelling 2.35 km south-east in Medina	Siting, infrastructure controls, management / procedures	Amenity	Moderate consequence Unlikely Moderate risk	Acceptable. No additional controls required
6.	Contaminated stormwater discharge, spills, leaks and overflows	Hardstand surfaces and infrastructure associated with the prescribed	Direct from infrastructure to land Groundwater , potential	Infrastructure and management controls.	Infiltration to groundwater impacting ecosystem component	Insignificant consequence Rare	Acceptable, Applicant controls conditioned.

	Emission		Pathway and Receptor	Applicant controls	Impact	Risk Rating	Acceptability with treatment (conditions on instrument)
	Type	Source					
	discharging to land (operation)	activity. Stormwater management infrastructure	hydraulic link to marine environment (Cockburn Sound)			Low risk	

10. Determined Regulatory Controls

10.1 Summary of Controls

		11.2 Infrastructure Requirements	11.4 Specified Actions
Risk Items (see section 9.10)	1. Gaseous emissions to air (construction)	●	
	2. Fugitive dust (construction)		●

10.2 Infrastructure Requirements

10.2.1 Gaseous emissions to air

All stacks will be required to be fitted with monitoring ports that are compliant with AS 4323.1.

Grounds: Stack testing is to be used to monitor products of combustion and particulate matter from air emission stacks based on Table 19 in section 9.4.1. Manual stack sampling will form an ongoing regulatory control on the licence.

10.2.2 Calciner baghouse filter

The baghouse filter to be fitted to the calciner will be required to achieve a particulate emission discharge criteria of less than 30 mg/m³ (STP dry) during normal operations. It will also be required to include;

- a broken bag detection system; and
- the ability to isolate broken bags without requiring baghouse bypass situations to replace the broken bag.

Grounds: The risk assessment in section 9.4 has considered particulate emissions from the calciner stack following treatment in a baghouse filter system. The risk of particulate emissions from the calciner stack is acceptable provided baghouse technology is operational. A particulate concentration criteria of less than 30 mg/m³ ensures an appropriate level of protection from point source particulate emissions at ground level. This emission criteria can be reliably achieved by existing baghouse filter technology. Malfunction of baghouses may occur if bag filters break or become damaged to an extent which impacts dust collection. Incorporation of a broken bag detection system with isolation and bypass avoidance capability avoids unacceptable emissions and provides the capability to take management action without impacting on process operations.

10.3 Fugitive Dust Risk Controls

10.3.1 Specified actions

Fugitive dust management will be required during construction. Specified actions will include the use of water carts, dust suppressants, internal vehicle routes/speeds, and cessation of activities.

Grounds: Construction works include disturbance of soils and earthworks where there is a risk of fugitive dust impacts if preventative measures are not taken to control or mitigate the risk of fugitive dust. The *Applicant Air Assessment* provided general dust control measures as summarised in section 9.5.3. The Delegated Officer has included specified actions as regulation controls given the risk rating and the absence of definitive Applicant controls to address the risk of fugitive dust impacts on receptors.

11. Setting Conditions

The conditions in the Issued Works Approval have been determined in accordance with DER's *Guidance Statement on Setting Conditions*.

Condition Ref	Grounds
Environmental Compliance Condition 1	Environmental compliance is a valid, risk-based condition to ensure appropriate linkage between the licence and the EP Act.
Premises Conditions 2 and 3	These conditions are valid, risk-based and consistent with the EP Act.
Location of Works Condition 4	This condition is valid, risk-based and consistent with the EP Act.
Infrastructure and Equipment Conditions 5, 6, 7 and 8	These conditions are valid, risk-based and contain appropriate controls (see section 9).
Fugitive Dust Management Condition 9	This condition is valid, risk-based and consistent with the EP Act.
Clearing of Native Vegetation Condition 10	This condition is valid and consistent with DER's Regulatory Principles (see Clearing Assessment Report in Appendix 3).
Records and Information Conditions 11 and 12	These conditions are valid and are necessary administration and reporting requirements to ensure compliance.
Reports Conditions 13 and 14	
Requests for Information Condition 15	

DER notes that it may review the appropriateness and adequacy of controls at any time and that following a review, DER may initiate amendments to the works approvals under the EP Act.

