



Application for Licence Amendment

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

Licence Number	L9012/2016/1
Licence Holder	Linden Gold Pty Ltd
ACN	138 222 705
File Number	DER2016/002205
Premises	Second Fortune Gold Mine Mining tenements M39/255, M39/649, M39/650 and miscellaneous licence L39/12 MENZIES WA 6436 (as defined by the Premises maps attached to the revised licence.
Date of Report	19 May 2022
Decision	Revised licence granted

Samara Rogers
A/MANAGER, RESOURCE INDUSTRIES
REGULATORY SERVICES

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

Table of Contents

1. Decision summary	1
2. Scope of assessment	1
2.1 Regulatory framework	1
2.2 Application summary	1
2.2.1 Proposed increase to Category 6 throughput limit	2
2.2.2 Proposed changes to site water management strategy	2
2.2.3 Proposed changes to groundwater monitoring program	5
2.2.4 Proposed inclusion of Category 89 activity	7
3. Risk assessment	7
3.1 Source-pathways and receptors	7
3.1.1 Emissions and controls	7
3.1.2 Receptors	9
3.2 Risk ratings	11
3.3 Detailed risk assessment for use of evaporation cannon	15
3.3.1 Proposed activity	15
3.3.2 Emissions	15
3.3.3 Pathway	15
3.3.4 Receptors	15
3.3.5 Proposed control	15
3.3.6 Risk assessment	17
3.4 Improvement conditions	18
4. Consultation	18
5. Conclusion	19
5.1 Summary of amendments	19
References	21
Appendix 1: Summary of Licence Holder's comments on risk assessment and draft conditions	22
Appendix 2: Application validation summary	24
Table 1: Proposed throughput changes	1
Table 2: Conceptual site water balance	4
Table 3: Standing water level during the 2020-2021 annual period	5
Table 4: Licence Holder controls	8
Table 5: Sensitive human and environmental receptors and distance from prescribed activity	10
Table 6. Risk assessment of potential emissions and discharges from the Premises during	

operation.....	12
Table 7: Consultation	18
Table 8: Summary of licence amendments	19
Figure 1: Monthly dewatering volumes.....	2
Figure 2: Groundwater monitoring bore location.....	3
Figure 3: Existing and proposed groundwater monitoring bore locations.....	6
Figure 4: Location of landfill sites within the premises.....	7
Figure 5: Vegetation condition surrounding the evaporation pond area.....	16
Figure 6: Location of evaporation cannons and extent of spray drift during trial	16
Figure 7: Proposed location of evaporation cannons and potential extent of spray drift.....	17

1. Decision summary

Licence L9012/2016/1 is held by Linden Gold Pty Ltd (Licence Holder) for the Second Fortune Gold Mine (the Premises), located at Menzies, Western Australia, on mining tenements M39/255, M39/649, M39/650 and miscellaneous licence L39/12.

This Amendment Report documents the assessment of potential risks to the environment and public health from proposed changes to the emissions and discharges during the operation of the Premises. As a result of this assessment, Revised Licence L9012/2016/1 has been granted.

2. Scope of assessment

2.1 Regulatory framework

In completing the assessment documented in this Amendment Report, the department 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 10 November 2021, the Licence Holder submitted an application to the department to amend licence L9012/2016/1 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act). The following amendments are being sought:

- Increase Category 6 production capacity to 420,000 tonnes per annual period (refer to Section 2.2.1);
- Changes to site water management to utilise excess mine dewater for dust suppression of the site's airstrip and gravel haul road from Second Fortune Gold Mine to Gwalia Processing Plant (refer to Section 2.2.2);
- Installation and use of evaporation cannons at the evaporation pond to remove excess mine dewater (refer to Section 2.2.2);
- Changes to groundwater monitoring program, including the construction of additional bores GW5 and GW6, and removal of limits to standing water levels for GW1 and GW6 (refer to Section 2.2.3); and
- Addition of Category 89 activity (putrescible landfill site) to the licence (refer to Section 2.2.4).

This amendment is limited only to the addition of Category 89 activity and changes to Category 6 activity from the existing licence. No changes to the aspects of the existing licence relating to Category 5 have been requested by the Licence Holder.

Table 1 below outlines the proposed changes to the existing licence.

Table 1: Proposed throughput changes

Category	Current throughput capacity	Proposed throughput capacity	Description of proposed amendment
5	156,000 tonnes per annual period (tpa)	-	No change proposed.
6	210,000 tpa	420,000 tpa	Increase in throughput capacity, as well as changes to controls and monitoring for managing risks associated with Category 6

			activity.
89	-	1,100 tpa	Addition of Category 89 activity to licence L9012/2016/1.

2.2.1 Proposed increase to Category 6 throughput limit

Under the existing licence L9012/2016/1, the Licence Holder is authorised to discharge 210,000 tonnes of mine dewater per annual period to the environment. The throughput limit was based on an estimated dewatering rate of 6 L/s in the underground workings (Rockwater 2013).

When the current Licence Holder acquired the premises and commenced dewatering in October 2020, the quantity of mine dewater discharged to the evaporation pond averaged at approximately 50,000 kL per month (Figure 1). The dewatering rate of 20 L/s was significantly higher than the initial rate proposed (i.e. 6 L/s). After the initial four months of dewatering to empty the flooded mining pit and underground workings, dewatering levels have stabilised at a lower level of about 33,500 kL per month. However, this is still a higher dewatering rate than predicted (i.e. 13 L/s).

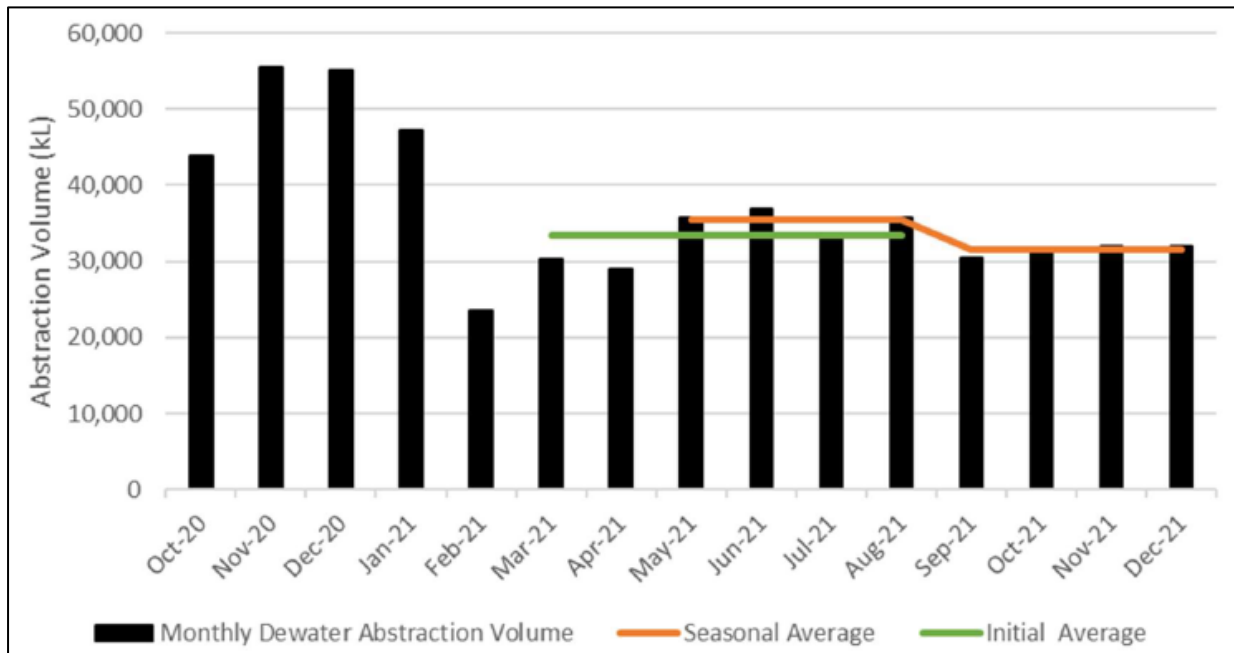


Figure 1: Monthly dewatering volumes.

Consequently, the dewatering quantity reporting during the July 2020 to July 2021 annual period was 357,260 m³, which exceeded the throughput limit of 210,000 m³ authorised by the existing licence (assuming one cubic metre is equivalent to one tonne, given the density of water), resulting in non-compliance.

