Government of Western Australia
Department of Water and Environmental Regulation

Decision Report

Application for Licence

Part V Division 3 of the *Environmental Protection Act 1986*

Licence Number	L9327/2022/1
Applicant	FTR Operations Pty Ltd
ACN	634 958 179
File number	DER2022/000122
Premises	Nexus Recycling 8 Winchester Road BIBRA LAKE WA 6163 Legal description Lot 82 on Plan 418427
Date of report	14 June 2022
Decision	Licence granted

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Abbie Crawford
A/MANAGER, WASTE INDUSTRIES

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

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1. Decision summary

This decision report documents the assessment of potential risks to the environment and public health from emissions and discharges during the operation of the premises. As a result of this assessment, licence L9327/2022/1 has been granted.

2. Scope of assessment

2.1 Regulatory framework

In completing the assessment documented in this decision report, the Department of Water and Environmental Regulation (the department; DWER) has considered and given due regard to its regulatory framework and relevant policy documents which are available at https://dwer.wa.gov.au/regulatory-documents.

2.2 Application summary

On 15 March 2022 FTR Operations Pty Ltd (the Applicant) lodged an application for Category 47 scrap metal recovery activities at 8 Winchester Road, Bibra Lake for the purposes of operating the newly constructed used lead acid battery (ULAB) reprocessing facility.

The maximum design capacity assuming the facility was to operate at 100% online time, without stoppages or breakdowns, for 12 hours a day, 6 days a week is 43 200 tonnes per year. The nominal online time for a ULAB reprocessing facility is 70%, hence the operational capacity being 30 240 tonnes per year. The online time of 70% accounts for the time taken to start machinery each morning, to run out product at the end of each working day, planned maintenance stops as well as unplanned downtime. Experience in operating ULAB reprocessing facilities shows 70% online time as typical operation capacity. As such, the estimated throughput of the proposed facility is up to 30 240 tonnes per year. Table 1 lists the prescribed premises category that has been applied for.

Table 1: Prescribed Premises Categories

Classification of Premises	Description	Proposed Premises production or design capacity
Category 47	Scrap metal recovery – premises (other than premises within category 45) on which metal scrap is fragmented or melted, including premises on which lead acid batteries are reprocessed	30 240 tonnes per annum

3. Overview of Premises

3.1 Operational aspects

Up to 11 people would be employed at the site. The facility would operate from 6am to 6pm, Monday to Saturday, excluding public holidays. All operations and storage will be contained within the warehouse building, which includes ULABs and all chemicals used in the process.

The site will be connected to the Western Power electricity grid. In addition, a 320 kW backup diesel generator will be installed at the site. The generator will supply power to the stirred slurry tanks in the event of a power outage. Diesel will be stored onsite in an above ground, self-bunded 2,000L fuel storage tank to fuel the mobile equipment (forklifts and front end loader). Diesel consumption for mobile equipment at peak demand will be approximately 10 L per hour.

It is anticipated that operation of the site will involve 90 truck movements per week to and from the site (i.e. 45 trucks entering and leaving the site per week) to facilitate delivery of materials and removal of recycled products and waste from the site.

If and when general maintenance of the plant and facilities is required, this will be undertaken via the onsite workshop. The maintenance programs are supported by safety standards and maintenance systems and will be compliant with any relevant Dangerous Good regulations.

The processing and operations onsite will generally comprise receipt of automotive batteries which are broken down and recoverable components extracted for recycling and/or re-use. This involves:

- Crushing where batteries are physically broken down.
- Primary separation of battery components which results in separation of metallic lead, lead paste and plastics.
- Secondary separation of plastic battery components and immobilisation of plastic separator waste.
- Production and packaging of recycled products and waste materials, and treatment of generated wastewater.

The facility will comprise the following components or areas:

- ULAB storage
- Crushing
- Primary screening and filtration
- Secondary screening and gravity separation
- Electrolyte neutralisation
- Separator immobilisation
- Product bagging

3.2 Premises infrastructure and layout

The ULAB processing infrastructure has been constructed to be fully contained within a warehouse, including the storage area for ULAB upon their arrival at the Premises. The infrastructure components are listed in Table 2. Access to the warehouse for delivery of product is via the northern hardstand area through the warehouse roller doors.

The entire warehouse comprises a concrete slab bunded by a curb to prevent any escape of spilled liquids from the facility. A floor drain has been installed in the centre of the warehouse which will collect any spills should they occur. This drain will discharge to the paste slurry tanks to reclaim any solids plus enable treatment of liquors via the waste water treatment system. Treated waste water from the electrolyte neutralisation process will be directed to the Water Corporation sewer.

The Applicant amended the warehouse layout where the internal loop road has been removed. Only forklifts will be used inside the warehouse. No external vehicles will be permitted to enter the warehouse.

A stormwater drainage system has been installed external to the warehouse to divert uncontaminated stormwater away from the Premises and into the City of Cockburn stormwater system.

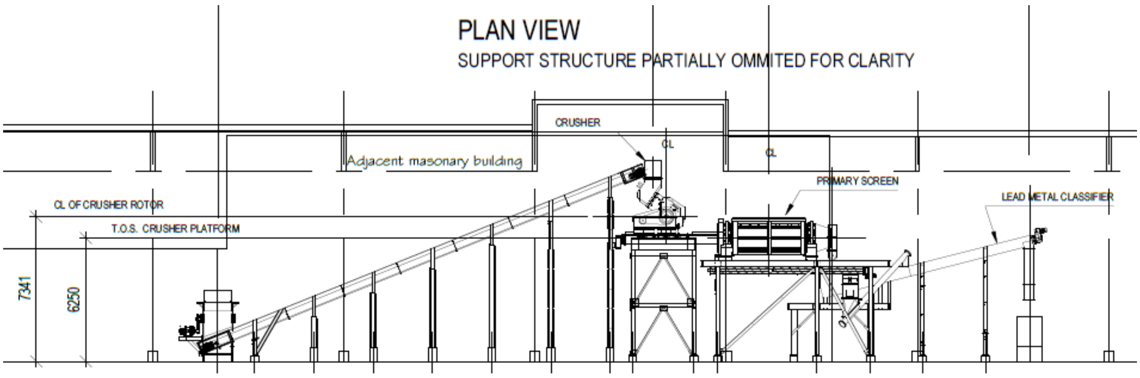

Figure 1: Structural view of the ULAB processing plant

Table 2: Infrastructure

Infrastructure	Design and construction / installation requirements
Used lead acid battery reprocessing plant	Designed and constructed to receive and process up to 30 240 tonnes per annum of used lead acid batteries. Reprocessing equipment to be free of leaks and defects.
Warehouse	Floor to be free of leaks and defects and constructed with concrete with a permeability of ≤$1x10^{-9}$ m/sec. Floor to be enclosed with a concrete bund Floor to contain a drain that collects spills and discharges back into the reprocessing system.
Crusher (hammer mill)	To be fitted with plastic curtains, spray bars and air bags. To be fitted with a mist eliminator that ensures negative pressure during operation and captures, collects and returns acid mist into the reprocessing system. Mist eliminator to be fitted with a fine mesh filter with co-knit glass or teflon fibres, such as the Dupont Towergard mesh pad, or equivalent. Mist eliminator to be fitted with a pressure gauge.
Epoxy liner	To be applied in accordance with the Manufacturer's instructions to meet the chemical resistance level of dilute sulphuric acid. To be installed to sufficient distance to capture potential spillage by jetting. To be installed under the following equipment: • ULAB storage area • Apron feeder • Crusher (hammer mill) & Shredder • Primary & Secondary screens • Lead metal classifying tank • Plastics classifying tank • Recirculation tank, surge tank and elutriator • Slurry tank, clean acid tank, wastewater treatment system area.
Laundry	Waste water from all washing machines is to be plumbed for disposal to the wastewater treatment system
Stormwater drainage	External to the warehouse, to direct uncontaminated stormwater off the Premises and into the stormwater system

Key finding:

1. The Delegated Officer notes the proposed Premises infrastructure and layout has been designed to meet the best practice requirements of the CEC (2016) and the WHO (2017), constructed in accordance with the granted works approval W6304/2019/1 and certified by a structural engineer.

3.3 Product reprocessing activities

FTR Operations will receive pallets of batteries from 3rd party suppliers, businesses that are established in Western Australia and currently supply ULABs to reprocessing facilities on the east coast of Australia. All types of ULAB will be reprocessed at the site, including car, truck, motorcycle, solar and industrial batteries. FTR Operations have a contractual agreement with their suppliers that all ULABs are to be supplied in accordance with the Australian Dangerous Goods Code ADG 7.5 (ABRI Undated) whereby the batteries are undamaged, intact, have not been previously drained of sulphuric acid and are adequately plastic wrapped and strapped for transport.

The 3rd party suppliers will make deliveries of ULABs during designated delivery times. The components of a ULAB are listed in Table 3 with the physical state of the components listed. The lead components are in a solid state and the sulphuric acid is in a liquid state.

Table 3: Components of used lead acid batteries

Component	Description	State	Weight %
Lead Paste	Paste is the term given to the active ingredient in the battery. In a newly manufactured battery, lead oxide is "pasted" into the metallic lead grid. The charge-discharge of the battery over its life results in the lead oxide/dioxide compound forming lead sulphate ($PbSO_4$) by a non-reversible side reaction with the sulphuric acid (H_2SO_4). The paste in a ULAB is typically 80% $PbSO_4$ with the remainder PbO_2.	Solid	42%
Lead Grid	The grid component is the metallic lead parts of the battery. The grid holds the paste [like chicken wire], the busbar [joins the 6x cells of the battery together] and the battery knobs [what we see on the outside of the battery], which carry the electric charge created by the active material in the battery (the paste).	Solid	29%
Sulphuric acid	The electrolyte is dilute sulphuric acid (H_2SO_4) with a strength of 10% acid and 90% water.	Liquid	20%
Polypropylene	The outer case of the battery is made from polypropylene.	Solid	5%
Separator	The positive and negative plates in the battery are separated by a silica/polyethylene film, termed separator.	Solid	3%

In order to facilitate ULAB reprocessing the following materials will also need to be sourced for the site:

- Water sourced from the Water Corporation reticulated water supply network;
- Lime ($Ca(OH)2$);
- Magnesium oxide (MgO);
- Phosphoric acid (H_3PO_4) and
- Diesel.

3.3.2 Used lead acid battery storage

ULABs will be stored in the designated storage area within the shrink-wrapped transport packaging, undercover and within the warehouse. A maximum of 250 tonnes of ULAB will be held in the storage area at any time. Normally, storage would be < 100 tonnes ULAB. One pallet can contain up to 60 car-sized batteries.

The designated storage area for ULABs and the floor under all machinery involved in reprocessing, will be coated with an epoxy resin resistant to acid, to prevent deterioration to the floor from spills of sulphuric acid (see section 3.3.10).

Batteries are unlikely to become damaged via dropping or incidental squashing due to the physical strength of the housing unit. Should any ULABs be damaged at the Premises, for example by puncture from the forks of a forklift, staff will be trained in the use of the on-site spill kits to contain and collect the spill. Any spilled matter is then disposed of back into the processing system, not into the general waste stream.

