



## Application for Licence

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

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<b>Licence Number</b>	L9356/2022/1
<b>Applicant</b>	Lunnon Metals Limited
<b>ACN</b>	82 600 008 848
<b>File number</b>	DWER2022/000509
<b>Premises</b>	Kambalda Nickel Project Foster/Warren Project M15/1568 (Part), M15/1570 (Part), M15/1572 (Part), M15/1571 (Whole), M15/1573 (Part), M15/1575 (Whole), M15/1549 (Part), M15/1569 (Part), M15/1574 (Part), M15/1670 (Part), M15/1669 (Part), M15/1668 (Part) As defined by the coordinates in Schedule 1 of the licence.
<b>Date of report</b>	15 February 2023
<b>Decision</b>	Licence granted

**Alana Kidd**  
**Manager, Resource 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 construction and operation of the premises. As a result of this assessment, licence L9356/2022/1 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 and overview of premises

On 30 September 2022, the applicant submitted an application for a licence to the department under section 57 of the *Environmental Protection Act 1986* (EP Act).

The application is to seek a licence for the installation and operation of mine dewatering infrastructure at the Foster/Warren premises (Table 1). The decision for the applicant to apply for a licence was the outcome of the scoping meeting held on 16 June 2022. The premises is one of many mining tenements owned by the applicant which are collectively referred to as the Kambalda Nickel Project (KNP). The premises is approximately 20 km south-east of Kambalda, immediately south-east of the St Ives Gold Mine (SIGM).

The proposal is limited to activities related to Category 6: Mine dewatering: premises on which water is extracted and discharged into the environment to allow mining of ore. Table 1 below outlines the proposal.

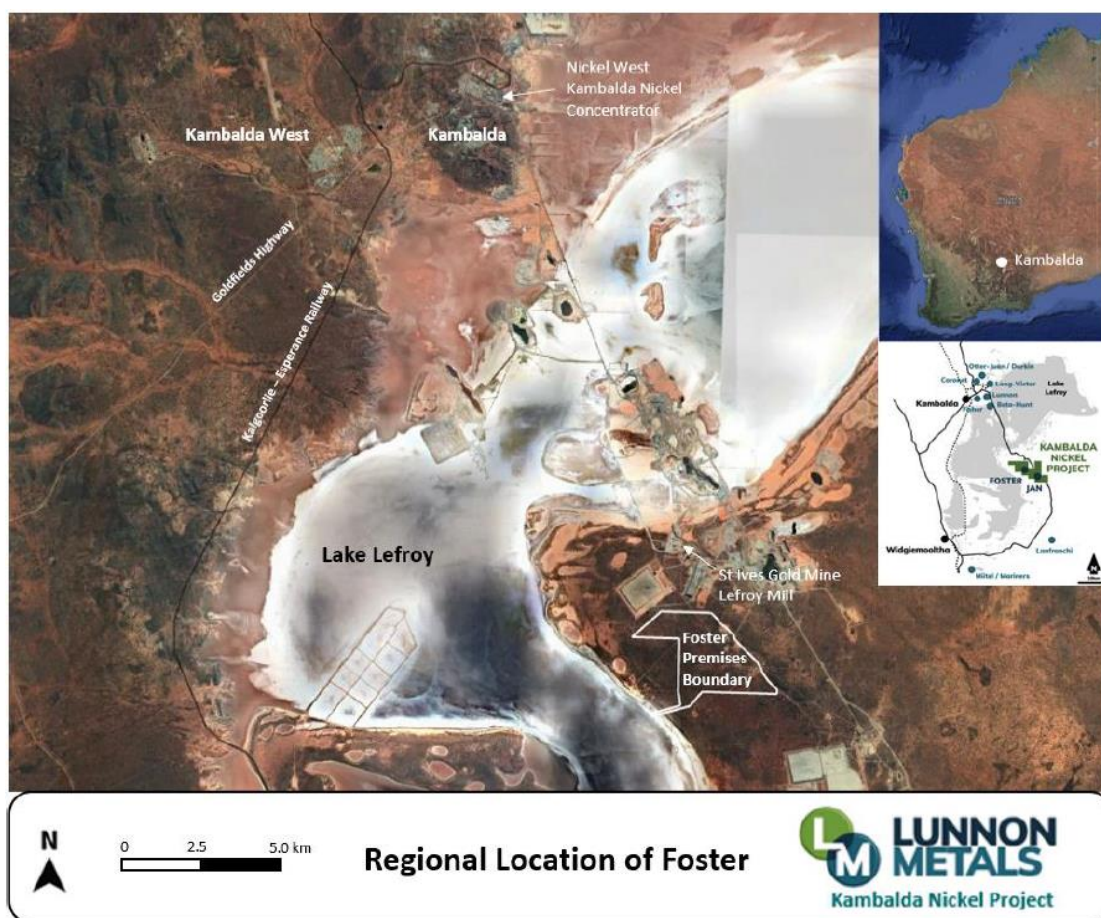
**Table 1: Proposed activity**

Category	Proposed design capacity	Description of proposal
6	1,700,000 tonnes per year	Dewatering from the Foster/Warren mine shafts to Lake Lefroy.

The premises relates to category 6: mine dewatering and assessed design capacity under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations) which are defined in licence L9356/2022/1. The infrastructure and equipment relating to the premises category and any associated activities which the department has considered in line with Guideline: Risk Assessments (DWER 2020) are outlined in licence L9356/2022/1.

#### 2.2.1 Proposed Activities

The applicant proposes to re-enter and rehabilitate the Foster/Warren declines to gain access and establish underground platforms to progress exploration and resource definition drilling. The Foster/Warren underground mine was mined for nickel by Western Mining Corporation (WMC) between 1984 and 1996 after which time the mine was closed and left to flood. The applicant consequently has the need to dewater Foster/Warren to gain access for this activity (Stage 1 dewatering), and then to maintain Foster/Warren in a dewatered condition ongoing (Stage 2 dewatering) enabling this activity to proceed safely. Any existing infrastructure is proposed to be used which will limit disturbance associated with the activities. Life of mine is estimated at 10 years.



**Figure 1: Regional Location of Foster/Warren Premises within the Kambalda Nickel Project**

## 2.2.2 Agreements with St Ives Gold Mine

### Option and Joint Venture Agreement

In order to conduct the operations, the applicant requires access to selected SIGM mining tenements to construct its dewatering pipelines from the Foster/Warren shafts and maintain access to a previously licensed discharge point (W14) on Lake Lefroy (Figure 2). An Option and Joint Venture Agreement (OJVA) has been executed between the applicant and SIGM in 2015 and continues to govern select commercial, environmental, and regulatory aspects of both the applicant and SIGM's activities on the tenements. The OJVA documented the necessity that the applicant's activities in relation to dewatering and related infrastructure on its tenements would require access to surrounding SIGM tenements to enable discharge at the relevant permitted discharge point. The OJVA contains approvals by SIGM for the applicant to access the relevant tenure and infrastructure, subject to the applicant complying with SIGM's authorisations in undertaking such activities.

### Access Deed

An Access Deed between the applicant and SIGM is an agreement which allows the applicant additional rights further to the OJVA. These rights include vehicle access to the Foster/Warren Project through St Ives tenements and Foster Access Track (Figure 3), to facilitate the construction of a dewatering pipeline from the Warren deposit to mining lease M15/1670.

The applicant leases mining tenements M15/1549, M15/1568, M15/1570-73 (Figure 4) and M15/1575, has obtained access via Letter Agreement to M15/1569 and M15/1575 and has

obtained access via Option and Joint Venture Agreement to M15/1669-70.

### 2.2.3 Other approvals

A 5C licence to take water was issued to Lunnon Metals on 4 October 2022. No clearing is required for the pipeline and associated dewatering infrastructure.

