Amendment Report

Application for Licence Amendment

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

Licence Number	L8435/2010/3
Licence Holder	GSM Mining Company Pty Ltd
ACN	165 235 030
File Number	APP-0026033 2011/000299-3
Premises	Granny Smith Gold Mine LAVERTON WA 6440 Within Mining tenements L38/80, L38/106, L38/144, L38/329, M38/18, M38/161, M38/162, M38/167, M38/191, M 38/205, M38/287, M38/361, M38/380, M38/389, M38/397, M38/440, M38/525, M38/532, M38/690, M38/691, M38/692, M38/725, M38/1280 As defined by the Premises maps attached to the Revised Licence
Date of Report	29/07/2025
Decision	Revised licence granted

Table of Contents

1. Decision summary 3

2. Scope of assessment 3

2.1 Regulatory framework 3

2.2 Amendment summary 3

2.2.1 Proposed Activities 3

2.2.2 Dewatering Infrastructure 4

2.3 Part IV of the EP Act 6

3. Risk assessment 6

3.1 Source-pathways and receptors 6

3.1.1 Emissions and controls 6

3.1.2 Receptors 7

3.2 Risk ratings 10

3.3 Detailed risk assessment of mine dewater discharge into Lake Carey 12

3.3.1 Characteristics of Mine dewater 12

3.3.2 Characteristics of receiving environment 12

3.3.3 Impacts from additional mine dewatering discharge from Granny smith and Windich pits and additional regulatory controls 16

4. Consultation 18

5. Conclusion 19

5.1 Summary of amendments 19

References 22

Appendix 1: Summary of Licence Holder's comments on risk assessment and draft conditions 23

Table 1: Proposed throughput capacity changes 3

Table 2: Licence Holder controls 6

Table 3: Sensitive human and environmental receptors and distance from prescribed activity 8

Table 4. Risk assessment of potential emissions and discharges from the Premises during construction and operation 11

Table 5: Pit water quality in Granny Smith, Windich and Wallaby pits against guideline values 13

Table 6: Consultation 18

Table 7: Summary of licence amendments 20

Figure 1: Proposed mine dewatering operation from Granny Smith and Winditch pits 5

Figure 2: Distance to sensitive receptors 9

1. Decision summary

Licence L8435/2010/3 is held by GSM Mining Company Pty Ltd (Licence Holder) for the Granny Smith Gold Mine (the Premises), located within mining tenements L38/80, L38/106, L38/144, L38/329, M38/18, M38/161, M38/162, M38/167, M38/191, M38/205, M38/287, M38/361, M38/380, M38/389, M38/397, M38/440, M38/525, M38/532, M38/690, M38/691, M38/692, M38/725, M38/1280.

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 construction and operation of the Premises. As a result of this assessment, amended Licence L8435/2010/3 has been granted.

The Revised Licence issued as a result of this amendment consolidates and supersedes the existing Licence previously granted in relation to the Premises.

2. Scope of assessment

2.1 Regulatory framework

In completing the assessment documented in this Amendment Report, the Delegated Officer 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 Amendment summary

On 10 November 2022, the Licence Holder submitted an application to the department to amend Licence L8435/2010/3 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act). The following amendments are being sought:

- Approval to discharge mine dewater from Granny Smith Open Pit and Windich Open Pit to a new dewatering discharge point at Lake Carey (W3); and
- Updating the Prescribed premises boundary (removal of L38/50, L38/51).

This amendment is limited only to changes to Category 6 activities from the Existing Licence. No changes to the aspects of the existing Licence relating to Category 5, 33, 52, 54, 64 and 73 have been requested by the Licence Holder.

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

Table 1: Proposed throughput capacity changes

Category	Current throughput capacity	Proposed throughput capacity	Description of proposed amendment
6	10,219,614 kL per annual period	30,219,614 kL per annual Period	Licence holder anticipates developing underground mines at the premises beneath and surrounding the Granny Smith and Windich open pits. To allow safe access to the underground portals, dewatering of the Granny Smith and Windich open pits are proposed. The proposed dewatering volume is an additional 20 GL/year. This water will be discharged to a new discharge point at Lake Carey.