12. Applicant's Comments on Risk Assessment

The applicant was provided with the draft decision report and draft works approval on 13 September 2016. The Applicant's comments were received by DER in writing on 15 September 2016. Appendix 2 contains a summary of the Applicant's comments and the Delegated Officer's consideration.

13. Licence Conditions

The granting of a licence will be subject to a separate application for a licence from the Applicant. The Applicant should note DER's target timeframe for determining an application for a licence is 60 working days from receipt of an application, excluding stop clock periods.

A licence is likely to reflect Applicant controls outlined in section 9 and may include regulatory conditions. In consideration of the section 9 risk assessment outcomes, controls on a licence are likely to be consistent with Table 28.

Table 28: Summary of potential Applicant and regulatory controls for a future licence.

Risk	Controls	Description
Gaseous emissions to air	Infrastructure requirements	Consistent with works approval design requirements.
	Monitoring	Stack monitoring.
	Reporting	Annual reporting of monitoring results.
Fugitive dust emissions	Infrastructure requirements	Consistent with works approval design requirements
	Specified Actions	Loading and unloading of materials within specified buildings with doors closed. Clean up of spilt materials. Trucks loads to be covered.
Noise emissions	Monitoring	One off investigation of noise emissions against assigned levels in r. 8 of the <i>Environmental Protection (Noise) Regulations 1997</i> .
	Reporting	One off reporting of noise investigation outcomes.
Contaminated stormwater	Infrastructure requirements	Consistent with works approval design requirements
Wastewater discharges to SDOOL	Infrastructure requirements	Consistent with works approval design requirements
	Limits	Wastewater quality
	Monitoring	Continuous – Volume, temperature, conductivity, turbidity and pH. Point in time – parameters to be determined.
	Reporting	Annual reporting of continuous and point in time monitoring results

14. Conclusion

This assessment of the risks of activities on the premises has been undertaken with due consideration of a number of factors, including the documents and policies specified in this decision report (summarised in Appendix 1).

Based on this assessment, it has been determined that the Issued Works Approval will be granted subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

Jonathan Bailes

Acting Senior Manager - Industry Regulation (Process Industries)

An officer delegated under section 20 of the *Environmental Protection Act 1986*

Appendix 1: Key Documents

	Document Title	Availability
1	DER <i>Guidance Statement: Regulatory principles</i>	Accessed at www.der.wa.gov.au
2	DER <i>Guidance Statement: Setting conditions</i>	
3	DER <i>Guidance Statement: Licensing and works approvals</i>	
4	DER <i>Guidance Statement: Land use Planning</i>	
5	Ministerial Statement 665	Accessed at www.epa.wa.gov.au
6	EP Bulletin 1135	
7	Licence L4247/1991/13 – Greenbushes Lithium Operations	Accessed at www.der.wa.gov.au
8	Perth Groundwater Atlas	Accessed at www.water.wa.gov.au
9	MSDS – Lithium Hydroxide	Accessed at www.sciencelab.com
10	MSDS – Sodium Aluminosilicate	
11	MSDS – Sodium Sulphate anhydrous	
12	MSDS – Spodumene concentrate	Accessed at www.talisonlithium.com

Appendix 2: Summary of Applicant’s Comments on Risk Assessment and Draft Conditions

Applicant comments	Delegated Officer consideration of comments
General comments	
Noted change to Category 44.	Noted.
Stormwater comments	
<p>The Applicant advised that subsequent to the submission of the works approval application, earthworks design development has delivered a number of improvements to the storm water plan. The Applicant attached a copy of a revised storm water layout plan.</p> <p>The Applicant proposed the following changes to table of the Draft Works Approval as a result of this design development:</p> <p><i>“All storm water to be contained on site and directed overland, and via a number of pipe systems, into swales”</i></p> <p><i>“Storm water catchment from the Northern site road, Stage 1 Pyro Area and Stage 2 Pyro Area will runoff to Wedge Pit 1 and Wedge Pit 2 respectively to allow for settlement of solids”</i></p> <p><i>“Wedge Pits</i></p> <ul style="list-style-type: none"> • <i>to be concrete and designed to capture suspended solids by sedimentation;</i> • <i>treatment chamber size to be designed for storage requirements based on a 1 in 1 year ARI storm of 1 hour duration in compliance with the EPA first flush design guidelines & principles. The required storage capacity will include the adjacent tanks ‘A’ & ‘B’;</i> • <i>will allow machinery (Bobcat) access for removal of accumulated solids”</i> <p><i>“Storm water catchment from Stage 1 Hydro Area and Stage 2 Hydro Area will runoff into</i></p>	<p>The information was noted. The revised stormwater plan does not alter the risk of contaminated stormwater impacts on the environment.</p> <p>Section 9.9.3 was amended with information provided by the Applicant. Consistent alterations were made to the works approval (Table 2 - Infrastructure Requirements) for the stormwater system. The Schedule 1: Stormwater Plan in the works approval was also replaced with the updated version.</p>