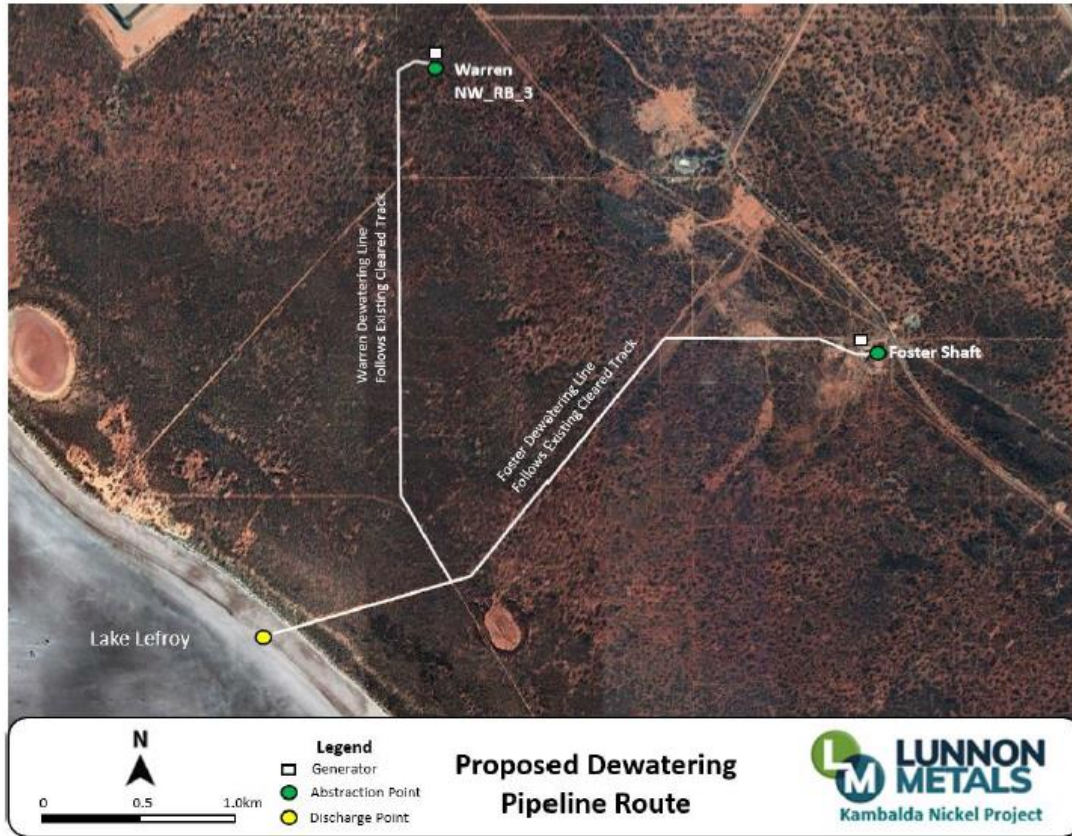


Figure 2: Proposed dewatering pipeline route

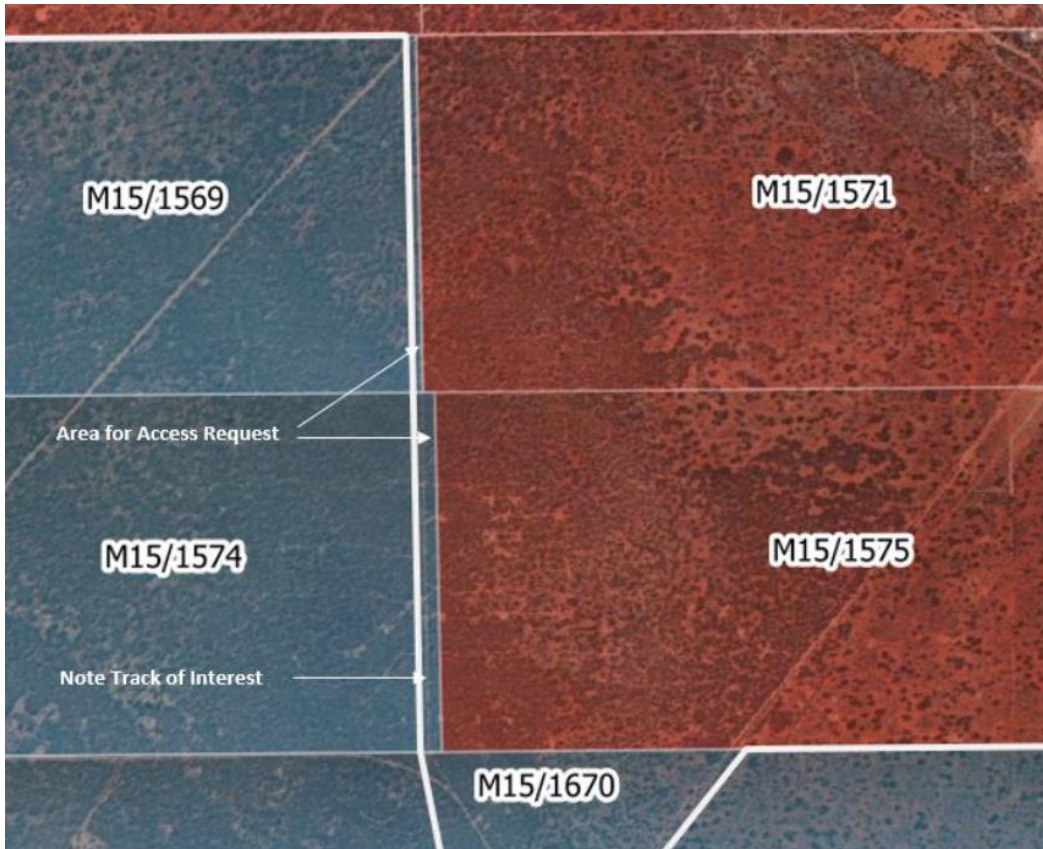


Figure 3: Foster access track



Figure 4: Lunnon and St Ives Leases relevant to the Foster/Warren Project.

## 2.2.4 Mine dewatering activities

The dewater from the pit is 1.57 GL of hypersaline groundwater and is proposed to be dewatered in two stages. The first stage is proposed to dewater the Foster/Warren pit at a maximum rate of 100 L/s (8.6 ML per day) for seven months (Figure 6).

Stage 2 proposes to maintain the belowground mining operations in a dewatered state at a rate of 0.65 GL per annum for underground rehabilitation and drilling activity to proceed safely (Figure 7).

## 2.2.5 Characteristics of mine dewater

Water quality characteristics of the Foster Shaft mine is derived from water samples taken in 2014 at depths of 0 m, 10 m, and 50 m, and in 2021 between 10 m and 50 m (Table 2). Little difference in water quality was observed between the two years. The water over this period was demonstrated to have neutral waters, low total dissolved (TDS) and suspended solids (TSS), and low nutrients. With depth, waters become increasingly hypersaline, and concentration of metals that are present, as well as TSS tends to increase. Where mine water exceeds the ANZECC guideline of 75 mg/L TSS for marine crustaceans, dewater must be passed through the sediment settling containers.

Five metals manganese, aluminium, chromium, nickel, and zinc were elevated above the 80% trigger value ANZECC Marine water quality guidelines 2000 (the guidelines) (Table 2). However, deeper in the pit aluminium and chromium were below the limit of reporting (LOR). Nutrients nitrate, ammonia and nitrite were low and showed no trends with water depth. All other metals and nutrients observed were within the guidelines.

These results are less saline than is recorded at Lake Lefroy, which ranges between 274,000 and 462,000 mg/L TDS and indicate that the water will not adversely affect the salinity of Lake Lefroy.

The metals of high concern when discharging into salt lakes (due to their bioaccumulation properties in wildlife) include zinc and copper, selenium. The average amount of zinc detected was over 100 times the low trigger value and the 95% protection trigger value of 0.015 mg/L in 2014 (2.04 mg/L) and in 2021 (2.17 mg/L) (Table 2) (ANZECC, 2000). However, given the high salinity with depth uptake and toxicity of zinc by marine invertebrates in Lake Lefroy should be reduced (ANZECC, 2000).