To rectify this, the Licence Holder proposed to increase the throughput limit for mine dewater from 210,000 tonnes to 420,000 tonnes per annual period, through this amendment.

2.2.2 Proposed changes to site water management strategy

Given the large volume of mine dewater produced at the premises, appropriate water management strategies are required. Current operations primarily discharge all mine dewater to evaporation ponds located north of the premises.

While the evaporation ponds have a relatively large storage capacity of 85,000 m³, it is noted that the rate of evaporation (2.1 L/s; GRM 2020) is not sufficient to offset the rate of dewatering (13 L/s), resulting in a positive site water balance and constituting an increased risk of

overtopping and subsequent discharge to land.

Additionally, groundwater mounding has been observed in most of the groundwater monitoring bores around the evaporation ponds (Figure 2), likely also the result of the high dewatering volumes discharged to the ponds. This is further discussed in Section 2.2.3.

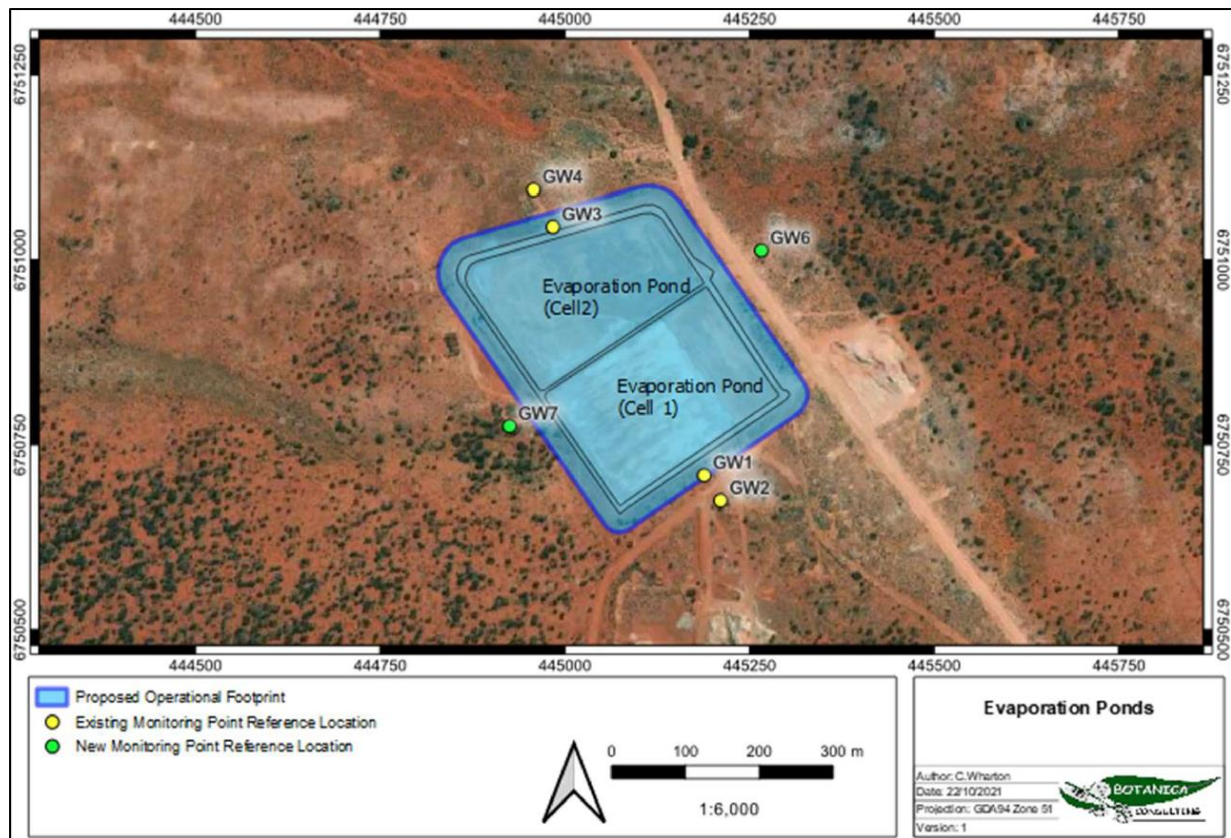


Figure 2: Groundwater monitoring bore location

The Licence Holder recognises that, in light of higher-than-expected volumes of mine dewater discharged to the evaporation ponds, this is not sustainable and has proposed several pathways to improve water use onsite to achieve a negative site water balance, which will reduce reliance on the evaporation ponds, risk of overtopping and the severity of seepage.

The primary opportunities for use of excess mine dewater are identified as follows:

- Currently, dust suppression occurs infrequently at the premises airstrip. Excess mine dewater could be beneficially reused to implement a routine dust suppression process;
- Excess mine dewater could be beneficially reused for dust suppression of the gravel haul road used to transport ore from Second Fortune Gold Mine to the Gwalia Processing Plant, spanning approximately 120 km. Currently, water trucks refill in Leonora prior to travelling to the premises. The proposed change would always have water trucks refill at the premises. Under this strategy, each water truck would increase the frequency of refill from once or twice, to up to four times per day, potentially more during the summer period; and
- The use of evaporation cannons to increase the rate of evaporation at the evaporation ponds, when required.

A conceptual site water balance was developed to demonstrate how implementation of these measures would allow the Licence Holder to effectively manage the increased dewatering production (Table 2).

Table 2: Conceptual site water balance

Inputs	Current (kL/day)	Proposed (kL/day)	Worst-Case Scenario (kL/day) Note 7
Dewatering	1123.2 Note 1		
Rainfall	57.3 Note 2		
Total Inputs	1180.5		
Outputs	Current (kL/day)	Proposed (kL/day)	Worst-Case Scenario (kL/day) Note 7
Dust suppression – Airstrip	0	360 Note 3A	270 Note 3B
Dust suppression – Haul road water truck	25	50	0
Dust suppression – Mine water truck	0	50	0
Evaporation – Evaporation ponds	0	0 Note 4A	135 Note 4B
Evaporation – Evaporation cannons	432 Note 5A	432	195.8 Note 5B
Recycle – Underground mine use	604.8 Note 6	604.8	604.8
Total Outputs	1061.8	1496.8	1205.6
Overall water balance Note 8	118.7	-316.3	-25.1

Note 1: Based on current dewatering production of 13 L/s, including natural recharge and recirculation of seepage from evaporation ponds.

Note 2: Based on long-term monthly averages from the nearest Bureau of Meteorology rainfall recording stations (i.e. average of monthly rainfall from station numbers 12045, 12052 and 12046). Calculated by dividing monthly average rainfall by days in year, then multiplied by pond surface area (86,500 m²).

Note 3A: 90 tonne water truck multiplied by conservatively four loads per day.

Note 3B: 90 tonne water truck multiplied by conservatively three loads per day.

Note 4A: Evaporation cannons are only required as contingency during the winter period, where natural evaporative loss may not be sufficient.

Note 4B: Based on a 12/5 L/s estimate, with conservative evaporation rate of 30 % (i.e. 4.2 L/s) and a conservative ten-hour per day operational timeframe. Evaporation rates depend greatly on meteorological conditions, such as temperature, relative humidity and is estimated to range between 30 % (during winter) to 55 % (during summer). Additional evaporation cannons can be installed to increase overall evaporation, if required.

Note 5A: Based on long-term monthly evaporation averages sourced from the Kalgoorlie-Boulder Bureau of Meteorology weather station. Calculated by multiplying total evaporation (adjusted with a correction factor of 0.75 for Class A pan rates) by the minimum pond surface area (85,000 m²). The derived value is in line with estimates provided by Rockwater (2013).

Note 5B: Derived using the same method as Note 5A. However, only evaporation averages for winter months (i.e. June, July and August) were included.

Note 6: Based on estimate of 7 L/s, calculated by subtracting the dewatering rate (13 L/s) by natural recharge rate in the underground workings (6 L/s).

Note 7: Worst-case scenario outputs derived using data from winter months, to reflect reduced rates of evaporation.

Note 8: Red cell shading represents net positive water balance (i.e. excess mine dewater), while green shading represents net negative water balance.