Key finding:

2. The Delegated Officer notes the proposed ULAB supply and storage requirements have been designed to meet the best practice requirements of the CEC (2016) and the WHO (2017).

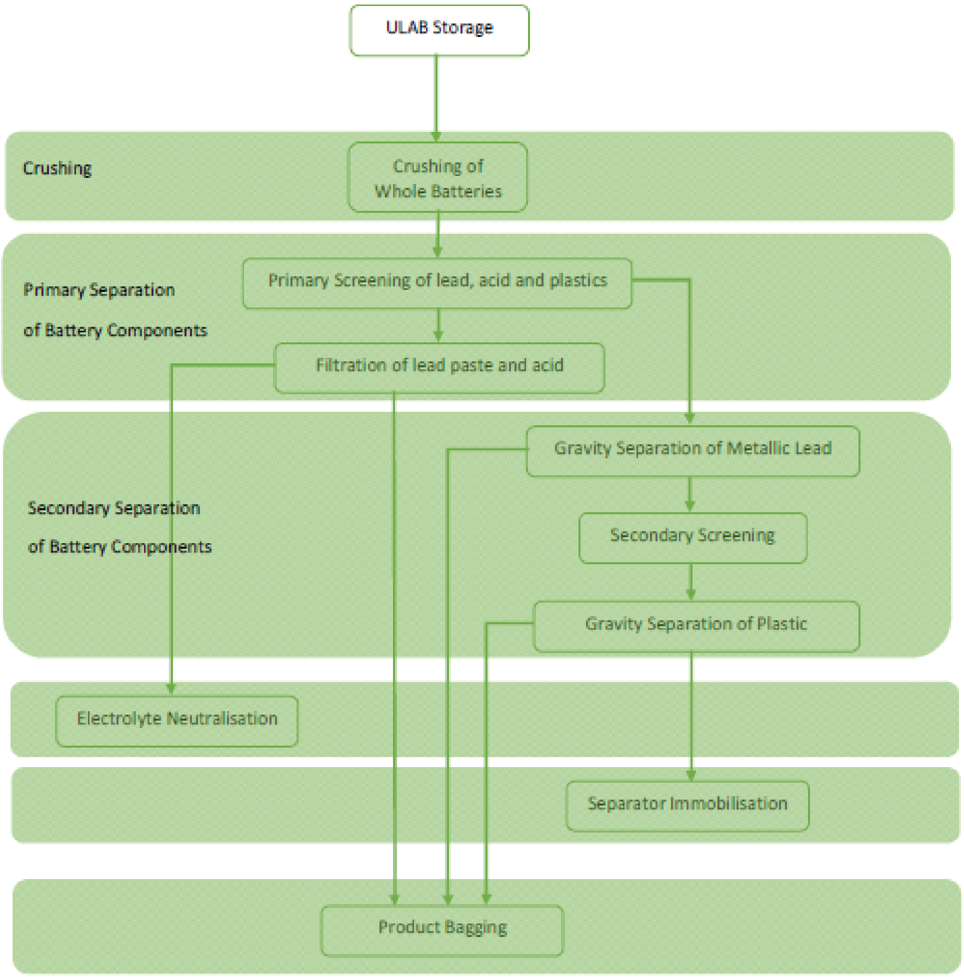

Figure 2: Process flow diagram

3.3.3 Crushing

Pallets of ULAB will be removed from the storage area by a forklift, the shrink-wrap will be removed, and ULABs unloaded into the stainless steel holding container of the apron feeder.

Alternatively, large industrial batteries (>600mm) will be partly crushed via a shredder located adjacent to the apron feeder, to reduce the size of the battery casing enough for the battery to pass through the hammer mill. The shredder does not completely break open the battery and the blades rotate at a very low rotational speed of 10 rotations per minute, which will minimize the contact with acids and prevent splash back of acids and the generation of mists. Output from the shredder reports to the apron feeder and thus follows the same route as other ULABs.

There are no vibrations caused by the shredder that could be transferred by ground.

The speed of the apron feeder can be controlled to limit the number of ULABs entering the processing plant at a time. The ULABs exit the apron feeder one at a time and move onto the conveyor belt which transports the ULABs to the top of the hammer mill. Over the inclined conveyor belt is a metal detector to identify foreign ferrous material and enable its removal. At this point the system is all automated, the machinery is all enclosed and the system is fully connected. There is no human transfer of matter between processing points. All wastes and by-products exit the system at specific points where they are contained in collection systems.

After passing through the plastic curtains at the mouth of the feeder, the batteries fall down an "L" angled chute into the hammer mill where the whole ULAB is cut. 1" wide cutting blades rotate at a speed of 2500 rotations per minute, cutting the battery into pieces less than 80mm. The high rotational speed of the blades can create splash back of sulphuric acid within the hammer mill, however the "L" angled chute presents as the first point of contact for this splash back. The hammer mill is designed to prevent transmission of ground vibrations through the subsurface structure via the installation of air bags between the base of the mill and the ground.

Spray bars are contained within the hammer mill to spray water on the battery when it is cut and to spray water around the internal cavity of the mill, to suppress all air borne sulphuric acid mists and wash off any splashes of lead paste and sulphuric acid. The "L" angled chute and the plastic curtains prevent backward movements of battery particles, back spray of sulphuric acid mists, lead paste and water spray out the mouth of the feeder, and ensure all cut batteries and contaminated water spray is directed down into the mill and through the processing system. The hammer mill is fully enclosed to capture all solids and liquors. The cutting process opens the grid for the lead paste to escape and enables screening and/or density separation to separate the ULAB into its individual components. The crushed battery scrap is then moved by screw conveyor to the primary screen.

The Applicant has installed a mist eliminator to the crusher (hammer mill) to obtain a negative pressure. Operating the hammer mill under negative pressure will ensure no fugitive emissions occurs. The pressure gauge is located within the pipeline which will be monitored during operations to ensure negative pressure is maintained.

Air, along with any sulphuric acid mist and dust, will be extracted from the hammer mill enclosure and directed through a mist eliminator. The mist eliminator consists of a vessel in which a mesh pad filter is installed. Air enters below the filter, passes up vertically through the filter and exits at the top of the vessel through an extraction fan and into the warehouse.

Solids and large sulphuric acid droplets will be easily trapped by a mesh filter. Lead paste is not expected to enter the mist eliminator as it is in a solid state, however if it does it will be trapped by the mesh filter. Slow moving, fine mists require a fine mesh filter, such as the Dupont Towergard mesh pad, where co-knit glass or teflon fibres provide larger surface areas to enable surface tension adhesion for the capture of slower and smaller droplets.

The mist, entrained in the air, collides with the filter, coalesces and drains to the base of the vessel. The air passes through the mesh, now mist free, and exits the top of the mist eliminator. Any solids entering the mist eliminator will collect within the mesh pad. Liquor will collect at the base of the vessel and be drained back into the reprocessing system.

Overtime a buildup of sulphuric acid and any solids in the mesh filter will reduce the effectiveness of the extraction. To maintain efficient negative pressure within the hammer mill, the mesh filter will need to be cleaned on a routine basis. An in-built pressure gauge on the inlet will measure the vacuum within the inlet/hammer mill. A pre-determined pressure will trigger an automatic mesh clean, otherwise the automatic mesh clean will be manually activated monthly.

The volume of air extracted would be in the order of $2m^3$ to $4m^3/hr$, enough to maintain a negative pressure within the mill housing. The clean discharged air from the mist eliminator will be vented within the factory building.

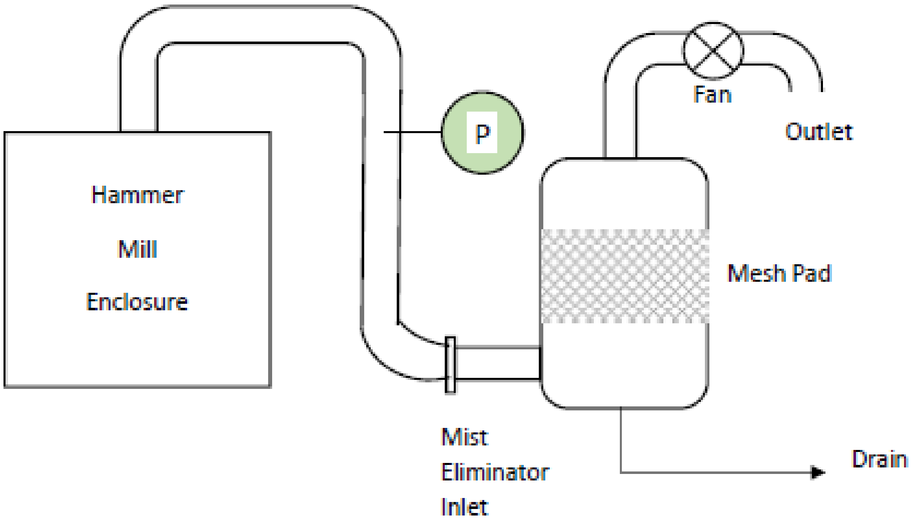

Figure 3: Mist eliminator showing pressure gauge

Key finding:

3. The Delegated Officer notes a stack is not utilised in the reprocessing system, therefore stack emissions to air are not of concern for the scope of the risk assessment.
4. The Delegated Officer notes the use of an automated, enclosed, fully connected reprocessing system operated under negative pressure via a mist eliminator with a mesh filter will reduce the potential for fugitive emissions of solid lead paste, sulphuric acid mist and dust, and has been designed to meet the best practice requirements of the CEC (2016) and the WHO (2017).
5. The Delegated Officer notes the use of air bags will prevent the transfer of vibrations from the mill through the subsurface structure.

3.3.4 Primary screening and filtration

The crushed battery scrap from the hammer mill is moved by screw conveyor to the primary screen. The primary screen separates the material based on size. The undersized material, fine lead paste and electrolyte pass through the <1mm screen. The oversized material, grids, polypropylene and separators, do not pass through the screen and exit to the metal classifying tank.

The lead paste and electrolyte that pass through the primary screen mesh report to the elutriator. This step is a second pass at collecting the fine lead grids. Any fine lead grids that passed through the primary screen mesh will sink in the elutriator via gravity separation and be passed into the metal classifying tank feed stream.