Copper was detected in trace amounts (0.01 mg/L) at the 50 m depth in 2014 (Table 2). Selenium was below the limits of reporting (LOR) in both years and was below the low reliability trigger of 0.003 mg/L in 2014 (Table 2). The LOR was higher than the trigger in 2021 (<0.1 mg/L) (Table 2) and therefore insufficient to determine whether selenium is present in harmful concentrations.



**Table 2: Water quality in Foster Shaft against guideline values**

Parameter	Units	Foster shaft (2014)			Foster Shaft (2021)	ANZG (2020) DGV 80% (marine)
		0m	10m	50m	10-50m	
pH	pH units	7	7.4	6.5	7.75	NG
Hardness/Alkalinity as CaCO <sub>3</sub>	mg/L	110	190	190	ND	NG
TDS (NaCl)		1000	31,000	270,000	62,800	NG
TSS		28	54	880	ND	NG
Major Cations (dissolved)						
Calcium, total (dissolved)	mg/L	28	280	820 (512)	399	NG
Sodium		320	9,900	70,000	10,300	NG
Potassium		16	130	1000	180	NG
Manganese		0.02	0.4	2.4	0.644	0.08 <sup>1</sup>
Mercury		<0.0002	<0.0002	<0.0002	<0.0002	0.0014
Major Anions (dissolved)						
Chloride	mg/L	390	16,000	130,000	26,700	NG
Nitrate		2.9	4.2	0.18	2.2	NG
Nitrite		<0.01	0.04	<0.01	<0.01	NG
Sulfate (as SO <sub>4</sub> <sup>2-</sup> )		210	3,100	17,000	5,070	NG
Heavy metals and metalloids (dissolved)						
Aluminium	mg/L	0.2	<0.1	<0.1	ND	0.0005 <sup>1</sup>
Antimony		ND	ND	<0.01	ND	0.270 <sup>1</sup>
Arsenic		<0.001	<0.001	<0.001	ND	0.0045 <sup>1</sup>
Cadmium		<0.002	<0.002	<0.002	0.0032	0.036
Chromium		0.09	<0.01	<0.01	<0.01	0.085
Cobalt		<0.01	<0.01	<0.01	ND	0.150
Copper (Cu <sup>2+</sup> )		<0.01	<0.01	0.01	<0.01	0.068 <sup>1</sup>
Iron, total		0.06	0.02	6.6	ND	NG
Lead		ND	ND	ND	<0.01	0.012
Nickel		0.75	0.28	0.25	0.153	0.56
Selenium		<0.001	<0.001	<0.001	<0.1	0.027 <sup>2</sup>
Strontium		0.08	1.3	4.1	3.58	NG
Zinc		0.08	0.65	5.4	2.17	0.08 <sup>2</sup>
Nutrients						
Ammonia (unionised)		0.1	0.6	3.3	ND	NG

ND – Not Determined

NG – Not Given

Note 1: Marine low reliability trigger value

Note 2: Recommended in literature for hypersaline conditions

## 2.2.6 Characteristics of the receiving environment

### **Flora and vegetation**

Numerous surveys of the area undertaken by SIGM and the applicant, have identified eight vegetation types. These include three eucalyptus woodland communities and one riparian vegetation within the broader SIGM project area. The condition across all vegetation types in the project area ranged from 'Completely Degraded' to 'Pristine'. The majority of the project area was mapped as 'Completely Degraded' due to historical disturbance. The eucalyptus woodland communities were found to be the most dominant and are likely to become impacted by large or sustained hypersaline spill events. No clearing is required for the pipeline, sediment settlement containers and associated infrastructure.

### **Fauna**

Fauna surveys within the SIGM project area found evidence of three vertebrate species of conservation significance:

- Malleefowl (*Leipoa ocellata*) (Vulnerable under the EPBC Act and WC Act)
- Rainbow Bee-eater (*Merops ornatus*) (Migratory under and WC Act)
- Fork-tailed Swift (Migratory under the EPBC Act and WC Act).

None of these species were recorded within the Foster-Warren Project area or its immediate vicinity.

### **Invertebrates**

Lake Lefroy is characterised as hyper-saline, having thick salt crusting, does not show significant decreases in salinity after rainfall events, and absence of valuable habitat, has seen a poor diversity of aquatic invertebrate fauna that would normally promote a lake's environmental value by attracting migratory birds (Stantec, 2018). Few microorganisms prevail, predominantly cyanobacteria, then diatoms and negligible phytoplankton productivity (Stantec, 2018). To date, the most commonly recorded aquatic invertebrate taxa include dipteran larvae, together with low numbers of copepods (*Calamoecia cf. salina* and *Meridiacyclops baylyi*) and brine shrimp *Parartemia*, which lay desiccant-resistant eggs (Stantec, 2018).

In addition, due to the absence of Quaternary alluvial deposits, the underlying geology of solid rock and hypersaline environment are also unlikely to support subterranean fauna.

Living in the salt crusts nearest to the discharge location, up to 100 m from the shoreline is a species of *Maratus* (genus of peacock spiders). Discharge should not significantly impact this species as further records of the same species can be found on and around Lake Lefroy, so the distribution of the species is not limited to the Project area. The discharge manifold is to be installed 100 m from the shore therefore most spiders should not be disturbed.

### **Lake Lefroy sediments**

Dewater is ultimately discharged into Lake Lefroy at discharge location W14 after suspended solids are reduced within the sea container sediment settlement system (Figure 5). St Ives Gold Mine (SIGM) sample sediments from current and historic discharge locations and provides the quality data as part of their annual environmental reporting (Figure 5).

Review of the 2015 through to 2021 Annual Environmental Reports found a range of metals in the sediment which are within or below the natural surface concentration or average-crustal abundance. These are iron, aluminium, manganese, chromium, zinc (Kenneth Barbalance, 1995-2022; Royal Society of Chemistry, 2022) (Table 3). The review also found sediments at the W14 discharge point had lower quantities of metals when compared to other nearby discharge locations (Table 3). Copper and nickel were slightly elevated when compared to the average crustal abundance, but this is unlikely to be significant (Table 3).



### Figure 2: Licence Condition 47 (b) Dewatering Location Map



#### LEGEND

#### Dewatering Points

- Active
- Inactive
- Proposed

0 2300 4600 6900 9200

Metres

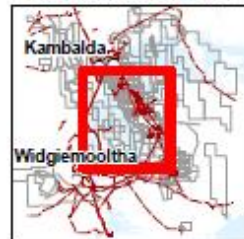


Datum: Geocentric Datum of Australia (GDA94)  
Map Grid: Map Grid of Australia (MGA)  
Projection: Universal Transverse Mercator Zone 51

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Date: 28/03/2022  
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#### SIG LEASE LOCALITY MAP



### Figure 5: St Ives Gold Mine dewatering point locations

Although water quality and sediment quality cannot be directly compared, trends can be observed to highlight abundant and non-abundant metals in both mediums. Manganese, iron, nickel and zinc were observed to be present in both the water and sediments (low concentrations in the sediments) (Table 3) therefore dewatering may be unlikely to significantly impact metal concentrations in the sediment and impact the existing Lake Lefroy ecosystem. Aluminium, chromium, cobalt, and selenium were present in only in the sediment which apart from some aluminium in the surface water, were below detection in the mine water. Cadmium only had trace presence in the water and is not likely to impact sediment concentrations (Table 3).

Of the three metals of concern for salt lakes, selenium sediment concentrations, as mentioned above, are higher than the natural surface concentrations, however since selenium was below detection in the mine water, concentration in the sediments are not likely to increase. Zinc concentrations are high in the water and are low in the sediments (Royal Society of Chemistry, 2023). High zinc which is likely reflective of natural deposits and speculation that galvanised pipes and ventilation-cans suspended in the shaft where water samples are taken may record concentrated results. Copper was below detection in both the mine water and in the sediment (Table 3).