It is expected that the water balance will experience seasonal fluctuations, with higher evaporation rates occurring during summer, compared to winter. The worst-case scenario modelling shown in Table 2 demonstrates that a negative water balance can still be maintained despite lower evaporation rate and reduced requirements for dust suppression.

Over time, the reliance on the evaporation ponds will be alleviated, which will reduce seepage of mine dewater and minimise reintroduction of seepage water into the superficial aquifer. Issues relating to seepage and groundwater mounding are further elaborated in Section 2.2.3.

2.2.3 Proposed changes to groundwater monitoring program

Since dewatering activities recommenced in October 2020, standing water levels (SWL) at the groundwater monitoring bores located at the evaporation ponds were found to be decreasing over time (i.e. becoming shallower). Quarterly SWL measurements are provided in Table 3.

A rising water table was also observed in the 2017/2018 annual period, when mine dewater was deposited at the evaporation ponds by the previous Licence Holder, reaching a peak SWL of 1.87 m below ground level (mbgl) at monitoring bore GW4. Thus, it is likely that seepage is occurring at the evaporation ponds and causing mounding in the surrounding groundwater table.

Table 3: Standing water level during the 2020-2021 annual period.

Monitoring bore ID	Annual period	Monitoring event	Standing water level (mbgl)
GW1	2020	Quarter 3	Dry
		Quarter 4	8.9
	2021	Quarter 1	5.6
		Quarter 2	6.1
GW2	2020	Quarter 3	Dry
		Quarter 4	Dry
	2021	Quarter 1	4.22
		Quarter 2	4.05
GW3	2020	Quarter 3	Dry
		Quarter 4	6.60
	2021	Quarter 1	4.25
		Quarter 2	4.05
GW4	2020	Quarter 3	Dry
		Quarter 4	Dry
	2021	Quarter 1	4.72
		Quarter 2	4.42

Note: Data obtained from Botanica Consulting (2021).

The evaporation ponds were constructed in accordance with works approval W5474/2013/1, where the base of the ponds was lined with at least 300 mm of compacted soil lining to reduce

the permeability of the natural surface. The permeability of the soil sourced from the premises was estimated to be between 10^{-6} to 10^{-8} metres per second (m/s), which did not meet the best practice target for liner permeability of 10^{-9} m/s.

Rehabilitation works to improve the permeability of the base was undertaken by the Licence Holder in October 2020, prior to commencing dewatering (Saltbush Contracting 2020). No permeability testing was undertaken to assess the efficacy of rehabilitation works.

To address the increasing SWL at the evaporation ponds, the Licence Holder proposed to reduce the volume of mine dewater deposited into the evaporation ponds (refer to Section 2.2.2). In addition, the Licence Holder intends to establish a 25 m buffer one around the evaporation zone, such that SWL limits do not apply within the buffer zone, where monitoring bores GW1 and GW3 are located within.

In liaising with the department, the Licence Holder proposed replacing GW1 and GW3, with GW6 and GW7 at the eastern and western portion of the evaporation pond, outside the 25 m buffer zone, to improve the monitoring coverage of the bore network (Figure 3). The construction details of the two bores are not known, as its likely they were installed in 2017 or earlier to monitor and investigate historical groundwater mounding at the evaporation ponds.

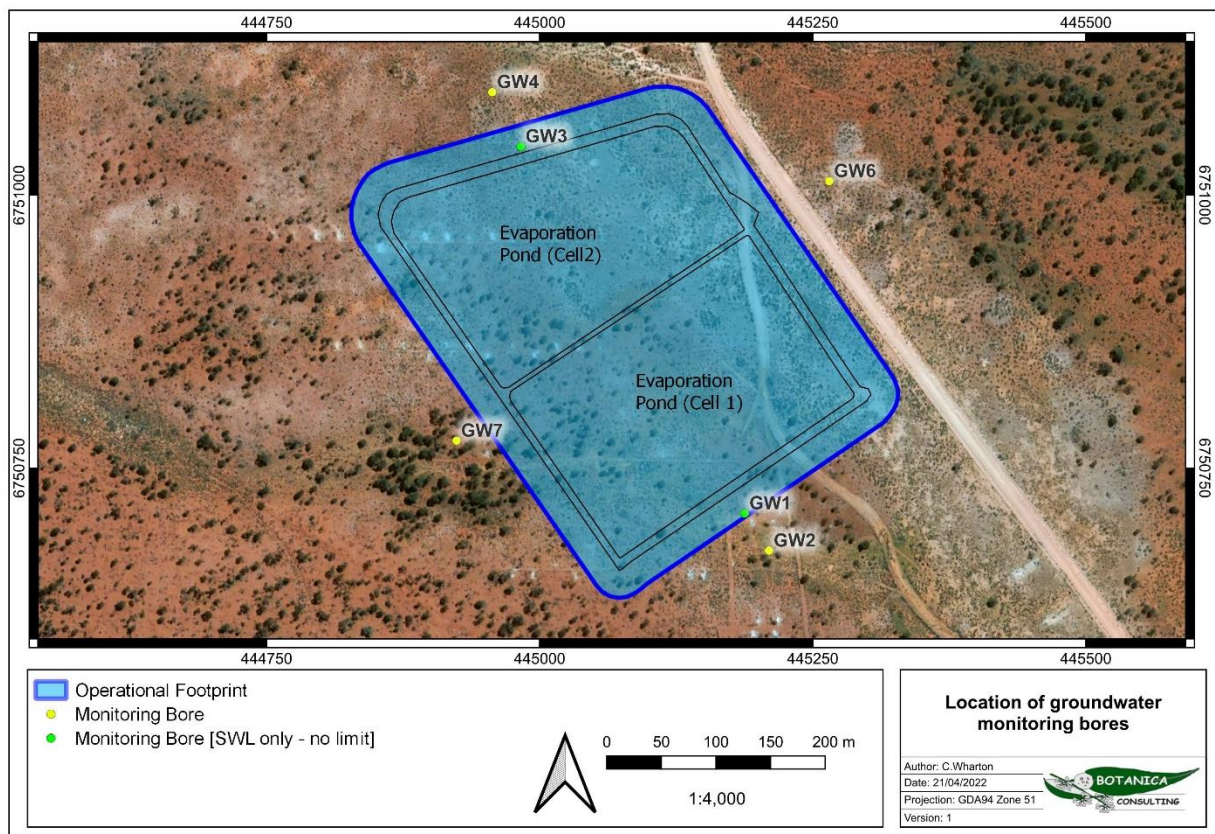


Figure 3: Existing and proposed groundwater monitoring bore locations

It was noted that the depth of the six monitoring bores is not currently known. As such, it is difficult to obtain a better understanding of the natural, pre-seepage depth to groundwater at the evaporation ponds.

Furthermore, the Licence Holder has noted that GW1 was observed to have collapsed during the February 2022 groundwater monitoring event. The Licence Holder has committed to repairing the bore, such that it is adequately operational for monitoring purposes.

2.2.4 Proposed inclusion of Category 89 activity

There are currently two landfill sites within the premises boundary: Alawa Landfill and North Landfill (Figure 4). Historical disposal quantities were low and did not necessitate a registration under the EP Act. However, it was anticipated that projected waste quantities would increase to approximately 26 tonnes of putrescible waste and over 1,000 tonnes of inert waste annually, triggering the requirement for regulation as a Category 89 activity.

The Alawa Landfill is almost at capacity and will be decommissioned soon. Hence, all waste disposal will be undertaken at the North Landfill, which is located between the evaporation ponds and the Second Fortune mine pit, adjacent to the main waste rock dump.