2.2.1 Proposed Activities

Granny Smith Operations consist of two main projects, namely Granny Smith open pit project and Wallaby Underground Mine. The Wallaby Underground Mine currently has ongoing mine dewatering with an approved discharge into Lake Carey through two discharge outfalls (Sothern outfall and Western Outfall). The current licenced dewatering volume is 10,219,614 kL (10.2 GL) per year.

Granny Smith open pit project consists of 3 pits: Granny Smith, Goanna and Windich pits. Historically, dewatering also occurred in Granny Smith open pit project and discharged into Lake Carey. In March 2015, dewatering discharge from Granny Smith Open Pit Project (GSOPP) was temporarily removed from the licence due to the addition of Tailings Storage Facility (TSF) seepage water to the Goanna and Granny Smith pits.

The licence holder has now refined the Granny Smith mine development (previously considered GSOPP and an open pit development is no longer expected; rather underground mines are proposed (now called Granny Smith Complex Underground Project (GSCUP)). GSCUP consists of an underground mine beneath and surrounding the Granny Smith and Windich open pits. To allow safe access to the underground portals, dewatering of the Granny Smith and Windich open pits are proposed. Dewatering of Goanna Open Pit is not proposed due to the addition of TSF seepage water to Goanna Open Pit that had occurred in the past. TSF seepage water was not discharged to Granny Smith Open Pit or to Windich Pit as previously proposed. The proposed dewatering volume is an additional 20 GL/year to be discharged to Lake Carey via a new discharge point (Figure 1).

Pit lake water levels are variable depending on the inflow of water during significant rainfall events, evaporation, and processing plant water abstraction. However, current estimated volumes of water are 7 GL in Windich Pit and 14 GL in Granny Smith Pit. The dewatering operation is proposed to be carry out for 13 months of pumping. It is also noted that pumping timeframes may be extended in the event of significant rainfall events resulting in increased water within the pits or the requirement to cease discharge onto Lake Carey.

It is also mentioned that ongoing dewatering of these two pits may be required, however the licence holder has not included ongoing mine dewatering within the scope of this Licence Amendment application and the department has not carried out risk assessment for any potential ongoing dewatering operation from GSCUP.

2.2.2 Dewatering Infrastructure

Majority of the dewatering infrastructure (pipeline and discharge infrastructure – transfer pond) has been constructed under W5165/2012/1 and the dewatering infrastructure route is shown in the figure 1 below. The pipelines are approximately 10 km long and have a maximum diameter of 500 mm.

Three pumps are yet to be installed, of which two pumps will be placed in Granny Smith Pit and one pump will be placed in Windich pit. Pipeline telemetry and automatic shutdowns will also be installed as a leak detection system.

Mine dewater will then transfer into a transfer pond which has already been constructed. The transfer pond consists of HDPE lined embankment foundations and base with a capacity of 20,000 m^3 and will provide at least 7 hours of retention time to remove sediment particles with a diameter greater than 0.02 mm prior to discharge to Lake Carey.

The discharge point at Lake Carey is located approximately 200 m away from the lake shore. The discharge structure is designed so that a single pipeline will feed multiple spigots. At each spigot, an engineered structure has been constructed, and the water will be directed via this structure to reduce the flow velocity. This design reduces the risk of erosion and scouring on Lake Carey.

Figure 1: Proposed mine dewatering operation from Granny Smith and Winditch pits

2.3 Part IV of the EP Act

The Licence Holder had referred the existing Wallaby open pit mine project to the Office of the Environmental Protection Authority (OEPA) at that time and the project has undergone an environmental assessment under Part IV of the EP Act. The Ministerial Statement 551 for the Wallaby Open Pit Project was obtained in August 2000.

The GSOPP proposal was submitted to the OEPA on 17th August 2011, OEPA advised the licence holder that the GSOPP will not be formally assessed. Given that the expected environmental impacts are less significant from underground operation compared to an opencut operation, the licence holder has decided not to refer this new proposal (GSCUP) to be assess under Part IV of the EP Act.

Ministerial Statement 551 for the Wallaby open pit mine project requires the submission of a Hypersaline Management Plan (HMP) to the OEPA and the Licence Holder submitted a HMP in 2012 to the OEPA for approval. The correspondence from the OEAP has stated that any further revisions of the HMP should be assessed and managed through the Part V licence.