These findings compliment the findings of the applicant who observed heavy metals in the groundwater to be similar to those from current SIGM discharge monitoring points at Lake Lefroy and therefore indicates the applicant's proposal will have a low likelihood of significant impacting Lake Lefroy from the dewater once settled out for sediments.

Dewater should be monitored after passing through the sea container sediment settlement system to ensure TSS, metals and other water quality factors are not significantly above the recommended ANZECC guidelines for marine environments.

**Table 3: Sediment Quality Averages**

Parameter	Sediment Quality Averages (mg/kg)					Average crustal abundance (ppm)
	W14: Foster	W8: Argo Hydroslide	W19: Incredible	W18: Invincible B	W10 Invincible A	Royal Society of Chemistry (2022)
pH	7.23	6.88	7.40	7.94	7.86	N/A
Aluminium	4,307	5,205	3,528	10,306	23,199	84,149
Arsenic	<5	<5	<9	8.2	<6.5	2.5
Beryllium	<1	<1	<1	<1	<1	1.9
Cadmium	<1	<1	<1	<1	<1	0.08
Copper	41	71.3	92.2	237.6	248	27
Chromium	3.8	18.2	9.5	12.2	13.6	135.0
Cobalt	<6	11.4	9.2	30.2	23.7	26.6
Iron	5,002	9,555	11,657	25,260	18,594	52,157
Lead	<5	<5	<7	8	7.3	11
Mercury	<0.1	<0.1	<0.1	<0.1	<0.1	0.03
Manganese	28.8	245.2	152.7	218.4	191.1	774
Nickel	47.8	81.5	31.8	82.8	85.3	26.6
Selenium	<5	<6	<5	<6	6	0.13
Vanadium	13.0	21.8	24.7	53.2	37.4	138
Zinc	<6.7	9.4	<9.7	29.6	24.7	72

*Note: Grey shaded values exceed average crustal abundances. Pale blue shaded values are the highest result among these select sample sites. Dark blue shaded values both above the average crustal abundance and is the highest result among these select sample sites.*

## 2.2.7 Mine dewatering infrastructure

### **Foster shaft**

The infrastructure required for the dewatering of the Foster mine includes installation of a genset and submersible pumps down the Foster Shaft and 3.66 km of HDPE pipe to the discharge point on Lake Lefroy.

### **Warren shaft**

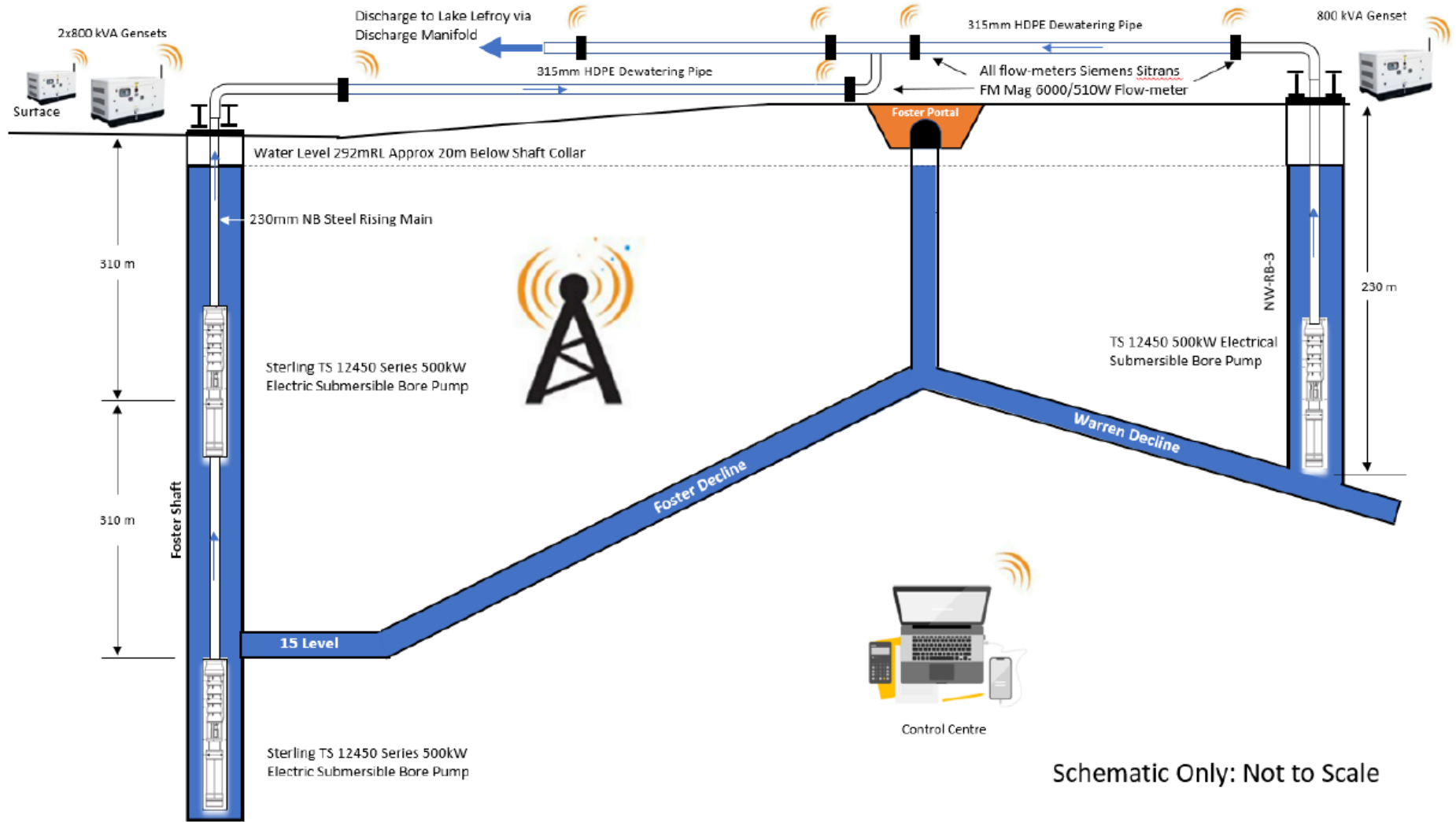
The infrastructure required for the dewatering of the Warren mine includes installation of a genset and submersible pump down Warren (NW\_RB\_3) shaft and 2.84 km of HDPE pipe, connecting to the Foster dewatering line.

### **Dewatering with sediment settlement containers**

The applicant describes the mine water in the mining voids as having accumulated over a period of 26 years, is settled, with no sediment loading, and is considered suitable for direct discharge onto Lake Lefroy. The Department considers all mine dewater to pass through the settlement containers to ensure TSS does not exceed 75 mg/L as per the ANZECC marine water guidelines 2000. Noting sampling at the discharge outlet is not to occur, the reduction of suspended solids needs to occur at source. The Department considers it necessary to sample for 6 months, the quality of the discharge water, to validate data provided from several years ago.

After initial dewatering and maintenance dewatering occurs alongside underground mine activity, the water is likely to contain sediment loading and therefore water will be sent to six/multiple sediment settlement tanks (Figure 8 and Figure 9) as follows:

- of sufficient capacity to allow for at least 5 hours retention prior to transfer for discharge onto Lake Lefroy;
- each sea container capacity is 75 kL or equivalent with capacity for 5 hours retention of dewater;
- is bunded;
- has a float switch to control pump(s); and
- has an isolation valve on each tank.