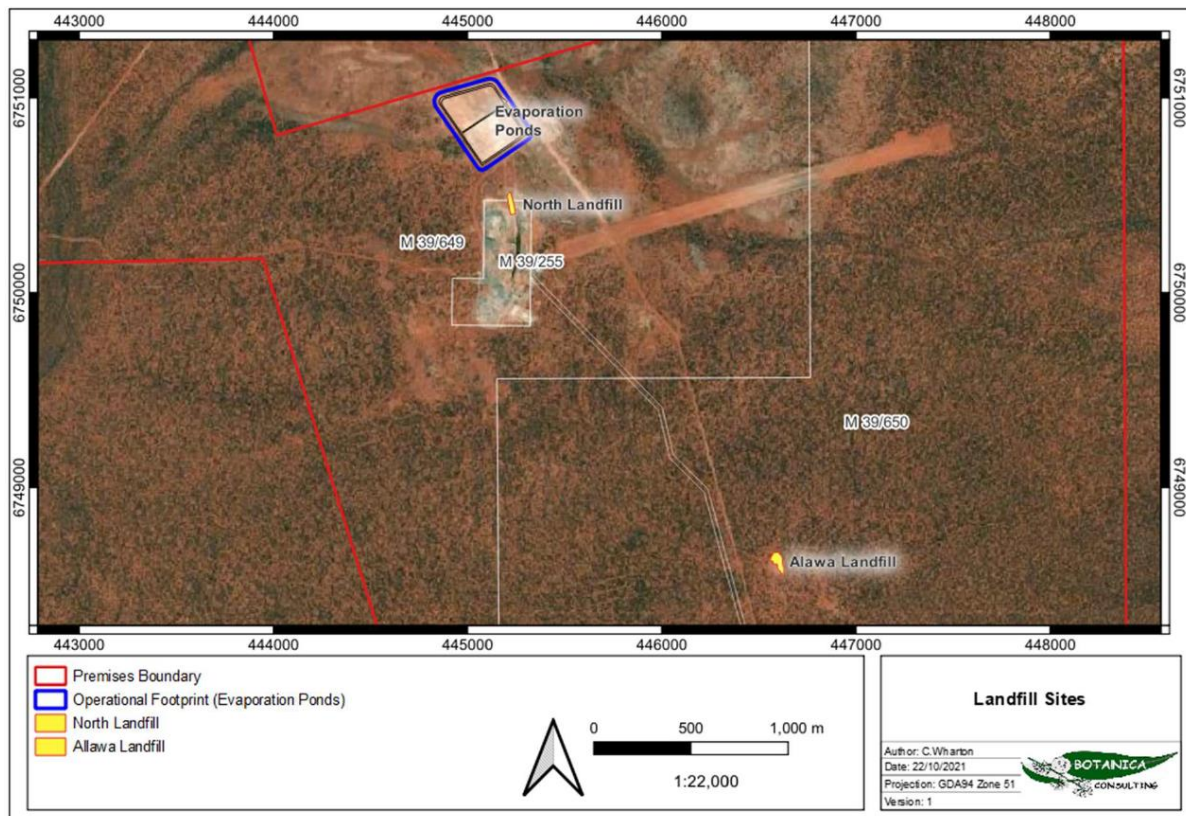


Figure 4: Location of landfill sites within the premises.

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 2020b).

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 operation which have been considered in this Amendment Report are detailed in

Table 4 below.

Table 4 also details the proposed control measures the Licence Holder has proposed to assist in controlling these emissions, where necessary.

Table 4: Licence Holder controls

Emission	Sources	Potential pathways	Proposed controls
Category 6 activity (Mine dewatering)			
Hypersaline mine dewater	Dewatering to Evaporation Pond 1 and 2	Overtopping, resulting in discharge to land	Risks to both overtopping and seepage pathways are associated with a high volume of mine dewater being stored in the evaporation ponds. Proposed controls relate to changes in site water management strategy to utilise excess mine dewater through the following pathways: <ul style="list-style-type: none"> • Use of mine dewater for dust suppression of site airstrip; • Use of mine dewater for dust suppression of gravel haul road from mine to Gwalia processing plant (approximately 120 km); and • Use of evaporation cannons to increase rate of water loss, when required.
		Seepage, resulting in groundwater mounding and subsurface migration	
	Dust suppression using mine dewater	Excessive dust suppression activity, resulting in discharge to land	<ul style="list-style-type: none"> • Additional areas (e.g. site airstrip, haul road) identified to require dust suppression, to avoid overwatering of the existing areas.
	Operation of evaporation cannons	Air/windborne pathway	<ul style="list-style-type: none"> • Evaporation cannons only used when required, particularly during winter months; • Evaporation cannons to be installed in a location where salt spray is captured by the evaporation pond; • Daily weather forecast conditions to be reviewed; • Evaporation cannons will not be operated when wind speeds exceed 4 m/s; and • Evaporation cannons will be inspected daily.
Category 89 activity (Putrescible landfill site)			
Dust	General landfilling operations at North Landfill	Air/windborne pathway	<ul style="list-style-type: none"> • Dust suppression during landfilling operations (e.g. trenching, tipping, covering) using water trucks.
Windblown waste			<ul style="list-style-type: none"> • Active tipping area will not exceed 100 m in length, 30 m in width and 2m in height • Landfill trench will be approximately 25 m wide; • Waste will be covered monthly with

Emission	Sources	Potential pathways	Proposed controls
			overburden thickness of at least 200 mm; <ul style="list-style-type: none"> • Installation of barrier mesh fencing to capture windblown waste; and • Monthly inspection around landfill area to return windblown waste to the tipping area.
Sediment laden stormwater		Overland runoff during high rainfall events	<ul style="list-style-type: none"> • Landfill trench will be surrounded by a safety bund of at least 1 m in height.
Putrescible waste leachate	Landfilling of putrescible waste	Overland runoff, during high rainfall events	<ul style="list-style-type: none"> • Landfill trench will be surrounded by a safety bund of at least 1 m in height.
		Infiltration/ seepage	<ul style="list-style-type: none"> • Maintain a three-metre separation distance between the base of landfill cell and the local water table; • Landfill trench will be surrounded by a safety bund to prevent inflow of runoff; and • Waste will be covered monthly with overburden thickness of at least 200 mm.
Odour		Air/windborne pathway	<ul style="list-style-type: none"> • Waste will be covered monthly with overburden thickness of at least 200 mm.

3.1.2 Receptors

In accordance with the *Guideline: Risk assessments* (DWER 2020b), the Delegated Officer has excluded employees, visitors and contractors of the Licence Holder's 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 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 2020a)).

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

Human receptors	Distance from prescribed activity
N/A	N/A
Environmental receptors	Distance from prescribed activity
Native vegetation	<p>Native vegetation comprising low woodland dominated by <i>Acacia aneura</i> surrounds the evaporations ponds, with the closest patch directly abutting the western boundary of the ponds.</p> <p>Native vegetation is also present approximately 150 m west of the North Landfill.</p>
Priority ecological community (PEC)	<p>Priority 3 Mount Linden Range vegetation complex (banded ironstone formation) is located approximately 3 km northwest of the evaporation ponds. The area of the PEC is 192 hectares.</p>
Groundwater aquifer	<p>Regional depth to groundwater is approximately 8 to 11 mbgl (GRM 2020).</p> <p>Regional groundwater quality is of sodium-chloride type, brackish to moderately saline with total dissolved solids (TDS) concentration reaching 50,400 mg/L. Additionally, the groundwater pH is neutral to slightly alkaline (i.e. between 7.3 to 7.8) and is low in metals and metalloid concentrations (GRM 2020).</p>

3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020b) for those emission sources which are proposed to change and takes into account potential source-pathway and receptor linkages as identified in Section 3.1. Where linkages are incomplete they have not been considered further in the risk assessment.

Where the Licence Holder 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 Licence Holder'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 Licence Holder's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 6.

The Revised Licence L9012/2016/1 that accompanies this Amendment Report authorises emissions associated with the operation of the Premises i.e. dewatering, landfilling.