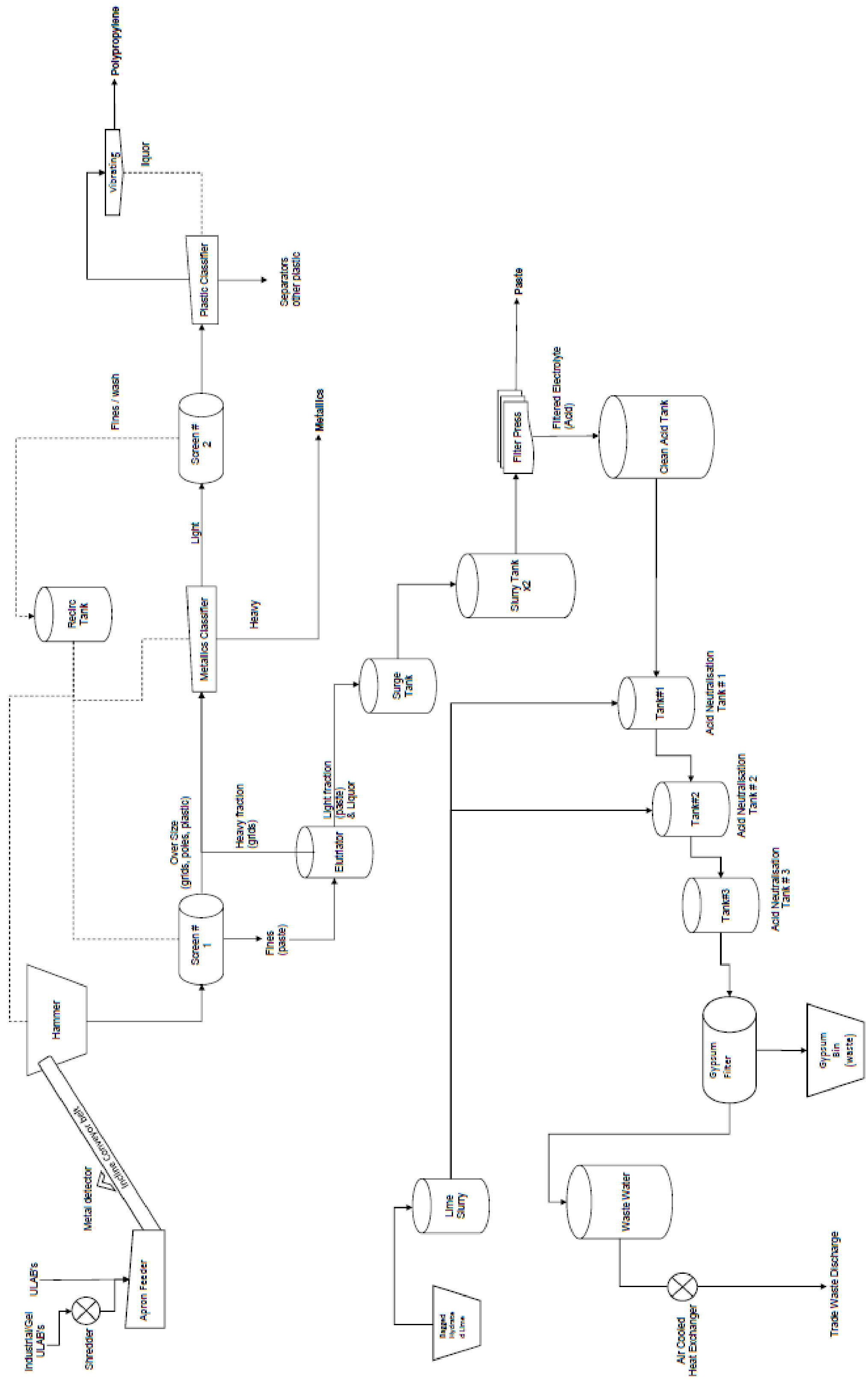

Figure 4: Process flow schematic

The overflow of lead paste and electrolyte from the elutriator pass into the surge tank. The slurry from the surge tank is pumped to the slurry tank. The slurry tank is a holding or buffer tank to hold the lead paste or electrolyte prior to filtration in one of the two plate and frame filter presses.

The plate and frame filter presses are used to separate the lead paste solids from the electrolyte liquor. The lead paste solids are washed and squeezed inside the press and released as a lead cake. The filtered lead paste is stored in the paste bunker awaiting bagging. The electrolyte filtrate from the press reports to the clean acid tank. The electrolyte is then sent to the water treatment plant for electrolyte neutralisation.

3.3.5 Secondary screening and gravity separation

The oversized material, lead grids, polypropylene and separators that do not pass through and exit the primary screen are sent to the metal classifying tank. The metal classifying tank uses gravity to separate heavy grids and light plastic material. The separation is aided by the use of an upflow liquor stream. The material that sinks is the metallic grids. The grids settle and are transferred from the tank to the grids bunker.

The material that is collected by the upflow liquor reports to the secondary screen. The secondary screen enables a final wash of the polypropylene and separators to collect any residual lead paste and enable the liquor to be recirculated throughout the process. The liquor that passes through the secondary screen mesh reports to the recirculation tank and is used as the liquor feed to the hammer mill, primary screen and metal classifying tank.

The polypropylene and separators that exit the secondary screen report to the plastics classifying tank. Gravity separation is used to separate the polypropylene which floats from the separators which sink. Screw conveyors remove the materials. The polypropylene passes over a vibrating screen to remove residual liquor and the polypropylene is collected in bins. The separators report to the separator immobilisation process.

3.3.6 Electrolyte neutralisation

The electrolyte filtrate from the press that reports to the clean acid tank is then fed to the water treatment plant for electrolyte neutralisation. The liquor has an acid (H_2SO_4) content of approximately 10%. Lime (Ca(OH)2) is used to react with the acid to neutralise the liquor and produce gypsum (CaSO4).

$$H_2SO_4 + Ca(OH)2 = CaSO_4\text{ (solid)} + 2H_2O$$

The filtered electrolyte is added to neutralisation tank 1 with a measured amount of lime. The slurry overflows from tank 1 to tank 2 where additional lime is added. The slurry then overflows to tank 3. This process yields the required residence time to ensure the neutralisation process goes to completion. The slurry from tank 3 is pumped to a drum filter to separate the wastewater from the gypsum. The drum filter releases the gypsum into bins. The gypsum is tested for impurity level, classified and sent to landfill.

The liquor wastewater is collected in a wastewater tank. Prior to discharge the liquor passes through a heat exchanger to ensure temperature is compliant with trade waste discharge limits. The quality of the wastewater will be determined by the potential impurities [i.e lead content (Pb mg/L) and S as SO_4 content (mg/L)] as well as pH and temperature (^oC).

In order to discharge the treated wastewater to sewer a Water Corporation Trade Waste Permit is required.

Cooling is affected by a dry, air-cooled system, negating the need for a water cooling tower.

A portion of the wastewater stream will be utilised as the liquor in the plastics classifying tank.

3.3.7 Separator immobilisation

The separators exiting the plastics classifying tank report to an inclined screw conveyor with hopper. The hopper holds a buffer amount of separators while awaiting immobilisation.

Separators from the hopper are transferred into a mixer with the immobilisation reagents. The process is to immobilise the residual lead content. As the separators are porous and designed to allow flow of electrolyte through them, the separators result in a residual lead content that cannot be washed out. Due to the density difference of lead and the silica/polyethylene separator a small quantity of lead results in a lead content of approximately 3 to 6%. To enable compliant disposal, the lead content needs to be immobilised.

The addition of MgO converts the Pb content to Pb(OH)2, then the addition of phosphoric acid converts the lead hydroxide Pb(OH)2 into lead phosphate $Pb3(PO_4)2$, which has extremely low leachability. This is a common method used to immobilise lead in soils.

$$MgO + H_2O = Mg(OH)2$$

$$Mg(OH)2 + \text{Pb Compounds} = Pb(OH)2 + \text{Mg compounds}$$

$$3Pb(OH)2 + 2H_3PO_4 = Pb3(PO_4)2 + 6H_2O$$

The mixing process is batch wise. The immobilised batches are transferred into the separator bunker, awaiting sampling, analysis and final disposal.

3.3.8 Product bagging

Lead paste and lead grids are to be sold to customers either within Australia or overseas. The products will be loaded into bulka bags of 1 to 2 tonnes. A front-end loader will add material to bags via a dedicated hopper/bag loading system. As the lead material is dense grids or a cake paste no fugitive emissions will occur. All activities are to take place inside the warehouse.

Polypropylene will also be bagged and sold to plastic recyclers.

3.3.9 Ambient temperatures within processing system

The running temperature of the reprocessing system will be ambient air temperature. There is no heating for melting or smelting required, thereby no fumes generated nor odour, and therefore there is no requirement for air extraction systems on the warehouse. The process is fully automated and enclosed within the processing plant equipment, using mechanical cutting to open the batteries and chemical extraction for the lead removal.

Key finding:

6. The Delegated Officer notes the lack of heating throughout the reprocessing system will minimise the generation of fugitive fumes and odour inside the equipment.

3.3.10 Acid resistant flooring

The warehouse floor is concrete. Although concrete is a porous substance as it contains voids or bubbles, overall it is relatively impermeable as those voids aren't well connected. The concrete used for the warehouse floor has a permeability of $\leq 1x10^{-9}$ m/sec. Concrete is however, susceptible to erosion by acids. ULABs contain sulphuric acid.

An epoxy coating has been applied to the concrete flooring in specific areas which is resistant to prolonged contact by dilute sulphuric acid to protect concrete from acid penetration and/or damage.

The areas where the coating is applied are:

- ULAB storage area
- Underneath battery breaking machine, which includes:
    - Apron feeder
    - Conveyor belt
    - Shredder
    - Hammer mill
    - Primary and secondary screens
    - Lead metal classifying tank
    - Plastics classifying tank
    - Recirculation tank, surge tank and elutriator
- Inside tank farm/bund area – including the slurry tank, clean acid tank, and water treatment plant area

Key finding:

7. The Delegated Officer notes the use of an epoxy coating under equipment will ensure any spills of sulphuric acid are adequately contained until they can quickly be cleaned up, which meets the best practice requirements of the CEC (2016) and the WHO (2017).

3.3.11 Maintenance schedule

The hammer mill is maintained on a regular basis. The cutting blades are replaced every 8-10 weeks as needed, the effectiveness of which can be observed daily by the resultant size of the pieces of cut battery.

At the end of every working day the mill is run until all battery particles have visibly exited, then fresh water is run through the entire plant circuit to clean internals of all equipment including spray nozzles, and flush out any small plastics. Up to 27 000 L/hr of water are circulated through the plant. This waste water then passes though the wastewater cleaning system to recover all acids, and the water is subsequently reused in the processing system.

The mist, entrained in the air within the hammer mill, collides with the mesh filter, coalesces and drains to the base of the filter. The air passes through the mesh, now mist free, and exits the top of the mist eliminator. Any solids entering the mist eliminator will collect within the mesh filter. Liquor will collect at the base of the vessel and be drained back into the reprocessing system.

Overtime the mesh filter within the mist eliminator will reduce in effectiveness of extraction of mist and dust. To maintain efficient negative pressure within the hammer mill, the mesh pad will need to be cleaned on a routine basis. An in-built pressure gauge on the inlet will measure the vacuum within the inlet/hammer mill. A pre-determined pressure will trigger an automatic mesh clean, otherwise the automatic mesh clean will be manually activated monthly.

The internal area of the warehouse will be washed daily including all floors and the external of the processing equipment. This wastewater is disposed of into the processing system to remove any potential lead or acid contaminants.

The external areas of the warehouse, being the carpark area, will be vacuumed daily with a road sweeper fitted with a HEPA filter to collect any dust, which will then be disposed of into the reprocessing system to remove any potential lead or acid contaminants.