**Figure 6: Schematic of Stage 1 dewatering**

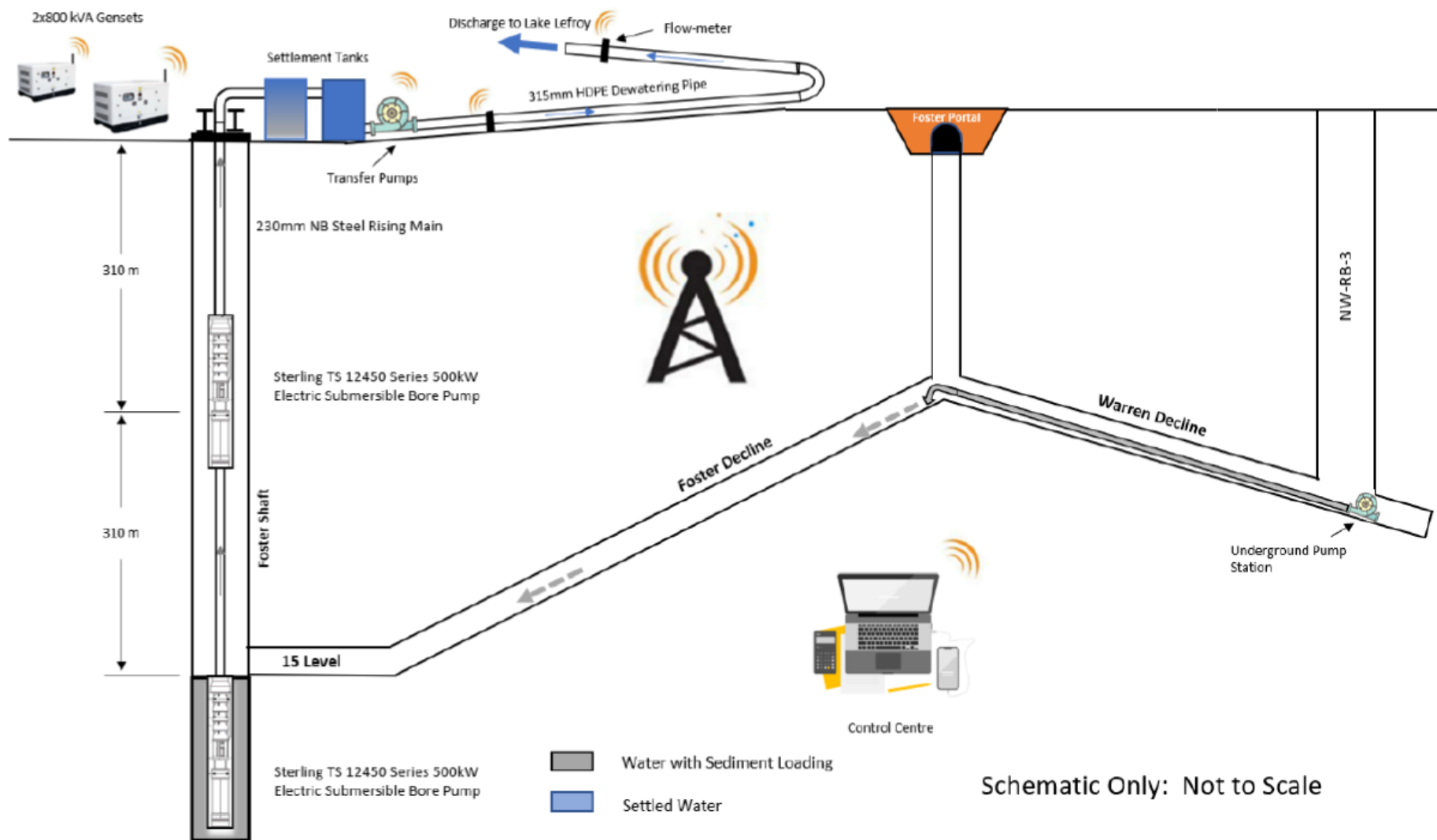
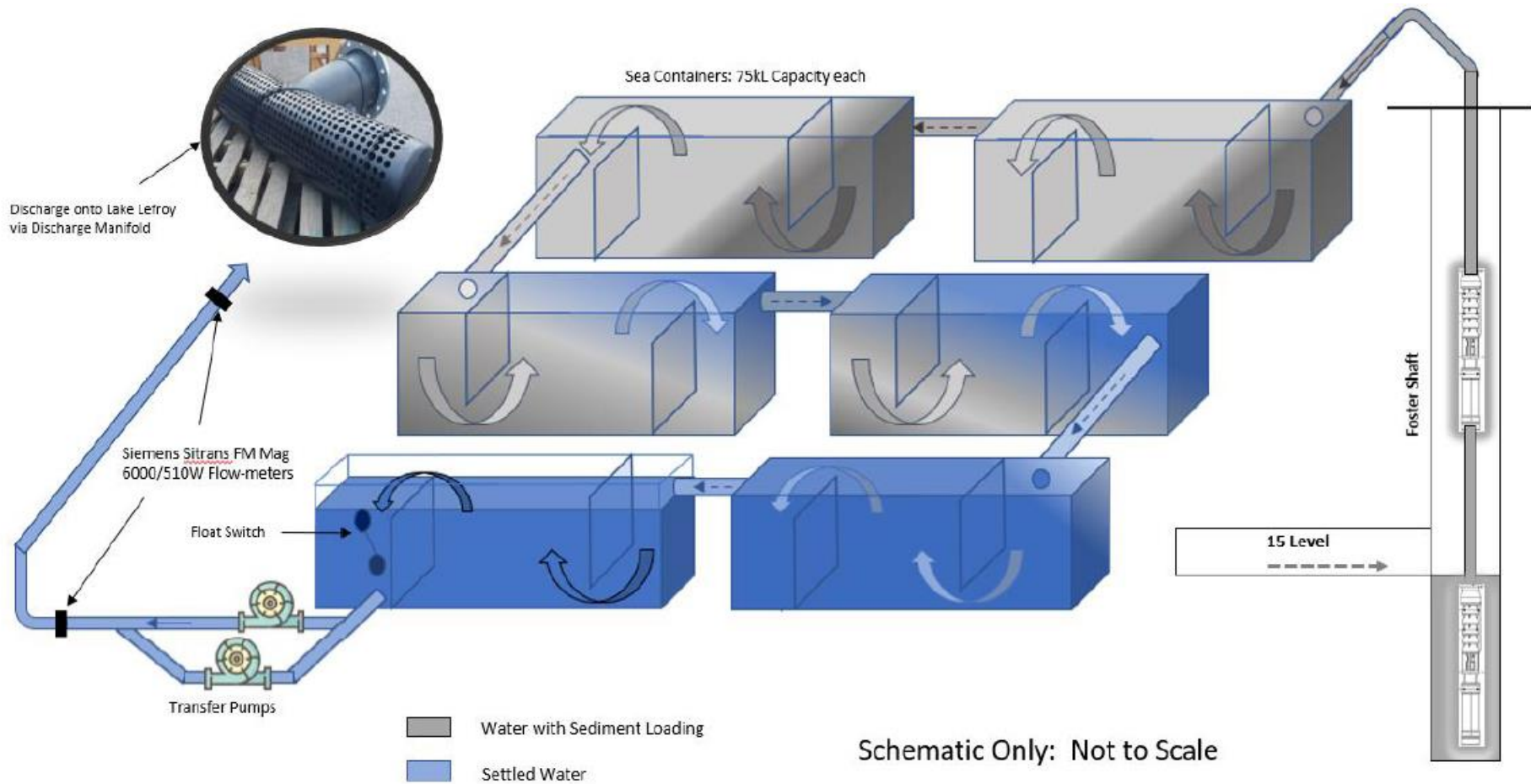


Figure 7: Schematic of Stage 2 dewatering



**Figure 8: Schematic of Stage 2 Dewatering Sediment Settlement Prior to Discharge**





**Figure 9: An example of sea container sediment settlement**

### 2.2.8 Lake Lefroy discharge point

The outfall of the pipeline at Lake Lefroy will be located 100 m beyond the shore to prevent potential erosion and risk to shoreline vegetation. The outfall location will have a manifold installed to reduce discharge velocity. Discharge pipe and manifold are assembled on land and positioned onto lake remotely from land base.