The conditions in the Revised Licence 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 operation

Risk Event					Risk rating ¹ C = consequence L = likelihood	Licence Holder's controls sufficient?	Conditions ² of licence	Justification for additional regulatory controls
Source/ Activities	Potential emission	Potential pathways and impact	Receptors	Licence Holder's controls				
Operation (Category 6: Mine dewatering)								
Dewatering to Evaporation Pond 1 and 2	Hypersaline mine dewater	<p>Pathway: Overtopping, causing discharge to land</p> <p>Impact: Impacts to amenity and ecological health</p>	Native vegetation, including PEC	Refer to Section 3.1	C = Moderate L = Unlikely Medium risk	Y	Condition 4	<p>The Delegated Officer considers that the proposed changes to the management and use of excess mine dewater would reduce reliance on the Evaporation Ponds, thereby lowering the risk of overtopping and a subsequent discharge to land presented to nearby environmental receptors.</p> <p>Additional regulatory controls are not required.</p>
		<p>Pathway: Seepage and potential mounding of water table</p> <p>Impact: Impact to ecological health</p>		Refer to Section 3.1	C = Minor L = Possible Medium risk	N	<p>Condition 2</p> <p>Condition 11</p> <p>Changes to groundwater monitoring requirements and limits.</p> <p>Condition 12</p> <p>Condition 20</p> <p>Condition 22</p> <p>Requirement to investigate the depth for groundwater bore network.</p>	<p>The Delegated Officer considers that the proposed changes to the management and use of excess mine dewater would reduce reliance on the Evaporation Ponds, thereby lowering the risk of seepage and subsequent mounding of the water table presented to nearby environmental receptors.</p> <p>Therefore, additional regulatory controls are not required.</p> <p>However, conditions 11 and 22 have been added to provide additional groundwater monitoring data to better identify the effects of groundwater mounding in the future.</p>
		<p>Pathway: Excessive dust suppression activity causing discharge to land</p> <p>Impact: Impact to</p>		Refer to Section 3.1	C = Slight L = Possible	Y	Condition 6 Authorisation for uses for mine	The Delegated Officer considers that the use of excess mine dewater for dust suppression as a control for seepage and mounding at the

Licence: L9012/2016/1

Risk Event					Risk rating ¹ C = consequence L = likelihood	Licence Holder's controls sufficient?	Conditions ² of licence	Justification for additional regulatory controls
Source/ Activities	Potential emission	Potential pathways and impact	Receptors	Licence Holder's controls				
		ecological health			Low risk		dewatering effluent.	Evaporation Ponds may also represent another pathway to impact environmental receptors. Condition 6 has been added to require the use of mine dewater for dust suppression in a manner that does not represent an unacceptable risk to the environment.
Operation of evaporation cannons		Pathway: Air/windborne pathway Impact: Impacts to amenity and ecological health	Native vegetation	Refer to Section 3.1	C = Slight L = Unlikely Low risk	Y	Condition 2 Condition 4	Refer to Section 3.3.
Operation (Category 89: Putrescible landfill site)								
General landfilling activity at North Landfill	Dust	Pathway: Air/windborne pathway Impact: Impacts to amenity and ecological health	Native vegetation	Refer to Section 3.1	C = Slight L = Unlikely Low risk	Y	Condition 2	The Delegated Officer considers the controls proposed by the Licence Holder to be consistent with the <i>Environmental Protection (Rural Landfill) Regulations 2002</i> and are sufficient to control for dust emissions from nearby environmental receptors. Additional regulatory controls are not required.
	Windblown waste			Refer to Section 3.1	C = Slight L = Possible Low risk	Y	Condition 2	The Delegated Officer considers the controls proposed by the Licence Holder to be consistent with the <i>Environmental Protection (Rural Landfill) Regulations 2002</i> and are sufficient to control for noise emissions from nearby environmental receptors. Additional regulatory controls are not required.

Risk Event					Risk rating ¹ C = consequence L = likelihood	Licence Holder's controls sufficient?	Conditions ² of licence	Justification for additional regulatory controls
Source/ Activities	Potential emission	Potential pathways and impact	Receptors	Licence Holder's controls				
	Sediment laden stormwater	<p>Pathway: Overland runoff during high rainfall events, resulting in discharge to land</p> <p>Impact: Ecological disturbance</p>		Refer to Section 3.1	C = Minor L = Unlikely Medium risk	Y	Condition 2	<p>The Delegated Officer considers the controls proposed by the Licence Holder to be consistent with the <i>Environmental Protection (Rural Landfill) Regulations 2002</i> and are sufficient to control for sediment laden stormwater from nearby environmental receptors.</p> <p>Additional regulatory controls are not required.</p>
		<p>Pathway: Overland runoff during high rainfall events, resulting in discharge to land</p> <p>Impact: Ecological disturbance</p>		Refer to Section 3.1	C = Minor L = Unlikely Medium risk	Y	Condition 2	<p>The Delegated Officer considers the controls proposed by the Licence Holder to be consistent with the <i>Environmental Protection (Rural Landfill) Regulations 2002</i> and are sufficient to control for the production and overland runoff of landfill leachate from nearby environmental receptors.</p> <p>Additional regulatory controls are not required.</p>
Landfilling of putrescible waste	Putrescible waste leachate	<p>Pathway: Seepage/ infiltration</p> <p>Impact: Impacts to ecological health</p>	Groundwater aquifer Native vegetation	Refer to Section 3.1	C = Minor L = Rare Low risk	Y	Condition 2	<p>The Delegated Officer considers the controls proposed by the Licence Holder to be sufficient to control for the production and seepage of landfill leachate from nearby environmental receptors.</p> <p>Furthermore, there are limited beneficial uses for groundwater due to hypersaline conditions and there are no third-party groundwater users surrounding the premises.</p> <p>Additional regulatory controls are not required.</p>

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

Note 2: Proposed Licence Holder's controls are depicted by standard text. **Bold and underline text** depicts additional regulatory controls imposed by department.

Licence: L9012/2016/1

IR-T15 Amendment report template v3.0 (May 2021)

3.3 Detailed risk assessment for use of evaporation cannon

3.3.1 Proposed activity

The Licence Holder proposed the use of evaporative cannons to improve the rate of evaporative loss of mine dewater stored at the evaporation ponds. The additional water lost through the cannons would reduce the risk of overtopping at the evaporation ponds and the quantity of seepage entering the groundwater system. However, the operation of an evaporative cannon would need to be risk assessed as it may represent another source-pathway-receptor linkage.

3.3.2 Emissions

The emission of concern is hypersaline mine dewater that is discharged at the evaporation ponds. Based on the Annual Environmental Report for 2021, water stored in the evaporation pond was hypersaline, with TDS concentrations ranging from 23,100 mg/L to 43,800 mg/L. Due to the hypersaline conditions, when the water has evaporated, salt residue particulates may be present.

3.3.3 Pathway

The evaporation cannon may act as an additional pathway that links the emission to sensitive receptors. Hypersaline water is pumped from the pond to the cannon, where it is sprayed into the atmosphere, which would enable air/windborne dispersion of hypersaline water (if it does not evaporate) or salt residue particulates (if water evaporates) to nearby environmental receptors.

Wind was identified as one of the highly variable meteorological factors affecting the direction and extent of dispersion pathway of hypersaline water and salt particulates. Between 1957 and 2004, wind roses available for the Bureau of Meteorology Leonora weather station (#12046) indicated that winds are expected to be predominant easterly in the morning (9am) and east to south-easterly in the afternoon (3pm) during summer (i.e. January). During winter, winds are expected to be variable in the morning but trended towards west to north-westerly in the afternoon.

3.3.4 Receptors

Native vegetation, comprising low woodland dominated by *Acacia aneura*, surrounds the evaporations ponds, with the closest patch directly abutting the western boundary of the ponds. A flora and vegetation assessment undertaken by Botanica Consulting (2021) indicated the community type is typical of the region and was well represented outside of the survey area. Additionally, there were no threatened or priority flora species recorded within the survey area. The assessment classified the vegetation condition directly abutting the evaporation ponds as degraded (Figure 5).

3.3.5 Proposed control

In a pilot trial conducted in early 2021, a series of six evaporation cannons were installed on the eastern side of the middle causeway, between evaporation ponds Cell 1 and Cell 2. The prevailing wind direction was noted to be from the southeast.

During operation, salt spray was observed on the adjacent native vegetation, indicating that spray drift of salt particulates had occurred. The extent of the salt spray was approximately 300 m from the cannons (i.e. discharge point) (Figure 6). The salt spray was described as very light and washed off after the first rainfall event.