Applicant comments	Delegated Officer consideration of comments
<p><i>the southern swales.”</i></p> <p><i>“Storm water catchment from the south-eastern site area will runoff into the southern swales.”</i></p> <p><i>“Storm water catchment from the remainder of the eastern site area runoff into the two eastern swales.”</i></p> <p><i>“Storm water catchment from the western site area will runoff into the two large western swales and the smaller swales internal to this area.”</i></p> <p><i>“Storm water catchments from the northern site area (between the Pyro Areas and the Spodumene Building) will runoff into the western swale within this area.”</i></p> <p>The Applicant further clarified in a letter dated 15 September 2016 that:</p> <p><i>“Storm water catchment from the Northern site road, Stage 1 Pyro Area will runoff to Wedge Pit 1 to allow for settlement of solids.”</i></p> <p><i>“Storm water catchment from Stage 1 Hydro Area will runoff into the southern swales.”</i></p> <p><i>“Storm water catchments from the northern site area (between the Pyro Area and the Spodumene Building) will runoff into the western swale within this area.”</i></p> <p><i>“The Hydro area has no free surface contaminants that may be collected in surface water runoff and all Hydro areas that contain contaminants are bunded.”</i></p> <p>A further revised Stormwater Plan was attached removing references to Stage 2 Pyro Area and Stage 2 Hydro Area and adding reference to the ‘Northern site road’ catchment area.</p>	

Appendix 3: Clearing Assessment Report



1. Application details

1.1. Permit application details

Permit application No.: 7198/1
Permit type: Works Approval Assessment

1.2. Applicant details

Applicant's name: Tianqi Lithium Australia Pty Ltd

1.3. Property details

Property: Lot 12 on Deposited Plan 39572
Local Government Authority: KWINANA, CITY OF
Localities: KWINANA BEACH

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
1.17	0	Mechanical Removal	Industrial

2. Background

2.1. Existing environment and information

2.1.1. Description of the native vegetation under application

Vegetation Description	Clearing Description	Vegetation Condition	Comment
The mapped Beard vegetation association 3048 is described as shrublands; scrub-heath on the Swan Coastal Plain (Shepherd et al. 2001).	The proposed clearing of 1.17 hectares on Lot 12 on Deposited Plan 39572, Kwinana Beach is for the purpose of a lithium hydroxide process plant.	Degraded; Structure severely disturbed; regeneration to good condition requires intensive management (Keighery, 1994).	The vegetation condition was established through a site visit conducted by GHD on 15 April 2016 (GHD, 2016). The vegetation within the application area consists of <i>Acacia rostellifera</i> and <i>Acacia saligna</i> regrowth over weeds including <i>Ricinus communis</i> , <i>Cenchrus setaceus</i> , <i>Avena barbata</i> and <i>Conyza bonariensis</i> . Isolated native species including <i>Melaleuca huegelii</i> , <i>Melaleuca lanceolata</i> , <i>Calothamnus quadrifidus</i> and <i>Callitris preissii</i> occur in the southern part of the application area (GHD, 2016).
The mapped Hedde vegetation complex Cottesloe Complex – Central and South is described as woodland and open forest and closed heath (Hedde et al. 1980).			

3. Assessment of application against clearing principles

Comments The proposed clearing of 1.17 hectares of native vegetation for the purpose of a lithium hydroxide processing plant is unlikely to have any significant environmental impacts. The vegetation within the application area consists of *Acacia rostellifera* and *Acacia saligna* regrowth over weeds including *Ficinus communis*, *Cenchrus setaceus*, *Avena barbata* and *Conyza bonariensis* in a degraded (Keighery, 1994) condition. Isolated native species including *Melaleuca huegelii*, *Melaleuca lanceolata*, *Calothamnus quadrifidus* and *Callitris preissii* occur in the southern part of the application area (GHD, 2016).