## 3. 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.

### 3.1 Source-pathways and receptors

#### 3.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during premises construction and operation which have been considered in this decision report are detailed in Table 4 below. Table 4 also details the control measures the applicant has proposed to assist in controlling these emissions, where necessary.

**Table 4: Proposed applicant controls**

Sources	Emission	Potential pathways	Proposed controls
<b>Construction</b>			
Installation of 6.5 km of dewatering pipelines from Foster and Warren mines to Lake Lefroy.	Dust	Air / windborne pathway	Dust suppression and visual checks. The impact from vehicle movements is not likely to be greater than the mining operations.
<b>Operation</b>			
<b>Stage 1 Dewatering</b>			
Dewatering Foster and Warren mines to Lake Lefroy.	Hypersaline spill from pipeline failure	Soak through the ground and sediment	Pipelines to be installed in a v-drain. Pipelines to be fitted with leak detection, telemetry control with automatic shutdown capability. Daily visual inspections.
	High pressure dewater discharge	Scouring of lakebed and embankments	Discharge via a manifold to reduce discharge velocity. Discharge point located 100m from shoreline to facilitate dispersal of hypersaline water away from lake shore and daily monitoring of water levels proximal to lake shore, and suspension of dewatering operations if necessary.
	Sedimentation from dewater discharge	Deposition onto Lake Lefroy	Water has been settling since mine closure so no additional settlement necessary. Daily monitoring for sedimentation of lake surface at discharge point.
Fuel storage in day tanks for the genset used to power the dewatering pump adjacent to the Foster and Warren mine shafts.	Hydrocarbon spill from day tanks.	Through the ground into the rootzone impacting vegetation.	Only a small amount of fuel will be stored within banded day tanks of the genset, therefore a hydrocarbon contamination will not be sizeable. Minor hydrocarbons shall be stored in banded areas with a capacity of holding 110% tank capacity, self-banded or double wall banded tanks. Gensets are required to have spill kits proximal, and all chemicals are to be correctly labelled. Inductions, training, and awareness is conducted on site and monitoring/housekeeping is carried out regularly. A Spill Management Procedure is in place on site.
<b>Stage 2 Dewatering (Includes Stage 1 risks with the addition of the risks below).</b>			
Dewatering to maintain the Foster/Warren mine in a dewatered state to enable the underground operations to proceed safely.	Mine dewater discharge containing high TSS.	Deposition onto Lake Lefroy	Dewatering infrastructure at Foster will include sediment settlement tanks with capacity for 5 hours retention prior to transfer and discharge onto Lake Lefroy.
	Hypersaline water spill from leak in settlement tanks.	Through the ground into the rootzone impacting vegetation.	Each settlement tank can be isolated via valving limiting the spill volume. Settlement tanks contained within bunding to prevent release of hypersaline water to the environment.

### 3.1.2 Receptors

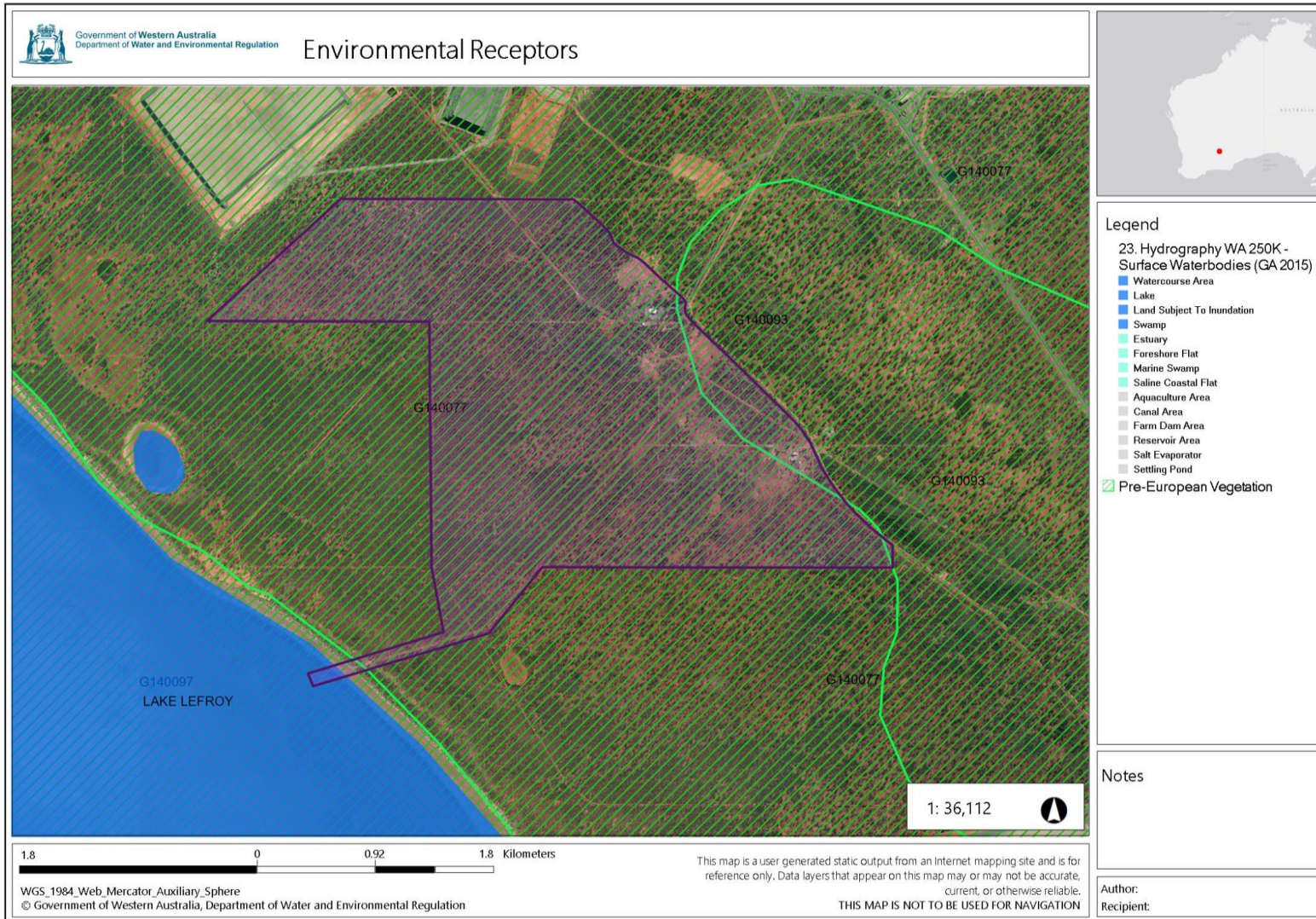
In accordance with the *Guideline: Risk Assessment* (DWER 2020), the Delegated Officer has excluded the applicant's employees, visitors, and contractors from its assessment. Protection of these parties often involves different exposure risks and prevention strategies, and is provided for under other state legislation.

Table 5 and Figure 10 below provides a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed premises (*Guideline: Environmental Siting* (DWER 2020)).