Key finding:

8. The Delegated Officer notes the daily internal and external cleaning regime meets the best practice requirements of the CEC (2016) and the WHO (2017).

3.3.12 Wastewater treatment system (electrolyte neutralisation)

Approximately 20% of the weight of a battery is liquid, and of that liquid 10% is sulfuric acid (H_2SO_4) and 90% water. The acid needs to be separated from the water, so the water can be disposed of into the sewer system and the acid can be converted to gypsum so it can be disposed of to landfill. This occurs in the wastewater treatment system. Treatment must meet the Water Corporation's acceptance criteria, as per the requirements of the Trade Waste Licence (see section 4.2.3).

The battery liquid must be treated to remove the sulfate content (SO_4) and increase the pH, which is called electrolyte neutralisation. Lime ($Ca(OH)_2$) is used to react with the acid (SO_4) to neutralise the acid and produce gypsum ($CaSO_4$) as follows:

Acid (H_2SO_4) + Lime ($Ca(OH)_2$) = Gypsum ($CaSO_4$) + Water ($2H_2O$)

The product of the reaction is gypsum ($CaSO_4$) which precipitates out of the solution as a solid. This enables the gypsum, and thus the SO_4, to be removed from the water by filtration.

This process commences with the wastewater entering neutralisation tank 1 and the addition of a controlled amount of lime. The slurry overflows from tank 1 to tank 2 where additional lime is added. The slurry then overflows to tank 3. All three tanks are agitated to promote mixing. The flowrate of the wastewater coupled with tank sizes, yields the required residence time to ensure the neutralisation process goes to completion. The completion of the neutralisation reaction is monitored continuously using pH meters.

The slurry from tank 3 is pumped to a drum filter to separate the gypsum from the water. The drum filter releases the gypsum into bins. The gypsum is tested for impurity level, classified and sent to landfill.

The water is collected in the wastewater tank. Prior to discharge the water passes through a plate heat exchanger to ensure the temperature meets the Water Corporation trade waste acceptance criteria. Parameters of the wastewater to be monitored include lead content (Pb mg/L), S as SO_4 content (mg/L), temperature ($^\circ$C) and pH.

Key finding:

9. The Delegated Officer notes the Water Corporation Trade Waste Licence regulates the disposal of treated wastewater into the sewage system.
10. The Delegated Officer notes the sewage system connection is part of a closed system and that wastewater will be piped to a wastewater treatment system for additional processing, thereby waste water is not considered an emission discharged to the environment from the Premises.

3.3.14 Process outputs

The proposed facility would reprocess up to 30 240 tonnes per year of ULAB. Reprocessed products and waste material will need to be removed from the site. Reprocessed products will generally be packed in bulka bags and sold to Australian and international customers, which include:

- Metallic lead grids;
- Lead paste; and
- Polypropylene.

Waste materials produced from the process are:

- Wastewater discharged at a rate of 34 kL per day which is anticipated to contain the following (values based on a similar facility operated in NSW):
    - Lead: 0.8 mg/L;
    - Sulphur in SO_4: 370 mg/L; and
    - pH: 7.7;
- Gypsum ($CaSO_4$) – estimated volume of 2 300 tonnes per year; and
- Separators (silica/polyethylene film) – estimated volume of 900 tonnes per year.

Wastewater will be disposed to the Water Corporation sewer system in accordance with the conditions of the Trade Waste licence (section 4.4).

General site wastes are also likely to be produced onsite, such as scrap pallets. This is estimated to comprise approximately 30 tonnes per year and will be directed to general waste or recycling bins for offsite disposal. Waste, including gypsum, maintenance workshop waste and office waste will be disposed to landfill via a waste transport contractor.

Table 4 lists the dangerous and non-dangerous goods to be stored at the Premises during the operational phase of the project.

Table 4: Dangerous and non-dangerous good storage

Substance	State	Storage Design Capacity	Typical Storage Quantity	Comments
Dangerous Goods				
Acid, Sulphuric – ULABs	Liquid	250,000 kg	100,000 kg	Batteries are to be stored in the battery bunker area. Batteries will remain in their individual casing prior to entering the process. Batteries are stored in plastic wrapped pallets, with a maximum of 60 batteries per pallet.
Acid – Sulphuric – spent electrolyte	Liquid	60,000 kg	30,000 kg	Sulphuric acid is collected in paste slurry tanks and in the clean acid tank. The capacity of each tank is 20,000L.
Acid – phosphoric	Liquid	2,000 kg	1,000 kg	Phosphoric acid is received in 1,000 L IBCs.
Diesel – automotive fuel	Liquid	2,000 L	1,000 L	Diesel is stored in a self-bunding designated tank. The capacity of the tank is 2,000 L.
Non-Dangerous Goods				
Lime, Hydrated	Powder	30,000 kg	10,000 kg	Hydrated lime is received in 1000 kg bags and stored in water treatment system area.
Lime slurry	Slurry	15,000 kg	10,000 kg	Lime slurry is prepared onsite from hydrated lime powder and for electrolyte neutralisation. Lime slurry is held in the 15,000L lime slurry tank in water treatment system area.
Magnesium oxide	Powder	8,000 kg	4,000 kg	Magnesium oxide is received on site as a powder in 25 kg bags in palletised 1 tonne lots by road transport. The MgO powder must be stored in the original bags in the dedicated area.
Magnesium hydroxide	Slurry	3,000 kg	1,500 kg	Magnesium hydroxide is produced onsite from magnesium oxide powder and water. Magnesium hydroxide is held in the Mg(OH)2 tank in the separator immobilisation area.

Key finding:

11. The Delegated Officer notes the storage and handling of the dangerous goods at the Premises will be regulated by the Department of Mines, Industry Regulation and Safety under the *Dangerous Goods and Safety Act 2004.*

3.3.15 Commissioning

Prior to commencement of operations, the reprocessing plant was subject to testing to ensure all components are operating as required. This involved:

- Testing equipment motors to ensure each individual unit installed operates in the correct direction and speed;
- Dry testing to ensure linked units operation in sequence as intended;
- Wet testing using water as product to ensure liquor is moved around the process in the intended manner, high level alarms and interlocks function; and
- Full scale testing for initial testing of the plant under operating conditions.

Wet testing took 5 days with no ULAB throughput, and full scale testing took 16 days with a reprocessing throughput of 527 tonnes. Commissioning includes periods where the reprocessing system is shut down for equipment readjustments and recalibration to ensure correct operation.

Key finding:

12. The Delegated Officer notes commissioning of the reprocessing plant achieved the required outcome to ensure the plant is automated, enclosed and fully connected. This meets the best practice requirements of the CEC (2016) and the WHO (2017). The Delegated Officer has considered the outcome of commissioning monitoring in section 5.2 and 5.3.

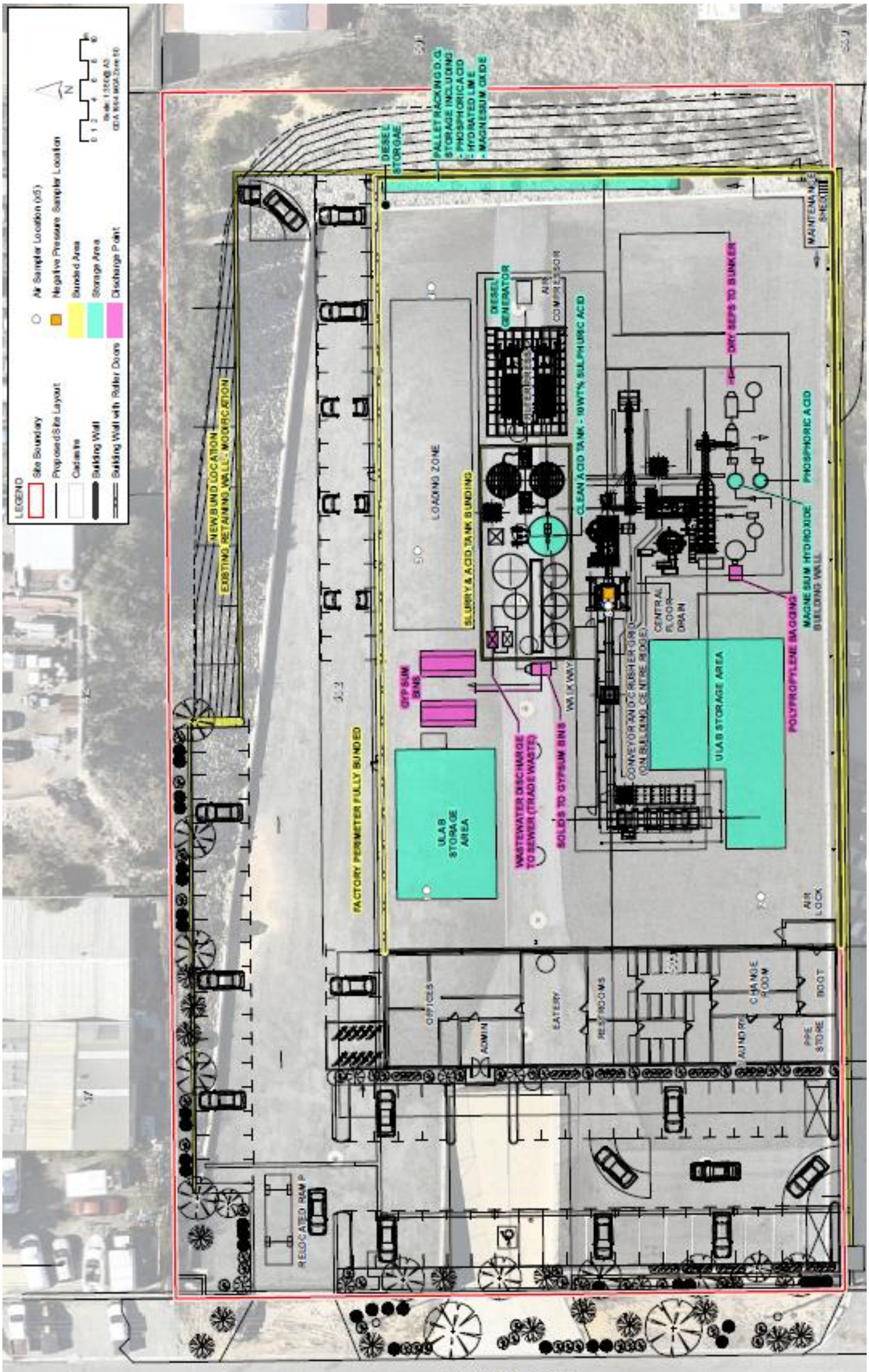

Figure 5: Premises layout plan with commissioning monitoring locations

4. Legislative context

4.1 Works approval and licence history

Construction, commissioning and time limited operations were authorised under Works Approval W6304/2019/1. The works approval included conditions requiring monitoring during time limited operations of the pressure within the mist eliminator outlet pipe and for sulphuric acid at this pipe outlet and at four locations within the warehouse. The results of this monitoring are discussed in section 5.2 and 5.3.