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 Amendment Report are detailed in Table 2 below. Table 2 also details the proposed control measures the Licence Holder has proposed to assist in controlling these emissions, where necessary.

Table 2: Licence Holder controls

Emission	Sources	Potential pathways	Proposed controls
Construction			
Minor construction and installation work	Dust	Air/wind borne pathways	No controls proposed.
Operation			
Hypersaline water: Dewatering from Granny Smith pit and	Dewatering pipeline / infrastructure rupture or failure	Direct discharge	• Will be equipped with telemetry systems and pressure sensors. • Pipelines have been installed within bunding • Daily Visual inspection to be carried out

Emission	Sources	Potential pathways	Proposed controls
Windich pit			to identify any incidents or maintenance required.
	Overtopping/seepage of the transfer pond	Direct discharge	• HDPE lined embankment foundations and base. • minimum top of embankment freeboard of 300 mm or a 1 in 100 year/72-hour storm event (whichever is greater) to be maintained. • at least 7 hours of retention time to be provided to remove sediment particles with a diameter greater than 0.02mm. • Daily Visual inspection to be carried out to identify any incidents or maintenance required.
	High pressure dewater discharge at the lake	Scouring of lakebed and embankments	• Discharge points are located approximately 200m away from the lake shore. • Single pipeline to feed multiple spigots. • A diffuser has been installed. • Discharge volumes monitoring via continuous flow meter • Flow to be directed through an engineered structure to reduce the flow velocity and the risk of erosion and scouring on Lake Carey. • Daily inspections of discharge outfall to identify any scouring or incidents.
	Sedimentation from dewater discharge	Deposition onto Lake Carey	• At least 7 hours of retention time to be provided to remove sediment particles with a diameter greater than 0.02mm. • Lake Carey monitoring programme to be carried out as per Hypersaline Management Plan.
	Dewater discharge (containing metals and metalloids) to Lake Carey	Direct discharge to Lake Carey	• Lake Carey monitoring programme to be carried out as per Hypersaline Management Plan.

3.1.2 Receptors

In accordance with the *Guideline: Risk assessments* (DWER 2020), 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 3 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 3: Sensitive human and environmental receptors and distance from prescribed activity

Human receptors	**Distance from prescribed activity**
Town of Laverton	approximately 23 km to the north of the Premises (screened out due to distance)
Mt Weld Pastoral Station	Prescribed premises is located within the pastoral lease
Environmental receptors	**Distance from prescribed activity**
Threatened Flora *Lysiandra baeckeoides (P3)*	Located within the prescribed premises, approximately 1.5 km northwest to the dewatering pipeline.
Threatened Fauna *Sminthopsis longicaudata* (Long-tailed dunnart) *Branchinella denticulate* (a fairy shrimp)	Reported within the prescribed premises
TECs/PECs Mount Jumbo Range Vegetation complex (banded iron formation) (*Priority 3*)	Approximately 1.5 km from the western part of the prescribe premises and intersects small portion. It is located approximately 6 km to the northwest from the dewatering pipeline.
Lake Carey	Western end of the prescribed premises intersects Lake Carey
Surface Water lines	Minor surface water lines are located within the prescribed premises. The dewatering pipeline intersects a minor surface water line at one location and the waterlines lies within 50 m in other sections
Goldfields Groundwater area proclaimed groundwater area under *Rights in Water and Irrigation Act 1914*	Underlying the prescribed premises