A total of 15 native taxa were identified within Lot 12 on Deposited Plan 39572, Kwinana Beach during a site visit conducted by GHD on 15 April 2016 (GHD, 2016). No conservation significant flora species were identified (GHD, 2016).

While *Melaleuca lanceolata* and *Callitris preissii* were recorded within the application area and the threatened ecological community (TEC) 'Callitris preissii (or *Melaleuca lanceolata*) forests and woodlands, Swan Coastal Plain' has been recorded within seven kilometres and on similar soil type as the proposed clearing area, it is not considered for the vegetation to represent this TEC given its degraded condition (Keighery 1994).

Given the above and the degraded (Keighery, 1994) condition of the vegetation, lack of understorey species and the relatively small size of the application area, the proposed clearing is not likely to impact on rare or priority flora, a priority or threatened ecological community, conservation reserves or significant fauna habitat and is not likely to be classified as clearing a significant remnant within a highly cleared landscape.

As no wetlands or watercourses are mapped within the application area and given its relatively small size, the proposed clearing is not likely to impact on riparian vegetation, contribute to or cause land degradation, deteriorate the quality of ground water or surface water and is not likely to cause or exacerbate flooding.

Given the above, clearing the vegetation within the application area is not likely to be at variance to the clearing principles.

Methodology References:
-GHD (2016)
-Keighery (1994)

GIS Databases:
- Hydrography, linear
-Geomorphic wetlands of the Swan Coastal Plain
-DPaW Managed lands
-Bush Forever sites
-Pre-European vegetation
-SAC Bio datasets (2 August 2016).

Planning instruments and other relevant matters.

Comments The applicant proposes to clear 1.17 hectares of native vegetation within Lot 12 on Deposited Plan 39572, Kwinana Beach, for the purpose of a lithium hydroxide processing plant.

The application area is zoned industrial under the metropolitan regional scheme.

The works approval application was received by Department of Environment Regulation (DER) on the 23 June 2016. The works approval involves the clearing of 4.8 hectares of native vegetation; however the applicant has advised on 22 July 2016 that 3.63 hectares of the proposed clearing will be cleared in accordance with clearing exemptions, Regulation 5, item 1 and Regulation 5, item 12 of the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*.

The applicant has applied for planning approval from the City of Kwinana which is currently outstanding.

The land owner of Lot 12 on Deposited Plan 39572 is the Western Australian Land Authority (T/A Landcorp).

Methodology GIS Databases:
-Metropolitan Regional Scheme

4. Recommendation

Recommendation

An assessment of the environmental impacts of the clearing of 1.17 hectares of native vegetation has been undertaken in accordance with DER's Regulatory Principles, taking into consideration the clearing principles contained in Schedule 5 *Environmental Protection Act 1986* the Delegated Officer considers that the proposed clearing is unlikely to cause environmental harm. Section 62(1) of the *Environmental Protection Act 1986* provides for conditions to be placed on a works approval to mitigate environmental harm. The Delegated officer advises no conditions are required for the proposed clearing.

The Delegated Officer notes that planning approval from the City of Kwinana for the proposed land use has not been obtained and that prior to a final decision on the proposed clearing, evidence of planning approval from the City should be provided by the applicant.



Kelly Faulkner
EXECUTIVE DIRECTOR
LICENSING AND APPROVALS

Officer delegated under section 20
of the *Environmental Protection Act 1986*

17 August 2016

5. References

- GHD (2016) Part Lot 12 Leath Road, Kwinana Beach Flora and Fauna Assessment, May 2016, Prepared for MSP Engineering Pty Ltd. DER ref A1125823
- Hedde, E. M., Loneragan, O. W., and Havel, J. J. (1980) Vegetation Complexes of the Darling System, Western Australia. In Department of Conservation and Environment, Atlas of Natural Resources, Darling System, Western Australia.
- Keighery, B.J. (1994) Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.
- Shepherd, D.P., Beeston, G.R. and Hopkins, A.J.M. (2001) Native Vegetation in Western Australia, Extent, Type and Status. Resource Management Technical Report 249. Department of Agriculture, Western Australia.

Appendix 4: Process information (Confidential)