Table 5 summarises the works approval and licence history for the premises.

Table 5: Works approval and licence history

Instrument	Issued	Nature and extent of works approval, licence or amendment
W6304/2019/1	03/04/2020	Works Approval granted
W6304/2019/1	18/10/2021	Amended Works Approval to incorporate time limited operations

4.2 *Environmental Protection (Controlled Waste) Regulations 2004*

The *Environmental Protection (Controlled Waste) Regulations 2004* regulate controlled waste substances and require carriers, vehicles and facilities to be listed to facilitate tracking of the substances. Due to the handling of the controlled waste ULABs (D221) the premises requires listing as a Controlled Waste Facility. The applicant obtained this listing for the premises on 10 August 2021 as the facility holds a valid Works Approval W6304/2019/1.

Upon granting of this licence, the applicant will be required to update the Controlled Waste Facility listing to reflect the facility holds a valid licence.

4.3 Planning approvals

The City of Cockburn advised that under the City's Town Planning Scheme No. 3 the proposed use class is 'General Industry – Licensed' which is a discretionary use in the Industry Zone.

The City of Cockburn granted approval to commence development, subject to conditions, for the proposed development of Industry – General (Licensed) – Battery Recycling Facility on 31 March 2020. The approved proposal is consistent with the proposal subject to the assessment within this Decision Report.

4.4 Water Corporation approvals

Any wastewater discharged from business or industry, other than that which comes from staff amenities or office facilities, is classed as trade waste. The Applicant intends on disposing of treated, non-contaminated wastewater to the sewer network, therefore the Applicant obtained approval from the Water Corporation for a Trade Waste Permit effective from 20 January 2022.

The Trade Waste Permit includes general conditions including:

- The concentration of lead is not to exceed 1 mg/L;
- The pH must be within the range 6 – 8 pH units upon discharge to sewer;
- The concentration of phosphorus is not to exceed 150 mg/L;

- Effluent from the separator treatment process is not an approved waste stream and shall not be discharged to sewer, neither directly nor through the wastewater treatment plant;
- The maximum instantaneous discharge rate to sewer is not to exceed 3 L/s; and
- The volume of trade waste discharge is not to exceed 35 kL/day, in any one day. When the daily volume exceeds this value your trade waste permit will be reviewed and updated.

4.5 *Dangerous Goods and Safety Act 2004*

The materials which will be stored and handled onsite include the following substances which are classed as Dangerous Goods and regulated under the *Dangerous Goods and Safety Act 2004*:

- Sulphuric Acid
- Phosphoric Acid
- Diesel
- Used Lead Acid Batteries

The required site and driver licenses are issued and managed by the Department of Mines, Industry Regulation and Safety and will be obtained prior to operation of the Premises.

4.6 *Occupational Safety and Health Act 1984*

The Applicant has a requirement under the *Occupational Safety and Health Act 1984* to provide a safe working environment for all employees. The construction of specific aspects within the building provides for workers to safely enter and exit the warehouse environment. An air lock room operates under negative pressure to prevent the transfer of dust contaminants between the warehouse and the administration facilities. Workers will wear personal air quality monitoring devices and the Applicant will utilise static air quality monitors that both measure airborne dust and lead particles within the warehouse.

Workers will utilise the dirty change rooms to disrobe from personal protective equipment, which remains within the dirty change room or is laundered in the provided laundry next door, and then enter the clean change rooms to don street clothes. This will prevent the transfer of dust contaminants on clothing and shoes, out of the warehouse and into the environment.

Washing machines are fitted with a drain pump filter to capture any potential lead solids in the wastewater. This filter will be cleaned regularly, and wastes disposed of back into the reprocessing system. Any potential acid washed from clothing will be very small quantities so will be adequately neutralized by standard washing powders which are slightly alkaline. Waste washing water, after it has been filtered, is plumbed directly into the wastewater treatment system for disposal.

Key finding:

13. The Delegated Officer notes the use of an automated, enclosed, fully connected reprocessing system will reduce the potential for release of fugitive dust emissions, the use of an air lock room and stringent changing requirements will reduce the potential for transfer of contaminants from inside the warehouse into the environment. The Delegated Officer notes the OSH requirements meet the best practice requirements of the CEC (2016) and the WHO (2017).
14. The Delegated Officer notes these OSH requirements will be regulated under the *Occupational Safety and Health Act 1984*.

5. Modelling and monitoring data

5.1 Monitoring of noise emissions

The allowable assigned levels set out in regulation 8(3) of the *Environmental Protection (Noise) Regulations 1997* apply to noise emissions from the proposed Category 47 scrap metal recovery activities.

The Applicant conducted noise modelling as part of the application for operational activities at the Premises. The Applicant advised the proposed operating hours of the facility will be from 6am to 6pm, Monday to Saturday.

It is noted that the loudest noise source within the warehouse, the crusher (hammer mill), is tonal at the source in the 50 and 100 Hz bands. While the enclosures are concrete the level of attenuation at low frequencies are limited and the absence of tonality at the residential premises to the west is not certain. While it is unlikely to be an issue during the day given the modelled levels emitted and as the residential premises are adjacent to Stock Road which is emitting noise that will cause masking to the crusher noise, the proposal is intending to start at 6am which is during the night period of the *Environmental Protection (Noise) Regulations 1997*. There is the potential that the nighttime assigned level may be marginally exceeded (~1 dB) for a limited number of residential premises to the west, prior to 7am.

The daytime risk regarding noise impacts to the industrial premises located adjacent to the north, east and south of the premises is minimal.

Modelling indicates that neither the L_{A10} nor the L_{A1} noise sources will exceed the assigned levels at nearby industrial premises. The model assumed that all the doors on the northern façade of the building remain shut when the crusher (hammer mill) is operating. If the roller doors on the northern side of the building were to be open there is a potential that the L_{A10} assigned noise level could be breached at the industry to the north.

The Applicant confirmed that the roller doors on the northern façade of the warehouse will remain closed when the crusher (hammer mill) is in operation. The mill is quick to stop and restart so any need to open the doors does not significantly hinder processing time. In addition the expected deliveries of ULABs, input products and collection of waste products are at anticipated times of day so mill shutdowns and door opening can be accommodated as necessary to prevent noise emissions.

Key finding:

15. The Delegated Officer notes the proposed activities will exceed the allowable assigned noise levels where crusher (hammer mill) activities occur prior to 7am.
16. The Delegated Officer notes the proposed activities will only meet the allowable assigned noise levels if the doors on the northern façade of the building remain shut when the crusher (hammer mill) is operating.
17. The Delegated Officer notes the crusher (hammer mill) will be operated during commissioning activities and normal operations.

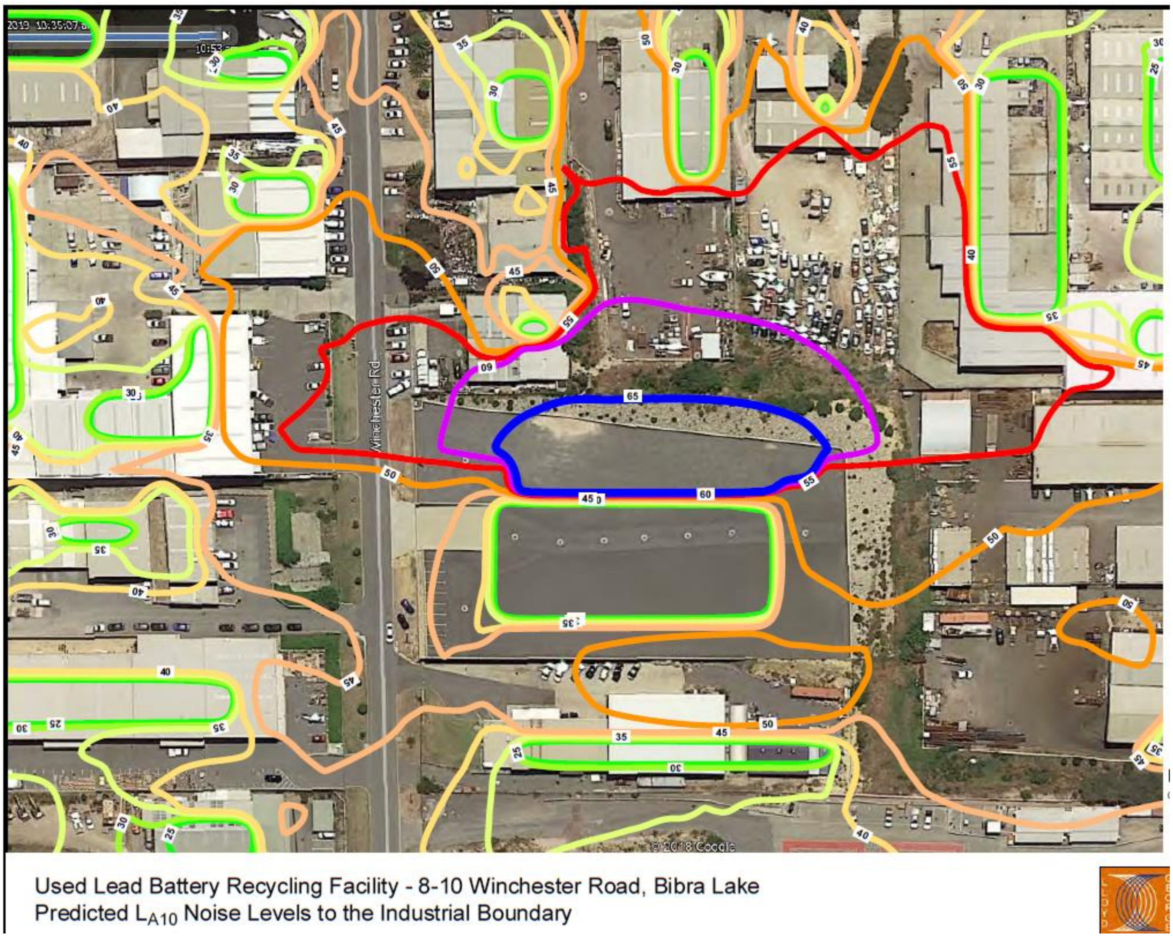

Figure 6: Noise modelling contour map for operations predicted L_{A10} levels

5.2 Monitoring of negative pressure

The Applicant has proposed the use of an automated, enclosed, fully connected reprocessing system to reduce the potential for fugitive emissions of sulphuric acid. The key indicator that the reprocessing system is free of leaks and defects is the ability to maintain negative pressure within the mist eliminator inlet pipe. As such, the works approval conditioned the requirement for the monitoring of pressure within the mist eliminator inlet pipe during each stage of commissioning.

The applicant monitored pressure at the inlet pipe over five days of wet testing and 16 days of full-scale testing during the commissioning phase of construction. Pressure testing over this time period ranged from -700 N/m^2 to -360 N/m^2.

Key finding:

18. The Delegated Officer notes maintaining a negative state within the reprocessing system indicates it has been constructed free of leaks and defects, and thereby meets the best practice requirements of the CEC (2016) and the WHO (2017).