**Table 5: Sensitive human and environmental receptors and distance from prescribed activity**

Human receptors	Distance from prescribed activity
-	<i>There are no residential receptors within 1 km of the projects.</i>
Environmental receptors <sup>1</sup>	Distance from prescribed activity
Eucalyptus Woodland	<p>Immediately adjacent to the pipeline corridors are three woodland vegetation types. These are summarised into:</p> <ul style="list-style-type: none"> <li>• <i>Eucalyptus salmonophloia</i> isolated trees over <i>Eremophila</i> mid shrubland,</li> <li>• <i>Eucalyptus salubris</i> mid woodland over melaleuca tall shrubland, and</li> <li>• <i>Eucalyptus spp.</i> mid woodland over sparse mixed shrubland.</li> </ul> <p>Vegetation quality ranges from Completely Degraded to Pristine, with most of the area mapped as Completely Degraded due to the historical disturbance.</p>
Stormwater	<p>Surface water on the lake comes from two main sources:</p> <ul style="list-style-type: none"> <li>• Direct precipitation; and</li> <li>• Surface runoff (sheet flow) and stream discharge following significant rainfall events.</li> </ul>
Riparian Vegetation	<p>Located on the edge of Lake Lefroy. The dewatering pipeline will pass through and terminate within the lake. <i>Melaleuca thyoides</i> and <i>Jacksonia arida</i> mid to tall open shrubland over <i>Darwinia</i> sp. <i>Karonie</i> low sparse to open shrubland.</p>
Lake Lefroy surface water, sediments and associated groundwater	<p>Located 3 km to the southwest of the Foster and Warren mine shafts. Proposed discharge location for mine dewatering. Lake Lefroy is a Playa Lake which are prominent within the Salina Land Division and occur as branching and partly interconnected chains that outline fossil drainage systems. Due to high evaporation rates in the Goldfields, the groundwater salinity associated with Lake Lefroy ranges between 50,000 mg/L to greater than 300,000 mg/L Total Dissolved Solids (TDS). Water inputs mainly come from rainfall and surface run-off and minor inputs from groundwater inflows and mine water discharge.</p> <p>Surface water in Lake Lefroy is generally hypersaline and neutral to weakly acid with dominant sodium-chloride signatures and in some areas of the lake are high in calcium. Salinities of up to 462,000 mg/L have been recorded in the surface water. Due to the salt crusting on the lake, surface water from extensive rain events is unable to dilute the salinity below 123,000 mg/L TDS. Aquatic invertebrate fauna diversity has also been recorded as low due to the hypersaline environment.</p> <p>Heavy metals observed within the groundwater of the Foster Project area, are generally observed to be similar to those from current SIGM discharge monitoring points at Lake Lefroy.</p>
Vertebrate fauna	<p>A total of 33 vertebrate species were recorded during the field survey. Evidence of three vertebrate fauna species of conservation significance were recorded within the study area during the field survey:</p>

	<ul style="list-style-type: none"> <li>• Malleefowl (<i>Leipoa ocellata</i>) (Vulnerable under the EPBC Act and WC Act)</li> <li>• Rainbow Bee-eater (<i>Merops ornatus</i>) (Migratory under and WC Act)</li> <li>• Fork-tailed Swift (<i>Apus pacificus</i>) (Migratory under the EPBC Act and WC Act).</li> </ul>
<i>Maratus</i> sp. 'PES0340' (genus of peacock spiders)	<i>Maratus</i> sp. has a distribution on and around Lake Lefroy not limited to the Project area. It has been recorded living in the thick salt crusts on Lake Lefroy up to 100 m from the shoreline and in close proximity to the proposed discharge location. It is one of 16 short range endemic taxa recorded in the project area.
Aquatic vertebrate fauna	
-	There are no threatened fauna, flora, TECs, PECs, other specified ecosystems, or RAMSAR wetlands within 1 km of the pipelines.



**Figure 10: Distance to sensitive receptors**

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IR-T13 Decision report template (short) v3.0 (May 2021)

## 3.2 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 3.1. 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 3.1), 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 6.

Licence L9356/2022/1 that accompanies this decision report authorises emissions associated with the operation of the premises i.e. mine dewatering.

The conditions in the issued licence, as outlined in Table 6 have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

**Table 6: Risk assessment of potential emissions and discharges from the premises during construction and operation**

Risk events					Risk rating <sup>1</sup> C = consequence L = likelihood	Applicant controls sufficient?	Conditions <sup>2</sup> of works approval	Justification for additional regulatory controls
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
<b>Construction</b>								
Installation of dewatering pipelines from Foster and Warren mines to Lake Lefroy.	Dust	Air/windborne pathway impacting photosynthesis.	Eucalyptus Woodland	Refer to Section 3.1	C = Slight L = Unlikely <b>Low Risk</b>	Y	N/A	Dust generated during installation will be temporary and progress along the pipeline route.
			Riparian Vegetation					
<b>Operation</b>								
<b>Stage 1 Dewatering</b>								
Dewatering Foster and Warren underground mine workings directly to an existing discharge point (W14) on Lake Lefroy.	Hypersaline spill from pipeline failure	Through the ground into the rootzone impacting vegetation.	Eucalyptus Woodland	Refer to Section 3.1	C = Slight L = Possible <b>Low Risk</b>	Y	Conditions 1, 4, 5, 6, <b>12 and 14</b>	Installation and operational requirements, spill clean-up and discharge monitoring. Discharge monitoring - a drop in flow may indicate a leak.
			Riparian Vegetation					
	High velocity discharge to Lake Lefroy	Scouring of the lake sediments increasing TSS.	Displacement of invertebrate fauna in the salt crusting.	Lake Lefroy	Refer to Section 3.1	C = Slight L = Unlikely <b>Low Risk</b>	Y	Condition 1, 4, 7
<i>Maratus</i> sp. (Peacock spider)				Refer to Section 3.1	C = Slight L = Unlikely <b>Low Risk</b>			

Risk events					Risk rating <sup>1</sup> C = consequence L = likelihood	Applicant controls sufficient?	Conditions <sup>2</sup> of works approval	Justification for additional regulatory controls
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
	Sedimentation and metal accumulation from dewater discharge Brine shrimp	Deposition onto Lake Lefroy	Riparian Vegetation Lake Lefroy surface water and sediments Malleefowl Migratory birds	Refer to Section 3.1	C = Slight L = Unlikely <b>Low Risk</b>	Y	Condition 1, 4, 7, <b><u>8, 9, 12 and 14</u></b>	Installation of sediment settlement containers and daily inspection. Monitoring of TSS.
Fuel storage in bunded day tanks for the genset used to power the dewatering pumps at Foster and Warren shafts.	Hydrocarbon spill from day tanks.	Through the ground into the rootzone impacting vegetation. Direct contamination of stormwater	Eucalyptus Woodland Vegetation Stormwater	Refer to Section 3.1	C = Slight L = Unlikely <b>Low Risk</b>	Y	Conditions 1, 4, 5, 6 and <b><u>14</u></b>	Whilst the amount of fuel stored is small, genset tanks are to be bunded and all spills of environmentally hazardous material should be cleaned up.
<b>Stage 2 Dewatering (Includes Stage 1 risks with the addition of the risks below).</b>								
Dewatering to maintain the Foster/Warren mine in a dewatered state to enable the underground operations to proceed safely.	Mine dewater discharge containing high total suspended solids (TSS).	Impact to surface water quality including increased TSS.	Lake Lefroy	Refer to Section 3.1	C = Minor L = Unlikely <b>Medium Risk</b>	Y	Condition 1, 4, 7, <b><u>8, 9, 10, 11, 12, 13, 14 and 19</u></b>	Installation and daily inspections of sediment settlement containers. Authorised discharge with monitoring and investigation of TSS limits in discharge and soil, consistent with other local operators.
	Hypersaline water spill from leak in settlement	Through the ground into the rootzone impacting	Eucalyptus Woodland Vegetation		C = Minor L = Unlikely		Condition 1, 4, 5, 6, <b><u>12 and 14</u></b>	Installation and daily inspections of bunding, float switches and an

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Risk events					Risk rating <sup>1</sup> C = consequence L = likelihood	Applicant controls sufficient?	Conditions <sup>2</sup> of works approval	Justification for additional regulatory controls
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
	tanks.	vegetation.			Medium Risk			isolation valve on each tank. Clean-up of spills.  Discharge monitoring - a drop in flow may indicate a leak.