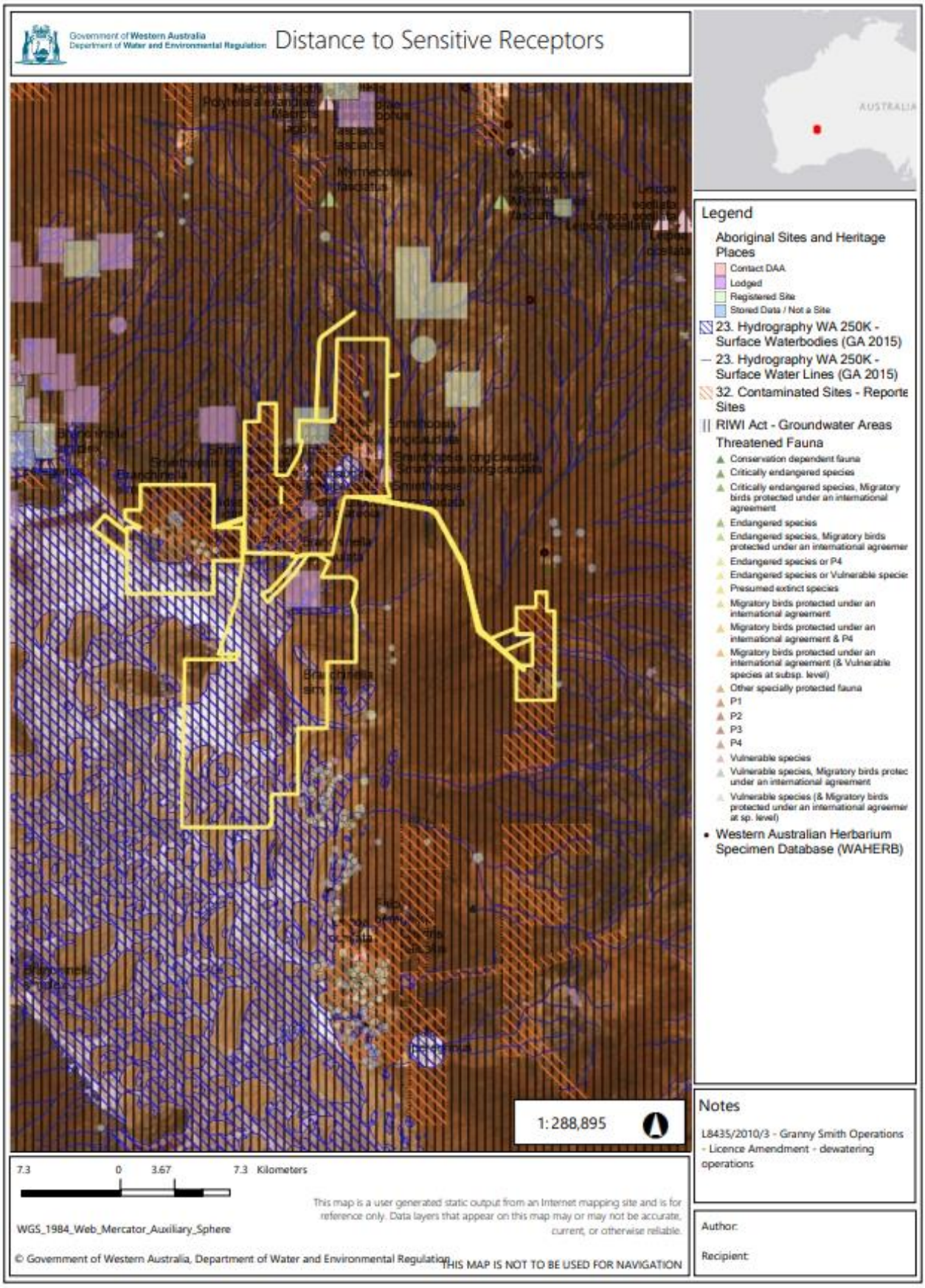

Figure 2: Distance to sensitive receptors

3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020) 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 in-complete 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 4.

The Revised Licence L8435/2010/3 that accompanies this Amendment Report authorises emissions associated with the operation of the Premises i.e. dewatering activities.

The conditions in the Revised Licence have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