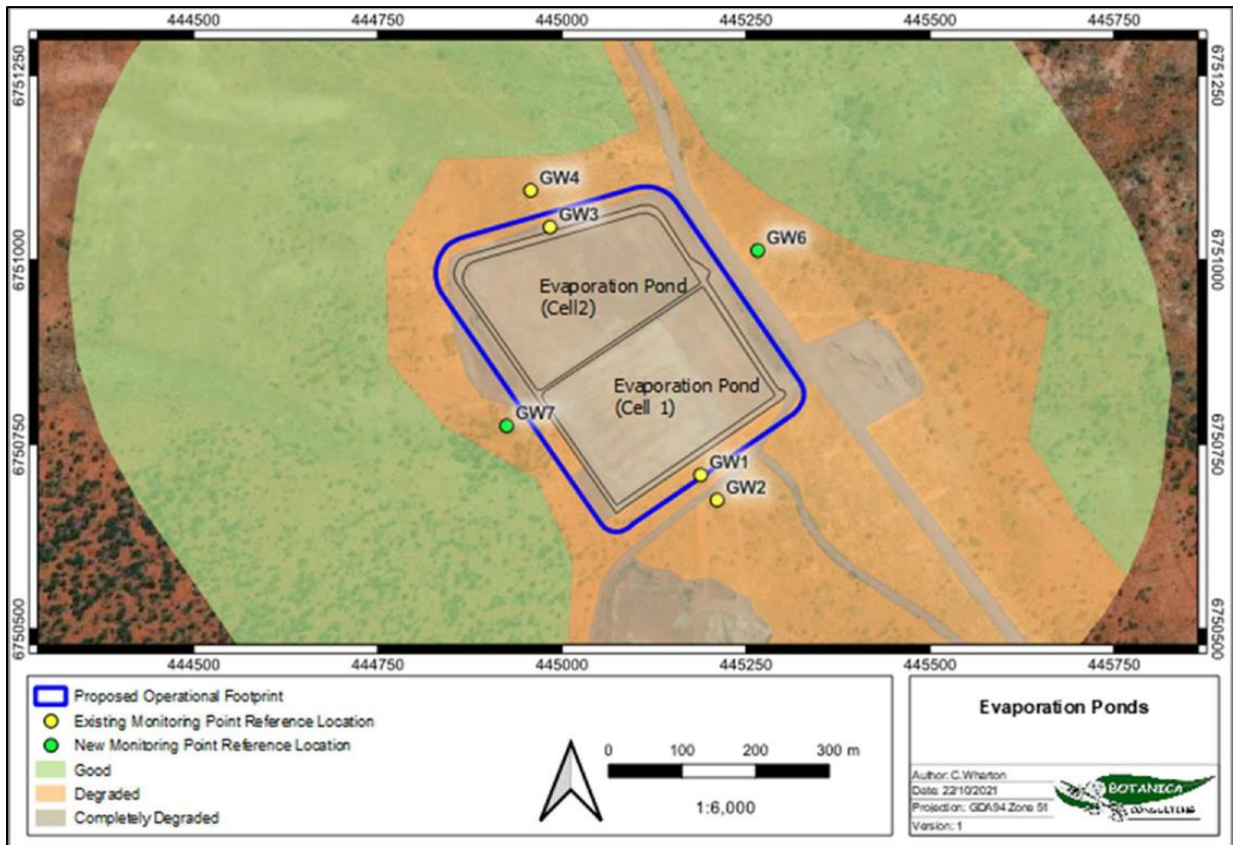


Figure 5: Vegetation condition surrounding the evaporation pond area

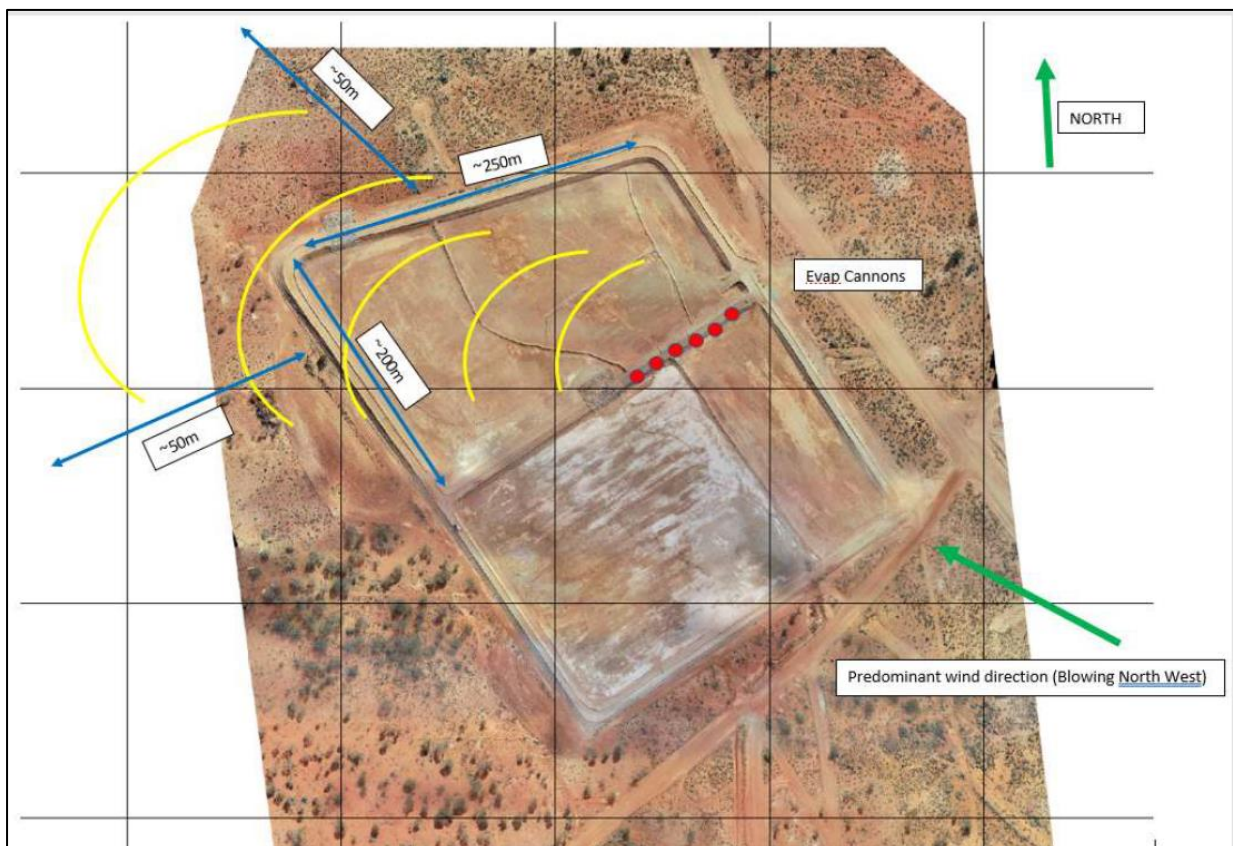


Figure 6: Location of evaporation cannons and extent of spray drift during trial

Based on the outcomes of the trial, the Licence Holder proposed to install the evaporation cannons in the southeast corner of the evaporation ponds. By doing so, the cannons would be aligned in the correct wind path for optimal performance (i.e. achieve maximum evaporation rate), whilst ensuring the spray is always directed over the evaporation ponds to collect any potential salt residue in the fallout (Figure 7). It was thought that the operational footprint of the evaporation ponds would provide an adequate distance of approximately 300 m to 500 m to capture any spray drift.