5.3 Monitoring of sulphuric acid

The Workplace Exposure Standards for Airborne Contaminants (Safe Work Australia, 2019) advise the eight hour, time weighted average sulphuric acid concentration must not exceed 1.0 mg/m^3.

The Applicant has proposed the use of an automated, enclosed, fully connected reprocessing system that is to be operated under negative pressure to minimise fugitive emissions of sulphuric acid. The key indicator that the reprocessing system is free of leaks and defects is the ability to maintain negative pressure within the mist eliminator inlet pipe. As such, the works approval conditioned the requirement for the monitoring of sulphuric acid at the mist eliminator outlet pipe and at four locations within the warehouse during each stage of commissioning.

The applicant conducted ambient air sampling for sulphuric acid at the five required locations. Monitoring results showed the eight hour, time weighted average sulphuric acid concentrations ranged from 0.16 mg/m^3 to 0.32 mg/m^3 at the four locations.

Key finding:

19. The Delegated Officer notes ambient sulphuric acid levels were all less than 1 mg/m^3, thereby indicating the reprocessing system had been constructed free of leaks and defects, and thereby meets the best practice requirements of the CEC (2016) and the WHO (2017).
20. The Delegated Officer notes the ambient sulphuric acid levels comply with the workplace exposure standards of SWA (2019).

6. Risk assessment

The department assesses the risks of emissions from prescribed premises and identifies the potential source, pathway and impact to receptors in accordance with the *Guideline: Risk Assessments* (DWER 2020).

To establish a risk event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission.

6.1 Siting context

The Premises is located at 8 Winchester Road, Bibra Lake within the City of Cockburn. The area is zoned for industrial purposes which provides for manufacturing industry, the storage and distribution of goods and associated uses, which by the nature of their operations should be separated from residential areas. The Industrial Zone extends north and east to Spearwood Road and beyond, south to Barrington Street, and west to Stock Road.

The Premises is surrounded by light industrial businesses and associated offices along Winchester Road to the north and south and across Winchester Road to the west, as well as behind the block, to the east on Wellard Street (Figure 7).

Stock Road is 400m west of the Premises, beyond which is the closest residential development. Another residential development is 1000m south, beyond Barrington Street and across the railway lines.

Figure 7: Distance to sensitive receptors

6.2 Receptors

6.2.1 Residential and sensitive receptors

Table 6 below provides a summary of human receptors, in proximity to the Premises, which have a potential to be impacted from the site activities considered in this Decision Report. The risk assessment in section 6.5 considers these human and environmental receptors in the context of emissions and potential pathways.

Table 6: Residential receptors and distance from activity boundary

Sensitive Land Uses	Distance from Prescribed Activity
Industrially zoned offices and workplaces adjacent to the Premises	Immediately adjacent to the side boundaries of the prescribed Premises, along Winchester Road to the north and south and across Winchester Road to the west. Immediately adjacent to the rear boundary of the prescribed Premises, to the east on Wellard Street.
Residential Premises	470m west of the boundary of the prescribed Premises.

6.2.2 Specified ecosystems

Specified ecosystems are areas of high conservation value and special significance that may be impacted as a result of activities at or Emissions and Discharges from the Premises. Table 7 below provides a summary of environmental receptors, in proximity to the Premises, which have the potential to be impacted from the site activities considered in this Decision Report. The table has been modified to align with *Guidance Statement: Environmental Siting*.

Table 7: Environmental values

Specified ecosystems	Distance from the Premises
Threatened Fauna	• Priority 4 classified *Isoodon fusciventer* (southern brown bandicoot) located 770m south, 770m east, 810m east and 1180m north of the boundary of the prescribed Premises; • Endangered *Calyptorhynchus latirostris* (Carnaby's black cockatoo) located 1010m south west of the boundary of the prescribed Premises; and • Priority 4 classified *Oxyura australis* (blue-billed duck) located 1600m west of the boundary of the prescribed Premises.
Bush Forever	Market Garden Swamps classified as a Special Area, located 1730m west of the boundary of the prescribed Premises.
Threatened Ecological Communities (TEC)	Banksia Dominated Woodlands of the Swan Coastal Plain located 300m north, 990m north east, 715m east and 1375m north east of the boundary of the prescribed Premises. These Threatened Ecological Communities are recognised as potential refuge habitat for fauna.

6.3 Potential pathways

Emissions and discharges can follow pathways that lead from the Premises to the receptors mentioned above. Pathways identified within the local area include prevailing winds, rainfall as overland flow or as leachate to groundwater, which have been considered in the risk assessment in section 6.5. Further detail is provided on some of these pathways below.

6.3.1 Wind direction and strength

Prevailing wind patterns can provide a direct pathway for transmission of dust and odours by air, so the prevailing wind patterns that may carry these emissions to sensitive receptors have been considered. The closest Bureau of Meteorology (BoM) weather station which records wind frequency data is Perth Airport (BoM site 009021). Prevailing winds are from the east and north east in the mornings, and from the west and south west in the afternoons (Figure 8).

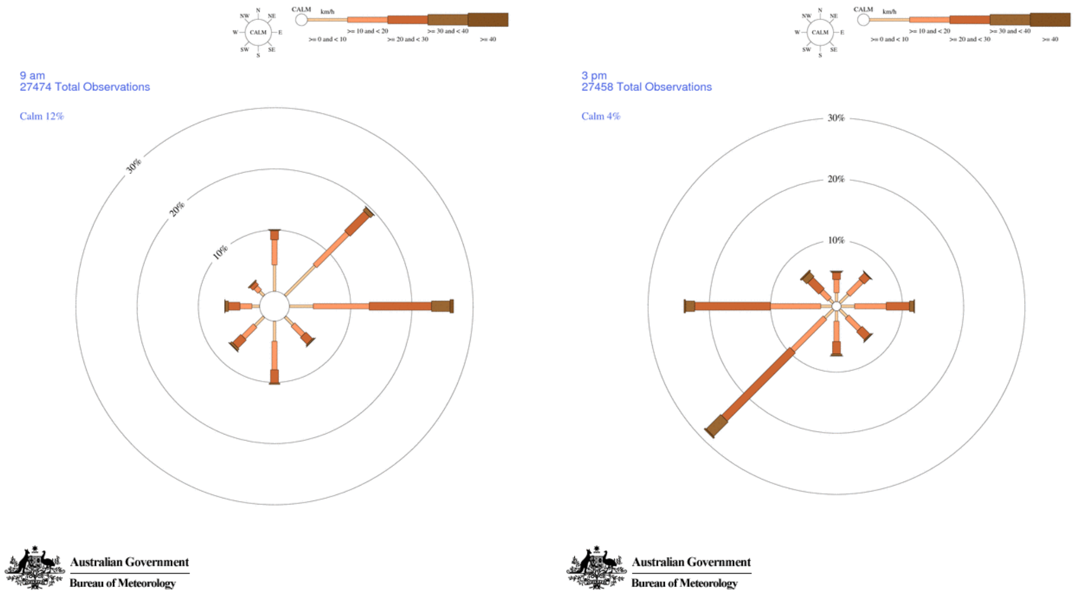

Figure 8: Annual wind rose for 9 am and 3 pm at Perth Airport site 009021

6.3.2 Rainfall

Rainfall as stormwater can contribute to emissions where the water becomes contaminated after coming into contact with wastes, then exits the Premises via overland flow or via leachate. Rainfall events that may carry these emissions to neighbouring sensitive receptors have been considered. The closest Bureau of Meteorology (BoM) weather station which records rainfall data is Perth Airport (BoM site 009021). Maximum average rainfall is received in June and July annually. Minimum average rainfall is received in November to March annually (Figure 9).

The Applicant has implemented various construction and control methods to prevent rainfall as stormwater entering the premises and prevent it from becoming contaminated, thereby reducing the risk of impacts from rainfall as stormwater. These controls and the associated residual risk are discussed in section 6.9.

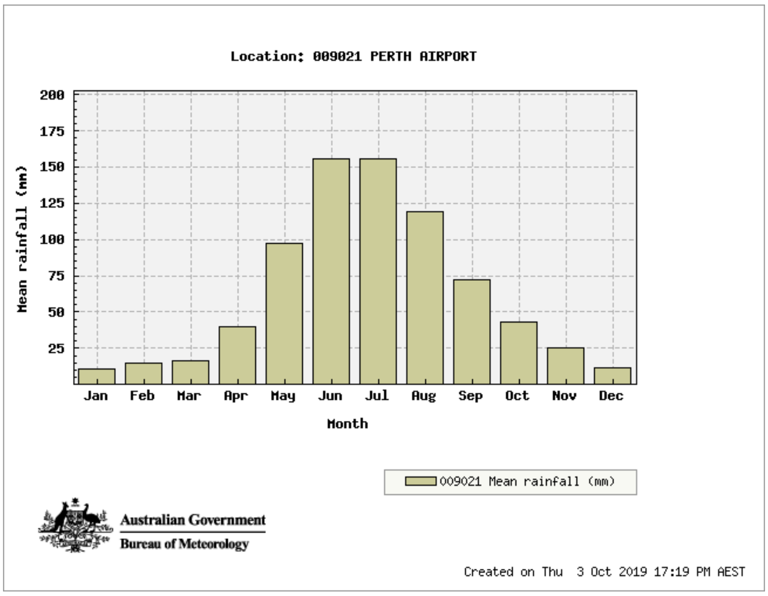

Figure 9: Average annual rainfall (mm) at Perth Airport site 009021

6.4 Applicant controls

The key emissions and associated actual or likely pathway during premises operation which have been considered in this decision report are detailed in Table 8 below. Table 8 also details the control measures the applicant has proposed to assist in controlling these emissions, where necessary.