Table 4. Risk assessment of potential emissions and discharges from the Premises during construction and 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**				
Construction								
Minor construction work – Dewatering pipelines and pumps	Dust	Air/windborne pathway causing impacts to health and amenity	Adjacent native vegetation	Refer to Section 3.1.1	C = Slight L = Unlikely **Low Risk**	Y	N/A	The remaining construction work are considered to be minor and temporary. Considerable dust emissions are not expected during the installation period. Additional regulatory controls are not required.
Operation								
Mine Dewatering into Lake Carey	Hypersaline Mine dewater	Rupture of pipeline causing hypersaline water discharge to land soil, native vegetation **Impacts:** Reduced native vegetation health Contamination of soil contamination of surface water	Adjacent native vegetation Land/soil Surface water drainage lines	Refer to Section 3.1.1	C = Moderate L = Unlikely **Medium Risk**	Y	Condition 5 – Inspection of infrastructure Condition 41 – Construction and installation requirements	The delegated officer considered that the proposed applicant controls including telemetry, automatic shut off and/or sufficient secondary containment is adequate to manage any impacts from potential pipeline rupture event. The requirement to construct these controls have been conditioned within the licence. Additionally, existing licence condition 5 has been updated to require daily visual inspection of the dewatering pipeline to ensure visual integrity.
		Overtopping of the granny smith transfer pond **Impacts: Co**ntamination of soil contamination of groundwater	Adjacent native vegetation Land/soil Groundwater	Refer to Section 3.1.1	C = Minor L = Unlikely **Medium Risk**	Y	Condition 2 – Containment infrastructure Condition 3 – freeboard requirement Condition 5 – Inspection of infrastructure	Exiting condition 2 of the licence has been updated to include the granny smith water transfer pond. Existing condition 3 therefore also applies which requires a freeboard to be maintained to ensure overtopping does not occur. In addition to that, existing condition 5 has been updated to include daily visual inspection of the granny smith water transfer pond to ensure integrity. The Delegated officer considered that these controls are adequate to manage any potential impacts from overtopping of hypersaline water from transfer pond.
		Direct discharge into Lake Carey **Impacts:** Increased erosion, scouring, and sedimentation within Salt Lake contamination of Salt Lake sediment, surface water and/or groundwater Reduced riparian vegetation health	Lake Carey surface water and sediment Riparian Vegetation Groundwater	Refer to Section 3.1.1	C = Moderate L = Possible **Medium Risk**	N	Condition 16 – Emission points to surface water Condition 17 – updated to remove approval for discharge of TSF seepage water to Granny smith pit. **Condition 23 – monitoring of point source emissions to surface water (addition of trigger values)** **Condition 24– trigger value response actions** **Condition 29 – annual ecological assessment requirement** **Condition 30- sediment sampling methodology**	Refer Section 3.3 – Detailed risk assessment of mine dewater discharge into Lake Carey

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

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

3.3 Detailed risk assessment of mine dewater discharge into Lake Carey

3.3.1 Characteristics of Mine dewater

Water quality characteristics of the Granny Smith and Windich pits are derived from the recent water samples analysed in 2021 and from the historical data. Given Granny Smith water originally sourced from Wallaby underground project, similar water quality is expected. Lower salinity levels and metals concentration are expected in Windich pit as it is associated with inflows of sheet flow during significant rainfall events.

Based on those monitoring results, discharged water from Granny Smith pit is considered to be hypersaline, ranging from a total dissolved solids (TDS) concentration of 90,000 mg/L to 294,000 mg/L, with a mean of 228,544 mg/L.

Water in Windich pit is classified as fresh to saline with TDS concentrations ranging from 1,500 mg/L to 46,300 mg/L. pH of the pit waters is classified as circumneutral and generally ranging from 6.7 to 8.6. A suite of heavy metals was also measured and identified that concentrations of metals and metalloids in Granny Smith pit is usually higher than that of the Windich pit (Table 5).

The historical data indicated that the concentrations of cobalt, copper and selenium at Granny Smith Pit have increased in recent years. This may be due to both evapo-concentration and/or increase in mini reporting (LoR) of these parameters. Several parameters were identified as elevated and can be consider as potential contaminants of concern. LoR of most of these metals and metalloids was considered adequate and have compared against the 80% and 95% species protection level Default Guideline Values (DGVs) of Australian and New Zealand Environment and Conservation Council (ANZECC) water quality guidelines, in Table 5.

3.3.2 Characteristics of receiving environment

Lake Carey is part of a chain of salt lakes located in the eastern portion of the Yilgarn Craton. The lake covers an area of approximately 1,000 square kilometers (km^2), of which around 250 km^2 is made up of islands and peninsulas. Numerous small claypans and wetlands are scattered around the periphery. Lake sediment comprises fine silt material on the surface, underlain by clay, with lenses of coarse gypsum (GSM, 2022).

Drainage is endorheic (internal), occurring in a south-easterly direction during surface sheet flow. Major flood events are rare, and the lake only fills after intense winter rains or cyclonic events from the north. During flood events, surface water is transported to the lake from the surrounding catchments via several tributaries (GSM, 2022).