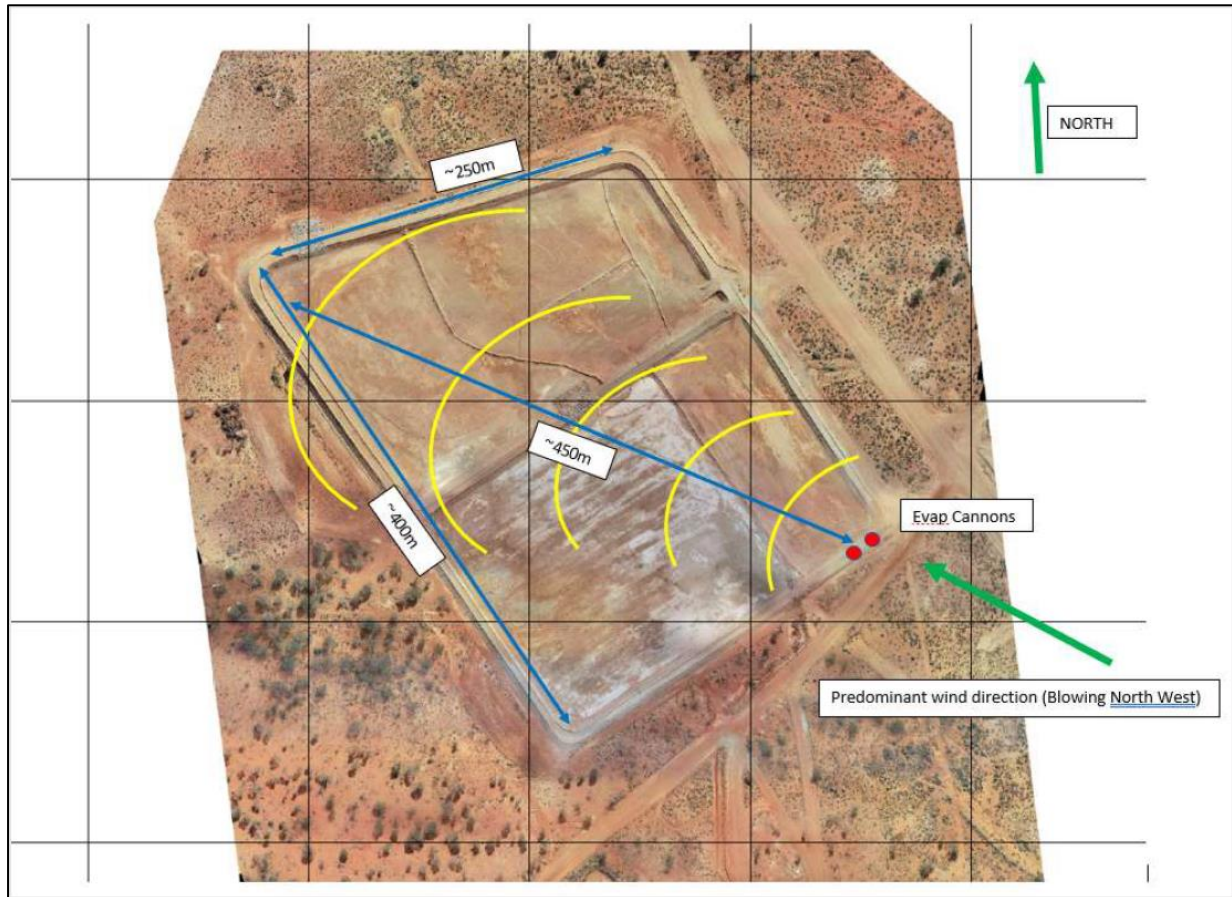


Figure 7: Proposed location of evaporation cannons and potential extent of spray drift

As demonstrated in the site water balance (Table 2), the evaporation cannons would not be required to be operational continuously, but only in environments where water inputs are higher or natural evaporative losses are reduced (i.e. during the winter season). As such, the need to adjust the location of the evaporation cannons to account for seasonal wind direction changes would be minimised. Furthermore, the higher rainfall frequency would allow salt residues accumulating on vegetation to be washed off more often.

The Licence Holder has also committed to the following:

- Review daily weather forecast conditions to assess the suitability of operating the evaporation cannons;
- No operation of evaporation cannons when wind speeds are greater than 4 m/s to ensure that the spray is not dispersed beyond the extent of the evaporation ponds; and
- Daily inspection of evaporation cannons.

3.3.6 Risk assessment

The Delegated Officer considers that the use of evaporation cannons may be considered an appropriate control for managing excess mine dewater at the evaporation ponds. If the rate of

evaporation can be increased at the ponds, the risk of seepage and overtopping would lower as a consequence. However, evaporation cannons represent an additional pathway that must be considered, as it has the potential of exposing the surrounding native vegetation (i.e. receptor) to an emission (i.e. hypersaline mine dewater and salt residue particulates) through an air/windborne pathway.

As a result of the detailed risk assessment undertaken, the following conclusions were made:

- The consequence rating is classed as **slight**, as the salt residue is unlikely to impact on native vegetation severely, which is already degraded to some extent. Additionally, surrounding vegetation would not be exposed to salt spray for prolonged periods, as the evaporation cannons will only be operational in specific circumstances, such as the winter season, where rainfall will ‘wash’ out the salt spray more frequently;
- The likelihood rating is classed as **unlikely**, as the evaporation cannons are installed in the south-eastern corner of the evaporation pond to align with the most likely dominant wind direction and maximise the extent of the evaporation ponds to capture any salt residue fallout. Furthermore, the Licence Holder has committed to several controls, including a restriction on operating the evaporation cannons during strong winds.
- Overall, the consequence and likelihood presented above have resulted in a **low** risk rating.

Conditions in the licence have been updated as part of this amendment to incorporate the controls proposed by the Licence Holder. Additional regulatory controls were not considered necessary.

3.4 Improvement conditions

Improvement conditions were added to licence L9012/2016/1 as part of this amendment. Conditions 20 and 21 relate to the maintenance and reporting requirements of groundwater monitoring bores detailed on the licence. These were conditioned to ensure that damaged bores were repaired and operational to address monitoring requirements conditioned in the licence.

Conditions 22 and 23 relate to the investigation of the depth of existing monitoring bores around the evaporation ponds. The depths of these bores are currently not known to both the department and the Licence Holder. The data is relevant for assessing ambient groundwater levels once mounding of the water table has stabilised. Additionally, it will inform the ability of these bores to detect early signs of groundwater mounding in the future. If the bore depth is significantly shallower than the natural water table, then the occurrence of mounding would not be detectable by monitoring these bores until the water table have become significantly and sufficiently mounded to reach the bores. This scenario would not be conducive for early detection and management of seepage from the evaporation ponds.

4. Consultation

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

Table 7: Consultation

Consultation method	Comments received	Department response
Department of Mines, Industry Regulation and Safety (DMIRS) advised of proposal on 1 March 2022	DMIRS advised that Mining Proposal REG ID: 70772 was approved on 15 December 2017 to allow for dewatering activity and the operation of evaporation ponds.	The department confirmed that the proposed controls for the North Landfill were consistent with the <i>Environmental Protection (Rural Landfill) Regulations 2002</i> .

	The Mining Proposal also allowed for inert and putrescible waste to be disposed within the shallow northern part of the existing Second Fortune pit and will be managed in accordance with the <i>Environmental Protection (Rural Landfill) Regulations 2002</i> .	
Shire of Menzies advised of proposal on 1 March 2022	No response received.	N/A
Works Approval/Licence Holder was provided with draft amendment on 22 April 2022	Refer to Appendix 1	Refer to Appendix 1

5. Conclusion

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

5.1 Summary of amendments

Table 8 provides a summary of the proposed amendments and will act as record of implemented changes. All proposed changes have been incorporated into the Revised Licence as part of the amendment process.

Table 8: Summary of licence amendments

Condition no.	Proposed amendments
-	Updated Cover page with current <i>Registered business address</i> and added <i>Date of amendment</i> . Inclusion of Category 89 activity in <i>Prescribed premises category description</i> . Updated <i>Licence history</i> with this amendment.
2	Deletion of text to enable condition to be compatible with general infrastructure, rather than only dewatering infrastructure. Updated Table 1 to include infrastructure requirements for evaporation cannon and north landfill, and to remove bitterns from RO plant as a material accepted at Evaporation Pond 1. Inclusion of infrastructure location in Table 1. Deleted redundant information in Table 1.
4	Updated Table 2 to include evaporation cannon.
6	Inclusion of condition to authorise for discharge of mine dewater.
10	Deletion of erroneous text in Table 4.
11	Updated Table 5 to: <ul style="list-style-type: none"> Remove standing water level limit for GW1 and GW3;

Condition no.	Proposed amendments
	<ul style="list-style-type: none"> • Include additional monitoring bores GW6 and GW7; and • Include mbgl as a unit reported to align with the limit for standing water level. <p>Updated the water quality guideline reference in Note 2 of Table 5.</p> <p>Inclusion of Note 3 to apply condition 11 to GW1 once it has been repaired in accordance with condition 20.</p>
12	Updated the water quality guideline reference in Note 2 of Table 6.
13	<p>Corrected grammatical error.</p> <p>Updated to reflect the department's current standard records condition.</p>
14	Updated to reflect the department's current standard AACR condition.
15	Corrected grammatical error.
16	<p>Updated to reflect the department's standard AER condition.</p> <p>Updated Table 7 for further clarity on reporting requirements.</p>
19	<p>Updated Table 9 to specify condition 9 as relevant condition for calibration report.</p> <p>Deletion of Note 2 as it is redundant.</p>
20 and 21	Inclusion of conditions for the maintenance of groundwater monitoring bore GW1
22 and 23	Inclusion of conditions for the investigation and reporting of depths in current groundwater monitoring bores on the licence.
-	<p>Updated Figure 1 and Figure 2 with more recent maps, provided as part of the amendment application.</p> <p>Inclusion of Figure 3 (Location of monitoring bores), Figure 4 (Location of evaporation cannon), Schedule 2: Premises boundary and Schedule 3: Monitoring bore information.</p>

References

1. Botanica Consulting 2021, *Second Fortune Gold Mine – Flora and Vegetation Assessment*, Perth, Western Australia.
2. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
3. Department of Water and Environmental Regulation (DWER) 2020a, *Guideline: Environmental Siting*, Perth, Western Australia.
4. DWER 2020b, *Guideline: Risk Assessments*, Perth, Western Australia.
5. Groundwater Resource Management (GRM) 2020, *Hydrogeological and Water Balance Review: Second Fortune Gold Mine. Linden Gold Alliance*, Ascot, Western Australia.
6. Saltbush Contracting 2020, *Letter: Saltbush Contracting was requested by Linden Gold Pty Ltd to complete rehabilitation works on two evaporation ponds located to the North of the Second Fortune Gold Mine*, Kalgoorlie, Western Australia.
7. Rockwater Pty Ltd (Rockwater) 2013, *Second Fortune Gold Mine – Hydrogeological Assessment*, Jolimont, Western Australia.