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. **Bold and underline** text depicts additional regulatory controls imposed by department.

## 4. Consultation

Table 7 provides a summary of the consultation undertaken by the department.

**Table 7: Consultation**

Consultation method	Comments received	Department response
Application advertised on the department's website 31 October 22	None received	N/A
DMIRS was provided with the application on 31 January 2023	DMIRS advised they have not yet received a Mining Proposal for this Project.	The Licence Holder will need to ensure all other approvals are in place.
Applicant was provided with draft documents on 2 February 2023	Refer to Appendix 1	Refer to Appendix 1

## 5. 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 and New Zealand guidelines for fresh and marine water quality. Volume 3, *Primary industries / Australian and New Zealand Environment and Conservation Council, Agriculture and Resource Management Council of Australia and New Zealand*.
2. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
3. Department of Water and Environmental Regulation (DWER) 2020, *Guideline: Environmental Siting*, Perth, Western Australia.
4. DWER 2020, *Guideline: Risk Assessments*, Perth, Western Australia.
5. Kenneth Barbalace. Periodic Table of Elements - Nickel - Ni. EnvironmentalChemistry.com. 1995 - 2022. Accessed on-line: 12/12/2022 <<https://EnvironmentalChemistry.com/yogi/periodic/Ni.html>>
6. Royal Society of Chemistry 2022. *Selenium*. <<https://www.rsc.org/periodic-table/element/34/Selenium>>
7. Royal Society of Chemistry 2022. *Zinc*. <<https://www.rsc.org/periodic-table/element/30/zinc>>
8. Stantec, 2018. B2018 Project: *Ecological Assessment of Lake Lefroy and Peripheral Wetlands*. The technical report is available from web site [https://www.epa.wa.gov.au/sites/default/files/PER\\_documentation2/Appendix%20O%20\(Ecological%20Assessment%20of%20Lake%20Lefroy%20and%20Wetlands\).pdf](https://www.epa.wa.gov.au/sites/default/files/PER_documentation2/Appendix%20O%20(Ecological%20Assessment%20of%20Lake%20Lefroy%20and%20Wetlands).pdf).

## Appendix 1: Summary of applicant's comments on risk assessment and draft conditions

Condition	Summary of applicant's comment	Department's response
Draft Licence		
Cover Page	We moved over Christmas, new address is: 10/33 Richardson St, West Perth WA 6005	Address details updated.
Cover Page	1,730,000 tonnes per year (see DR edits Section 2.2.2)	
Condition 4, Table 2	Gensets will be within containment bunding. Weekly service of gensets will be completed in the field, within containment bunding.	Removed line referring all maintenance to the KNP workshop, as bunding will be sufficient for weekly maintenance checks.
Draft Decision Report		
Section 2.2, Table 1	1,730,000 tonnes per year (see DR edits Section 2.2.2)	
Section 2.2.2* (actually 2.2.4)	Dewatering of 1.57GL at 100L/s plus recharge of 5L/s will require 1,730,000 tonnes per annum annual limit.	
Section 2.2.4 (actually 2.2.6)	W14 is correct.	No change.
Section 3.1.1, Table 4.	Gensets will be located within containment bunding and weekly servicing will be completed in-situ within the containment bunding.	Removed line referring all maintenance to the KNP workshop, as bunding will be sufficient for weekly maintenance checks.

## Appendix 2: Application validation summary

SECTION 1: APPLICATION SUMMARY (as updated from validation checklist)				
<b>Application type</b>				
Works approval	<input type="checkbox"/>			
Licence	<input checked="" type="checkbox"/>	Relevant works approval number:		None <input checked="" type="checkbox"/>
		Has the works approval been complied with?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>	
		Has time limited operations under the works approval demonstrated acceptable operations?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>	
		Environmental Compliance Report / Critical Containment Infrastructure Report submitted?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>	
		Date report received:	N/A	
Renewal	<input type="checkbox"/>	Current licence number:		
Amendment to works approval	<input type="checkbox"/>	Current works approval number:		
Amendment to licence	<input type="checkbox"/>	Current licence number:		
		Relevant works approval number:	N/A	<input type="checkbox"/>
Registration	<input type="checkbox"/>	Current works approval number:	None	<input type="checkbox"/>
Date application received	30 September 2022			
<b>Applicant and premises details</b>				
Applicant name/s (full legal name/s)	Lunnon Metals Limited (82 600 008 848)			
Premises name	Kambalda Nickel Project (Foster Project)			
Premises location	M15/1568 (Part), M15/1570 (Part), M15/1572 (Part), M15/1571 (Whole), M15/1573 (Part), M15/1575 (Whole), M15/1549 (Part), M15/1569 (Part), M15/1574 (Part), M15/1670 (Part), M15/1669 (Part), M15/1668 (Part)			
Local Government Authority	Shire of Coolgardie			
<b>Application documents</b>				
HPCM file reference number:	DER2018/001042-8-23			
Key application documents (additional to application form):	Option and Joint Venture Agreement – Attachment 8B Service Agreement – Attachment 8C Letter of agreement for SIGM to excise area from their prescribed premises Attachment 8D			

**SECTION 1: APPLICATION SUMMARY (as updated from validation checklist)**

**Scope of application/assessment**

Summary of proposed activities or changes to existing operations.	<p>Licence</p> <p>Construction and operation of 'Foster' dewatering infrastructure including installation of genset and submersible pumps down Foster Shaft and 3.66km of HDPE pipe to discharge point on Lake Lefroy.</p> <p>Construction and operation of 'Warren' dewatering infrastructure including installation of genset and submersible pump down NW_RB_3 and 2.84km of HDPE pipe, connecting to the Foster dewatering line.</p>
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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 6: mine dewatering	Estimated actual throughput not more than 1,261,440 tonnes per year. Maximum 3,153,600 tonnes per year.	

**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 <input type="checkbox"/> No <input checked="" type="checkbox"/>	Referral decision No: Managed under Part V <input type="checkbox"/> Assessed under Part IV <input type="checkbox"/>
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Ministerial statement No: EPA Report No:
Has the proposal been referred and/or assessed under the EPBC Act?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Reference No:
Has the applicant demonstrated occupancy (proof of occupier status)?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Certificate of title <input type="checkbox"/> General lease <input type="checkbox"/> Expiry: Mining lease / tenement <input type="checkbox"/> Expiry: Other evidence <input checked="" type="checkbox"/> Extract of Current Tenements Expiry: 23/12/2025 Option and Joint Venture Agreement Expiry: N/A
Has the applicant obtained all relevant planning approvals?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>	Approval: Expiry date: If N/A explain why?

SECTION 1: APPLICATION SUMMARY (as updated from validation checklist)		
Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	CPS No: N/A No clearing is proposed.
Has the applicant applied for, or have an existing CAWS Act clearing licence in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Application reference No: N/A Licence/permit No: N/A No clearing is proposed.
Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Application reference No: 050984 Licence/permit No:
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Name: Goldfields Groundwater Area Type: Proclaimed Groundwater Area Has Regulatory Services (Water) been consulted? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> Regional office: Goldfields
Is the Premises situated in a Public Drinking Water Source Area (PDWSA)?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Name: N/A Priority: N/A Are the proposed activities/ landuse compatible with the PDWSA (refer to <a href="#">WQPN 25</a> )? Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>
Is the Premises subject to any other Acts or subsidiary regulations (e.g. <i>Dangerous Goods Safety Act 2004, Environmental Protection (Controlled Waste) Regulations 2004, State Agreement Act xxxx</i> )	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Is the Premises within an Environmental Protection Policy (EPP) Area?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Is the Premises subject to any EPP requirements?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Is the Premises a known or suspected contaminated site under the <i>Contaminated Sites Act 2003</i> ?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Tenements: M15/1568, M15/1569, M15/1570 Classification: possibly contaminated – investigation required (PC–IR) Date of classification: 27 Feb 2020