The water table lies beneath the surface of the lake Carey is naturally hypersaline and shallow. As a result, a thin, naturally occurring salt crust often covers the lakebed, which appears much thicker in the vicinity of the other approved discharge outfalls (W1 and W2). However, the salt crust is readily dissolved by rainfall and completely dissipates during major flood events. Discharge to the lake results in additional salt load into the water, which typically develops a thicker salt crust in the vicinity of the discharge outfalls. Yet, the thickness of the salt crust varies on several factors including the salinity of the discharge water, lake evaporation, geology, lake elevation and hydroperiod.

Table 5: Pit water quality in Granny Smith, Windich and Wallaby pits against guideline values

Parameter (mg/L)	2021 Results		Wallaby Discharge Mean	ANZG (2000) 80% DGV	ANZG (2000) 95% DGV
	GSM Discharge Mean	Windich Discharge Mean			
Aluminium	0.25	0.05	0.04	0.0005[2]	NG
Arsenic	0.006	0.002	0.004	0.0045[2]	NG
Bicarbonate $CaCO_3$	78	104	56	NG	NG
Boron	0.22	-	1.16	NG	NG
Barium	0.029	0.121	0.029	NG	NG
Cadmium	0.026	0.001	0.011	0.036	0.005
Calcium	370	352	603	NG	NG
Chloride	98,236	20,333	116,861	NG	NG
Chromium (III)	0.005	0.001	0.004	0.0906	0.0274
Cobalt	0.11	0.09	0.051	0.150	0.001
Conductivity Lab (mS/cm)	221	62	220	NG	NG
Copper	0.013	0.001	0.025	0.008[2]	0.0013
Iron	0.27	0.19	0.44	NG	NG
Lead	0.07	0.0002	0.128	0.012	0.0044
Magnesium	4,880	998	5,220	NG	NG
Manganese	0.6	6.5	2.7	NG	NG

Molybdenum	0.018	0.003	0.025	0.023[2]	NG
Nickel	0.08	0.02	0.06	0.56	0.070
Nitrate as N	0.22	0.02	3.44	NG	NG
pH - Lab (SU)	7.2	7.6	6.9	NG	NG
Potassium	2,318	394	2,029	NG	NG
Selenium	-	-	0.013	0.027[1]	-
Silver	0.006	-	0.002	0.0026	0.0014
Sodium	71,685	13,867	81,700	NG	NG
Sulphate, SO4	16,868	2,987	16,794	NG	NG
Total Dissolved Solids	258,023	43,433	248,436	NG	NG
Vanadium	0.007	0.001	0.007	0.280	0.100
Zinc	1.091	0.014	0.707	0.043[1]	0.015

NG: Not Given
Note 1: Recommended in literature for hypersaline conditions
Note 2: marine low reliability trigger value

Surface water quality

Based on the recent Annual Environment Report (2022), a field survey has been conducted to monitor the water quality in Lake Carey and water samples were collected at sites where sufficient surface water was present. The results indicated that the water quality of Lake Carey is hypersaline with TDS ranging from 238,000 mg/L to 333,000 mg/L. The salinity levels are elevated at all sites in comparison to the 80th percentile of the Lake Carey control site (CSR). The results also depicted that dewatering discharge has extended beyond the southern discharge area indicating elevated salinity at the southern control sites. However, the salinity of the surface water decreases substantially during infrequent flooding events and salts loads concentrating when the system enters the drying phase.

Major Ironic composition of the surface water of lake Carey, is that Na, Mg, K, Ca for cations and Cl, SO_4 and for HCO_3 for anions, confirms the hypersaline nature of the surface water. However, published literature also identified that ionic concentrations are also influenced by climate, catchment topography and the geological setting, with changes in the concentration of constituents often associated with evapo-concentration (Boulton and Brock 1999). Recent water quality on the lake also reflected that the total nitrogen concentration is substantially higher than the total phosphorus concentration. However, nutrient concentrations have exhibited variation over time and typically with elevated concentrations around the discharge outfalls.

The concentrations of dissolved metals and trace elements were analytical below detection limits for the majority of sites. However, several elements including Cd, Co, Pb, Mn, Ni and Zn recorded detectable concentrations, exceeding Lake Carey CSRs 80th percentile and/or ANZG (2000) 80% guideline values.