Appendix 1: Summary of Licence Holder's comments on risk assessment and draft conditions

Condition	Summary of Licence Holder's comment	Department's response
Cover page	The Licence Holder provided the correct registered business address for Linden Gold Pty Ltd.	The department has verified this information on the Australian Securities and Investments Commission website and have amended the registered business address on the cover page of the licence.
Condition 2	The Licence Holder requested the removal of " <i>bitterns from the reverse osmosis plant</i> " as an authorised material to be discharged to Evaporation Pond 1 in Table 1, as there is no longer a reverse osmosis plant at the premises.	The department has removed this material from Table 1.
Condition 11	The Licence Holder requested that the unit for SWL be changed to metres below ground level (mbgl) in Table 5 to align with the units for the SWL limit.	The department has added mbgl as a unit of reporting for SWL but have decided to retain metres Australian Height Datum (mAHD) as the mAHD data is necessary for contouring groundwater elevations and understanding groundwater flow direction and potential mounding.
	<p>In the draft licence, note 3 of Table 5 specified that the "<i>monitoring conditions for GW6 and GW7 will only apply after they have been constructed in accordance with Condition 20</i>".</p> <p>The Licence Holder has since clarified that monitoring bores GW6 and GW7 have already been constructed in the past but were not included on the licence. Therefore, note 3 was redundant and should be removed.</p>	<p>The department understands that monitoring bores GW6 and GW7 have already been constructed. However, through liaising with the Licence Holder, the department was made aware that monitoring bore GW1 was found to have been damaged in February 2022, with the Licence Holder intending to repair it.</p> <p>Therefore, the department has retained note 3 and amended the text to reflect monitoring bore GW1, rather than GW6 and GW7.</p>
Condition 19	In Table 9, the Licence Holder notes that the calibration report was mistakenly referring to condition 7, instead of condition 9.	The department has acknowledged this as an administrative error and have correct the specified condition to condition 9.
	The Licence Holder noted that note 2 of Table 9 specified that " <i>forms are in Schedule 2</i> ", which was an error as Schedule 2 currently referred to the prescribed premises boundary.	The department has acknowledged this as an administrative error and have removed note 2 from Table 9. All relevant forms can be accessed on the department website.

Condition	Summary of Licence Holder's comment	Department's response
Condition 20	<p>In the draft licence, conditions 20 and 21 referred to the construction and reporting requirements for the installation of additional groundwater monitoring bores, respectively.</p> <p>The Licence Holder has since clarified that monitoring bores GW6 and GW7 have already been constructed in the past but were not included on the licence. Therefore, conditions 20 and 21 were redundant and should be removed.</p>	<p>The department understands that monitoring bores GW6 and GW7 have already been constructed. However, through liaising with the Licence Holder, the department was made aware that monitoring bore GW1 was found to have been damaged in February 2022, with the Licence Holder intending to repair it.</p> <p>Therefore, the department has retained condition 20 and amended the text to reflect that all groundwater monitoring bores should be maintained operational.</p>
Condition 21		<p>Similar to the department's response to comments relating to condition 20, condition 21 was retained and amended to specify reporting requirements upon completion of repairs to monitoring bore GW1. This is to ensure that both parties retain written records of the works undertaken.</p>
Condition 22	<p>The Licence Holder requires confirmation that the parameter in Table 11 refers to the total depth/base of the bores.</p>	<p>The department has confirmed that the parameter refers to the total depth of each bore and have amended the text to '<i>Total depth to the base of bore</i>' to further add clarity for future reference.</p>

Appendix 2: Application validation summary

SECTION 1: APPLICATION SUMMARY (as updated from validation checklist)				
Application type				
Works approval	<input type="checkbox"/>			
Licence	<input type="checkbox"/>	Relevant works approval number:		None <input type="checkbox"/>
		Has the works approval been complied with?	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Has time limited operations under the works approval demonstrated acceptable operations?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	
		Environmental Compliance Report / Critical Containment Infrastructure Report submitted?	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Date Report received:		
Renewal	<input type="checkbox"/>	Current licence number:		
Amendment to works approval	<input type="checkbox"/>	Current works approval number:		
Amendment to licence	<input checked="" type="checkbox"/>	Current licence number:	L9016/2016/1	
		Relevant works approval number:	N/A	<input type="checkbox"/>
Registration	<input type="checkbox"/>	Current works approval number:	None	<input type="checkbox"/>
Date application received				
Applicant and Premises details				
Applicant name/s (full legal name/s)		Linden Gold Pty Ltd		
Premises name		Second Fortune Gold Mine		
Premises location		MENZIES WA 6436 Mining tenements M39/255, M39/649, M39/650 Miscellaneous tenement L39/12		
Local Government Authority		Shire of Menzies		
Application documents				
HPCM file reference number:		DWERDT525310		
Key application documents (additional to application form):		<ul style="list-style-type: none"> Attachment 2A Map of Premises Boundary Attachment 2B Map of key infrastructure emission and monitoring points Attachment 3B Proposed Activities Attachment 6A Emissions and Discharges Attachment 8A Flora and Vegetation Assessment Attachment 9 Amendment Fee Response to Request for Further Information (19 January 2022) Saltbush Contracting Letter of Works Groundwater Resource Management Hydrogeological and 		

		Water Balance Review: Second Fortune Gold Mine.
Scope of application/assessment		
Summary of proposed activities or changes to existing operations.	<i>Licence Amendment</i> <ul style="list-style-type: none"> • Increase Category 6 throughput limit from 210,000 to 420,000 tonnes per annual period; • Changes to site water use and groundwater monitoring program (associated with Category 6); • Addition of Category 89 activity. 	
Category number/s (activities that cause the premises to become prescribed premises)		
Table 1: Prescribed premises categories		
Prescribed premises category and description	Assessed production or design capacity	Proposed changes to the production or design capacity (amendments only)
Category 5: Processing or beneficiation of metallic or non-metallic ore	156,000 tonnes per annual period	No change.
Category 6: Mine dewatering	210,000 tonnes per annual period	Proposed increase to 420,000 tonnes per annual period.
Category 89: Putrescible landfill site	-	New prescribed category to be added to licence. Estimated 1,026 tonnes per annual period, of which 26 tonnes is putrescible waste.
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"/>	Not a significant proposal.
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	N/A
Has the proposal been referred and/or assessed under the EPBC Act?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	N/A
Has the applicant demonstrated occupancy (proof of occupier status)?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	N/A to licence amendment
Has the applicant obtained all relevant planning approvals?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>	Premises is located on mining tenements. Local government planning approval not required.
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"/>	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"/>	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"/>	Licence/permit No: GWL176219(4)
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"/>	N/A
Is the Premises situated in a Public Drinking Water Source Area (PDWSA)?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	N/A
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 checked="" type="checkbox"/> No <input type="checkbox"/>	Mining Act 1978 Environmental Protection (Rural Landfill) Regulations 2002
Is the Premises within an Environmental Protection Policy (EPP) Area?	Yes <input type="checkbox"/> No <input type="checkbox"/>	N/A
Is the Premises subject to any EPP requirements?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	N/A
Is the Premises a known or suspected contaminated site under the <i>Contaminated Sites Act 2003</i> ?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	N/A