Table 8: Proposed applicant controls

Emission	Potential pathways	Proposed controls
Operation		
Lead	Air / wind dispersion	The applicant has implemented various construction requirements, operating procedures and controls to prevent emissions and accidental spillage of lead and prevent the transfer of any potential lead dust outside of the warehouse. These are detailed in section 6.6.
Noise	Air / wind dispersion	Applicant controls to mitigate noise emissions during daytime operations include ensuring the roller doors are closed when the crusher (hammer mill) is in operation, ease of stopping the mill should the doors need to be opened, and scheduling delivery times to accommodate the mill shut down and door opening times. These

Emission	Potential pathways	Proposed controls
		Applicant controls ensure neither the L_{A10} nor the L_{A1} noise emissions will exceed the assigned levels at neighbouring industrial premises.
Vibrations	Ground	Vibrations transferred through the ground are absorbed by air bags installed in between the base of the crusher (hammer mill) and the ground.
Odour	Air / wind dispersion	The Applicant has selected a reprocessing system that does not require heating, melting or smelting, thereby does not generate fumes so will not generate odours.
Spills of hazardous chemicals	Direct discharge to land	The Applicant has selected a reprocessing system where all activities are mechanical, automated and will occur within entirely sealed equipment, which will prevent spills of hazardous chemicals, with the exception of the mouth of the crusher (hammer mill). The Applicant has installed plastic curtains and spray bars on the crusher (hammer mill) and will operate the mill under negative pressure via the mist eliminator, which will contain all materials and will ensure no spills of hazardous chemicals. The Applicant has a designated storage area for ULABs and the floor under all machinery involved with reprocessing is non-permeable concrete coated with an epoxy resin impervious to acid, to prevent deterioration to the floor from spills of sulphuric acid. The entire warehouse comprises a concrete slab bunded by a curb to prevent any escape of spilled liquids from the facility. A floor drain has been installed in the centre of the warehouse which will collect any spills should this occur. This drain discharges to the paste slurry tanks to reclaim any solids as well as enable treatment of liquors via the waste water treatment system. Should a spill occur, staff will be sufficiently trained in the use of the on-site spill kits to contain and collect the spill, plus the daily internal and external cleaning regime will provide further spill collection, with disposal back into the reprocessing system. The storage and handling of all chemicals at the Premises is regulated by the *Dangerous Goods and Safety Act 2004*. This regulates the packaging, the method of storage and which chemicals can and cannot be stored together, to prevent spills, cross contamination and adverse chemical reactions.
Spills of hydrocarbons from vehicles and equipment	Direct discharge to land	Diesel is required for the forklifts, front end loader and generator. Diesel storage will be within an above ground, self bunded 2,000 L storage tank. Diesel storage at this quantity is regulated by the *Dangerous Goods and Safety Act 2004*. Should a spill occur, staff will be sufficiently trained in the use of the on-site spill kits to contain and collect the spill, and correct disposal.
Contamination of stormwater from operation of infrastructure and/or firefighting	Overland flow Leachate to groundwater Discharge to stormwater system	The Applicant has concrete lined all external areas of the warehouse which will prevent leachate to groundwater and has installed a stormwater drainage system to direct uncontaminated stormwater away from the warehouse, off the Premises and into the City of Cockburn stormwater system. This will prevent stormwater from entering the warehouse and therefore from becoming contaminated. The Applicant has selected a reprocessing system that is contained

Emission	Potential pathways	Proposed controls
water		within entirely sealed equipment and located within a warehouse which will provide further separation from stormwater. The Applicant has constructed the stormwater drainage system to enable diversion of the system during a fire or other emergency scenario, to ensure contaminated firefighting water is retained on the Premises and prevented from being discharged to the City of Cockburn stormwater system.

6.5 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020) for each identified emission source and takes into account potential source-pathway and receptor linkages as identified in Section 6.2 and 6.3. Where linkages are in-complete they have not been considered further in the risk assessment.

Where the applicant has proposed mitigation measures/controls (as detailed in Section 6.4), these have been considered when determining the final risk rating. Where the delegated officer considers the applicant's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the licence as regulatory controls.

Additional regulatory controls may be imposed where the applicant's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 9.

Licence L9327/2022/1 that accompanies this decision report authorises emissions associated with the operation of the premises.

The conditions in the issued licence, as outlined in Table 9 have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

Table 9: Risk assessment of potential emissions and discharges from the premises during operation

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions[2] of licence	Justification for additional regulatory controls
Sources / activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
Operation								
Operation of infrastructure	Lead	Air / wind dispersion Impacting amenity and human health	Industrial offices and workplaces adjacent to the Premises and residential premises	See section 6.4	C = Moderate L = Rare **Medium Risk**	Yes	Conditions 1, 2, 5, 8, 9, 12 – 14 **<u>Conditions 10 and 11</u>**	See section 6.6
Operation of infrastructure	Noise	Air / wind dispersion Impacting amenity	Industrial offices and workplaces adjacent to the Premises and residential premises	See section 6.4	C = Minor L = Unlikely **Medium Risk**	Yes	Conditions 3 and 4	N/A
Operation of infrastructure	Vibrations	Ground Impacting amenity	Industrial offices and workplaces adjacent to the Premises and residential premises	See section 6.4	C = Moderate L = Unlikely **Medium Risk**	Yes	Condition 1	N/A
Operation of infrastructure	Odour	Air / wind dispersion Impacting amenity	Industrial offices and workplaces adjacent to the Premises and residential premises	See section 6.4	C = Slight L = Rare **Low Risk**	Yes	Condition 1	N/A
Operation of infrastructure	Spills of hazardous chemicals	Direct discharge to land Impacting human health, soil quality, degradation of surface water and groundwater quality	Industrial offices and workplaces adjacent to the Premises, residential premises and TEC communities	See section 6.4	C = Moderate L = Possible **Medium Risk**	Yes	Conditions 1 and 5	N/A

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions[2] of licence	Justification for additional regulatory controls
Sources / activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
Operation of infrastructure	Spills of hydrocarbons from vehicles and equipment	Direct discharge to land Impacting soil quality, degradation of surface water and groundwater quality	TEC communities	See section 6.4	C = Slight L = Unlikely **Low Risk**	Yes	Conditions 1 and 5	N/A
Operation of infrastructure and/or firefighting water	Contamination of stormwater	Overland flow, leachate to groundwater and discharge to stormwater system Impacting soil quality, degradation of surface water and groundwater	TEC communities	See section 6.4	C = Moderate L = Possible **Medium Risk**	No	Condition 1 **<u>Conditions 6 and 7</u>**	Contaminated firefighting water entering stormwater systems may cause low level off-site impacts to sensitive receptors. Whilst the likelihood of discharge of firefighting water is possible, the implementation of an adequate fire and emergency plan will mitigate the risk of this discharge occurring.

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the *Guideline: Risk Assessments* (DWER 2020).

Note 2: Proposed applicant controls are depicted by standard text. **<u>Bold and underline text</u>** depicts additional regulatory controls imposed by department.

6.6 Detailed risk assessment for lead emissions

6.6.1 Description of lead emissions

Used lead acid batteries from 3rd party suppliers will be received at the Premises for reprocessing. Batteries contain lead paste within the battery casing. During reprocessing, batteries are mechanically cut open in the crusher (hammer mill) and the shredder and the lead removed by specific chemical processes within the automated system. Manually breaking open batteries can release solid lead particles.

Where reprocessing equipment is not designed to be fully enclosed, has leaks or defects, or requires manual handling of product, the crushers (hammer mills) and shredders can release solid lead paste, which can dry on the warehouse floor and release lead dust if disturbed (CEC 2016; WHO 2017).

Lead emissions can also be discharged from damaged batteries, spills, leaks from machinery and washing machine wastewater from the laundry.

An air stack is not utilised in the reprocessing system, therefore stack emissions to air outside of the warehouse enclosure are not of concern.

6.6.2 Description of pathway for transmission

For the lead emission to be transmitted to receptors, either human or the environment, the lead must be emitted outside of the machinery and outside of the warehouse. In addition, it must be transmitted by a pathway, via human contact for example on shoes or clothing, via mechanical contact for example on the wheels of vehicles, or via environmental influences such as prevailing wind conditions (section 6.3.1) or flow of liquid.

6.6.3 Description of potential adverse impact from the emission

For lead to impact upon the health of a human, the body must be exposed to lead. The main routes of exposure and absorption of lead are inhalation, ingestion and, to a much lesser extent, dermal contact. The absorption of lead is greater in people with dietary deficiencies of iron or calcium. Once absorbed, lead is distributed to most organs of the body, including the central nervous system, liver and kidneys, but the largest proportion (up to 90% in adults) is stored in bone (WHO 2017).

Lead has an affinity for sulfhydryl groups and other organic ligands in proteins and can mimic other biologically essential metals, such as zinc, iron and in particular calcium. This enables lead to disrupt enzyme systems dependent on these ions. The toxic effects of lead are wide-ranging and affect almost all body systems including the gastrointestinal system, the endocrine system, the reproductive system and pregnancy, and can cause neurological, cardiovascular and renal effects (WHO 2017).

6.6.4 Applicant controls

The applicant has implemented various construction requirements, operating procedures and controls to prevent emissions and accidental spillage of lead and prevent the transfer of any potential lead dust outside of the warehouse. These include:

- Batteries will only be sourced from established 3rd party suppliers, with contractual agreements that all ULABs are to be supplied undamaged, intact, have not been previously drained of sulphuric acid and are adequately shrink-wrapped and strapped for transport. This will ensure no leakage of lead paste during transport, on arrival at the Premises or when stored within the warehouse.
- ULABs will be stored in the designated storage area within the shrink-wrapped packaging,

undercover and within the warehouse. This will ensure protection from the environment such as rain and heat, and ensure no leakage of lead paste during storage within the warehouse.

- The reprocessing plant is mechanised, automated and sealed equipment, with the exception of the mouth of the crusher (hammer mill), which will ensure no lead particles are emitted inside the warehouse. The warehouse structure will ensure no lead particles are emitted outside the warehouse.
- The mouth of the crusher (hammer mill) is fitted with plastic curtains, spray bars and operated under negative pressure via the mist eliminator. This will ensure no lead solids are emitted outside of the machinery.
- The mesh filter within the mist eliminator will be cleaned on a routine basis via either automatic cleaning or manual activation of the cleaning on a monthly basis. This will ensure no lead solids are emitted outside of the machinery.
- The shredder is operated at low rotational speed of 10 rotations per minute, which will minimise the contact with sulphuric acid and prevent splash back of sulphuric acid and the generation of mists.
- Should a battery be damaged or a leak occur from machinery, staff will be sufficiently trained in the use of the on-site spill kits to ensure any spills are contained and collected quickly, and the collected spill disposing of back into the processing system.
- Water from the mist eliminator, waste wash water from the laundry and collected spills will be disposed of back into the reprocessing system. This will ensure no lead is emitted to the Water Corporation sewerage system.
- The entire warehouse comprises a concrete slab bunded by a curb. This will prevent any spills and daily wash water being discharged from the warehouse.
- A floor drain will be installed in the centre of the warehouse which will collect any spills. This drain will discharge to the paste slurry tanks to reclaim any solids as well as enable treatment of liquors via the waste water treatment system. This will ensure no lead is emitted to the Water Corporation sewerage system.
- The designated storage area for ULABs and the floor under all reprocessing machinery will be non-permeable concrete coated with an epoxy resin impervious to sulphuric acid. This will ensure sulphuric acid does not erode the warehouse floor and will prevent subsurface seepage of lead.
- The internal area of the warehouse will be washed daily including all floors and the external of the processing equipment. This wastewater is disposed of into the reprocessing system. This will ensure that, should any spill of lead paste go unnoticed, the warehouse is adequately cleaned to collect any lead paste and return it to the reprocessing system.
- The external areas of the warehouse, being the carpark area, will be vacuumed daily with a road sweeper fitted with a HEPA filter, and the dust will be disposed of into the reprocessing system. This will ensure that, should any spill of lead paste go unnoticed, the warehouse is adequately cleaned to collect any lead dust and return it to the reprocessing system.
- An air lock room operates under negative pressure between the warehouse and the administration facilities as part of OSH requirements for onsite worker safety. This will prevent the movement of lead dust between the warehouse and the administration facilities, and therefore will control the potential for fugitive emissions outside of the building.
- Workers will utilise the dirty change rooms to disrobe from personal protective equipment, which remains within the dirty change room or is laundered in the provided laundry next

door, and then enter the clean change rooms to don street clothes. This will prevent the transfer of dust contaminants on clothing and shoes, out of the warehouse and into the environment.

- Workers will wear personal air quality monitoring devices and the Applicant will utilise static air quality monitors to detect airborne dust and lead particles within the warehouse.
- Washing machines are fitted with a drain pump filter to capture any potential lead solids in the wastewater. This filter will be cleaned regularly and wastes disposed of back into the reprocessing system. Any potential acid washed from clothing will be very small quantities so will be adequately neutralized by standard washing powders which are slightly alkaline. Waste washing water, after it has been filtered, is plumbed directly into the wastewater treatment system for disposal.

6.6.5 Key findings

The Delegated Officer has reviewed the information regarding lead emissions and has found:

1. The proposed Applicant controls will ensure there is a low risk of lead emissions during reprocessing activities, and such controls meet the best practice requirements of the CEC (2016) and the WHO (2017).
2. The Delegated Officer notes the overall risk of lead emissions during operation of the reprocessing plant is directly related to the effectiveness of the Applicant controls put into place during construction to ensure the reprocessing plant is entirely sealed.
3. The Delegated Officer notes that although lead is listed in the Workplace Exposure Standards for Airborne Contaminants (Safe Work Australia, 2019) it takes the form of lead arsenate, lead chromate, lead dust or lead fumes. Lead at the point in time of operating the crusher (hammer mill) is in a solid paste form therefore monitoring specifically for lead is not practical.
4. The highest risk of lead emissions is likely to be during any loading activities, being the manual movement of ULABs via forklift within the warehouse. Although batteries are unlikely to become damaged via dropping or incidental squashing due to the physical strength of the housing unit, damage could occur to the batteries via puncture from loading equipment. As the lead at this point in time is in the form of lead sulphate ($PbSO_4$) or lead oxide (PbO_2) which are both in a solid paste state not a dust state, and it will be located inside the warehouse, it will not be transferred by wind movements outside of the warehouse nor off-site at the time of the spill. It is considered that a spill of this nature is sufficiently manageable by trained staff, sufficiently contained by the processes in place, able to be sufficiently collected prior to the spill becoming dry and therefore dust-borne and sufficiently disposed of back into the reprocessing system.
5. During operation of the reprocessing plant, data collected from air quality monitoring within the warehouse environment in accordance with OSH requirements is considered by DWER as a measurable indicator of the potential for leaks and defects from the sealed reprocessing plant, which may potentially result in lead being emitted within the warehouse during normal operational conditions.

6.6.6 Consequence

If lead emissions occur via manual activities, the Delegated Officer has determined that the impact of lead emissions resulting from loading activities on-site will be minimal, and impacts off-site will be minimal. Therefore, the Delegated Officer considers the consequence of lead emissions to be **Moderate**.

6.6.7 Likelihood of Risk Event

The Delegated Officer has determined that lead emissions at a level that have to potential to impact human health at the boundary of the premises will probably not occur in most circumstances. Therefore, the Delegated Officer considers the likelihood of lead emissions to be **Rare**.

6.6.8 Overall rating of lead emissions

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix and determined that the overall rating for the risk of lead emissions via manual activities is **Medium**.

6.6.9 Justification for additional regulatory controls

The Delegated Officer notes the overall risk of lead emissions during operation of the reprocessing plant is directly related to the effectiveness of the Applicant controls put into place during construction and for ongoing maintenance to ensure the reprocessing plant is and remains entirely sealed.

To determine effectiveness of construction of the reprocessing system, the Delegated Officer applied commissioning conditions on the Works Approval to require negative pressure testing and air quality monitoring within the warehouse during reprocessing of a limited volume of ULAB product, to determine if the reprocessing plant was free of leaks and defects. Testing conducted during commissioning confirmed negative pressure was maintained and all air samples showed sulphuric acid remained less than 1 mg/m^3 which was indicative of the plant being free of leaks and defects.

As the risk of lead emissions is mitigated by adequate and ongoing prevention of leaks and defects within the reprocessing plant, the Delegated Officer shall enforce ongoing air quality monitoring conditions for negative pressure and sulphuric acid as operational conditions on the Licence. Detection of sulphuric acid will be an indicator of leaks and defects occurring within the reprocessing plant. The limit for sulphuric acid is set at 1.0 mg/m^3, which is in accordance with the eight hour time weighted average (Safe Work Australia, 2019).

Further, as soon as this limit is breached, the Delegated Officer has included conditions 10 and 11 on the Licence to ensure that the Licence Holder immediately isolates and ceases operating the plant, investigates the source of the limit breach and rectifies any issues, prior to recommencing operations. This will ensure that any leaks and defects in the reprocessing plant are immediately detected and rectified, to ensure emissions of lead are mitigated.

Discharges of chemicals may also be subject to the provisions of the *Environmental Protection (Unauthorised Discharges) Regulations 2004*.

7. Consultation

Table 10 provides a summary of the consultation undertaken by the department.

Table 10: Consultation

Consultation method	Comments received	Department response
Application advertised on the department's website on 30 March 2022 and the West Australian on 4 April 2022.	None	N/A
Letter inviting comment sent to surrounding premises and registered stakeholders on 30 March 2022.	DWER received one submission. DWER has removed any personal identifying references within the submissions, however has maintained the integrity of the concerns of the submitter. 1. Concern was raised relating to pollution of the environment – gas, noise, odour, dust affecting health 2. At 30,240 tonnes/annum the capacity is approx. 600 tonnes/week or 100 tonnes/day (for a 6 day week). The movement of this amount of material would result in a lot of traffic congestion in the area	1. This Decision Report has assessed the risks posed by all emissions and discharges from the prescribed activity in section 6. 2. Traffic management is a matter for consideration by the City of Cockburn.
City of Cockburn advised of proposal on 30 March 2022.	The City advised on 27 April 2022 they hold no objection to the issue of the licence.	N/A
Department of Health advised of proposal on 30 March 2022.	DOH previously commented on this site in August 2021. Our previous response recommended that "further information is submitted in relation to possible emissions during periods of unexpected shut down or malfunction, or during fire incidents at the site, including contingency measures to prevent contaminated firefighting water from entering the storm drainage systems, manage the quantity of waste and recycled product stored on site, and procedures to manage external (public) communications and emergency actions should a hazardous emission arise". Of course, these may already be in place and approved by other relevant agencies". However, this further information has not been provided to DOH. DOH requests that the proponent provides the further information outlines above in order that DOH can assess whether the proponent has satisfied "Commissioning Testing" requirements.	DWER has considered these comments within the scope of this assessment.
Applicant was provided with draft documents on 26 May 2022.	The applicant requested on 10 June 2022 that the definition for annual period aligns with the commencement date of the licence.	Annual period to be amended as requested.

8. Conclusion

Based on the assessment in this decision report, the Delegated Officer has determined that a licence will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

References

1. Australian Battery Recycling Initiative undated, *Used lead acid battery recycling. Packaging guidelines for used lead acid batteries. ULAB R4.*
2. Commission for Environmental Cooperation 2016, *Environmentally sound management of spent lead-acid batteries in North America: Technical guidelines*.
3. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
4. Department of Water and Environmental Regulation (DWER) 2020, *Guideline: Environmental Siting*, Perth, Western Australia.
5. DWER 2020, *Guideline: Risk Assessments*, Perth, Western Australia.
6. Safe Work Australia 2019, *Workplace Exposure Standards for Airborne Contaminants*.
7. World Health Organization 2017, *Recycling used lead acid batteries: health considerations.* Geneva.

Appendix 1: Application validation summary

SECTION 1: APPLICATION SUMMARY (as updated from validation checklist)					
Application type					
Works approval	☐				
Licence	☒	Relevant works approval number:	W6304/2019/1	None	☐
		Has the works approval been complied with?	Yes ☒ No ☐		
		Has time limited operations under the works approval demonstrated acceptable operations?	Yes ☒ No ☐ N/A ☐		
		Environmental Compliance Report / Critical Containment Infrastructure Report submitted?	Yes ☒ No ☐		
		Date Report received: 25/02/2022			
Renewal	☐	Current licence number:			
Amendment to works approval	☐	Current works approval number:			
Amendment to licence	☐	Current licence number:			
		Relevant works approval number:		N/A	☐
Registration	☐	Current works approval number:		None	☐
Date application received					
Applicant and premises details					
Applicant name/s (full legal name/s)	FTR Operations Pty Ltd				
Premises name	Nexus Recycling				
Premises location	8 Winchester Road, Bibra Lake				
Local Government Authority	City of Cockburn				
Application documents					
HPCM file reference number:	DER2022/000122				
Key application documents (additional to application form):	Technical documentation and environmental assessment Volume 1 Technical documentation and environmental assessment Volume 2				
Scope of application/assessment					
Summary of proposed activities or changes to existing operations.	Licence Operation of used lead acid battery reprocessing facility				
Category number/s (activities that cause the premises to become prescribed premises)					

Table 1: Prescribed premises categories

Prescribed premises category and description	Proposed production or design capacity	Proposed changes to the production or design capacity (amendments only)
Category 47 Scrap metal recovery: premises (other than premises within category 45) on which metal scrap is fragmented or melted, including premises on which lead acid batteries are reprocessed.	30,240 tonnes per annum	

SECTION 1: APPLICATION SUMMARY (as updated from validation checklist)		
Legislative context and other approvals		
Has the applicant referred, or do they intend to refer, their proposal to the EPA under Part IV of the EP Act as a significant proposal?	Yes ☐ No ☒	
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?	Yes ☐ No ☒	
Has the proposal been referred and/or assessed under the EPBC Act?	Yes ☐ No ☒	
Has the applicant demonstrated occupancy (proof of occupier status)?	Yes ☒ No ☐	Copy of Lease agreement lodged confirms Lessor name as Annandale, Lessee name as FTR Operations. The Lease is unsigned. Lease term is 10 years
Has the applicant obtained all relevant planning approvals?	Yes ☒ No ☐ N/A ☐	Approval: DA19/0810-4313588 Granted: 31 March 2020
Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	Yes ☐ No ☒	No clearing is proposed.
Has the applicant applied for, or have an existing CAWS Act clearing licence in relation to this proposal?	Yes ☐ No ☐	No clearing is proposed.
Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal?	Yes ☐ No ☒	Licence / permit not required.
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)?	Yes ☐ No ☒	
Is the Premises situated in a Public Drinking Water Source Area (PDWSA)?	Yes ☐ No ☒	
Is the Premises subject to any other Acts or subsidiary regulations (e.g. *Dangerous Goods Safety Act 2004, Environmental Protection (Controlled Waste) Regulations 2004, State Agreement Act xxxx*)	Yes ☒ No ☐	*Dangerous Goods Safety Act 2004* Trade Waste Permit from Water Corporation
Is the Premises within an Environmental Protection Policy (EPP) Area?	Yes ☐ No ☒	
Is the Premises subject to any EPP requirements?	Yes ☐ No ☒	
Is the Premises a known or suspected contaminated site under the *Contaminated Sites Act 2003*?	Yes ☐ No ☒	