Sediment quality

Sediment testing carried out during the monitoring program in 2022 reflected that, pH of the sediments was moderately to strongly alkaline ranging from 8.1 to 8.7. there was no significant difference in the mean pH of the southern and western discharge areas, or between the discharge and control sites.

Sediment salinity was also measured during the monitoring program and identified that at the western discharge outfall, discharge sites had significantly elevated mean salinity than that of at the control sites. In contrast, no significant difference has been identified among the discharge sites and the control sites at the southern discharge outfall. Based on the monitoring data over time, it is indicating the influence of the dewatering discharge at Lake Carey typically higher at discharge sites compared to control sites.

Metals and metalloid concentrations in the sediments were also tested and during the recent monitoring program, it was identified that mean concentrations of lead were significantly higher then at the discharge sites. This is more likely associated with the characteristics of the discharge water. Over time, the discharge sites have been characterised by significantly higher Mn and Ni, while control sites significantly higher in Cr. Recent results also illustrated that, the concentrations of several metals and trace elements including B, Cd, Hg, Se, Ni, and Zn have exceeded the Lake Carey CSRs 80th percentile.

However, based on the sediment testing results, no cumulative trends are evident in metal concentrations at the discharge sites over time. It should be also noted that, concentrations typically increase during dry conditions due to evapo-concentration, and decrease during major flood events, associated with dilution and dispersal (GSM, 2022).

Riparian Vegetation

A flora and vegetation survey around the perimeter of Lake Carey and in the vicinity of the project was conducted in October 2022 to assess density and health of the riparian vegetation in relation to impacts associated with the already approved dewatering discharge (W1 and W2). Based on the supporting documents provided with the application, the field assessment has not identified any significant species, that are priority, threatened or declared rare flora. Riparian

vegetation in the vicinity is characterised by halophytic chenopods. Twenty-one riparian vegetation taxa from seven families were recorded and the recorded vegetation species are not considered groundwater dependent. *Tecticornia* was the most diverse and dominant genus, especially in proximity to the playa, with *Atriplex* and *Frankenia* species becoming more prevalent on elevated, sandy soils (GSM, 2022).

Due to inconsistency in the transect lengths and orientation, comparison between monitoring sites is challenging. However, overall plant cover, abundance and health decreased in comparison to previous years. Yet, the recent monitoring results has not reflected any clear trends between potentially drawdown-affected and reference sites, thus it has determined that this is likely reflect the influence of the dry climate due to below average rainfall, as well as proximity to dewatering discharge and obstruction of natural drainage patterns in the lake due to the causeway (GSM, 2022).

Aquatic biota

Based on the supporting information provided with the application, several taxonomic groups of Phytoplankton, Benthic algae, Diatoms, Aquatic Invertebrates and Waterbirds, have been recorded within the playa of Lake Carey. Phytoplankton and benthic algae in the Lake Carey have been limited to the periods of major floods and also identified few differences in assemblage between discharge outfalls and wider lake. Diatoms are one of the few groups that can be persist both in dry and flooded conditions. When inundated, substantial increase in diatom productivity can be observed and during recent major floods, a total of 28 diatom taxa were identified. Species composition of diatoms at Lake Carey appear to be driven by the hydroperiod, and corresponding fluctuations in salinity, nutrient availability, and substrate characteristics (GSM, 2022).

Very few records of Macrophytes from Lake Carey, and to date only one aquatic plant has observed. Germination of this species stimulated by elevated salinity and however, this species preferred deep, still, and clear water habitat for establishment and can survive in salinities over 200,000 mg/L. Notably, this species was absent from discharge outfalls potentially due to water flow preventing establishment. Among the recorded aquatic invertebrate taxa from Lake Carey, crustaceans are the prevailing invertebrates identified in the lake, including copepods, ostracods (seed shrimps) notostracans (shield shrimp) and anostracans (fairy shrimp and brine shrimp). The eggs of ostracods and *Parartemia* (brine shrimp) have also been widespread in the sediments and usually common in the surface water during flooding. There is one Priority 1 species (*Branchinella simplex*) and at least two potentially restricted taxa (*Parartemia bicorna and Reticypris* sp. BOS1087) know from the playa (GSM, 2022). Most of the aquatic invertebrate taxa recorded from Lake Carey also occur in the surrounding wetlands, providing a mechanism for re-colonisation during flooding (GSM, 2022).

Previous studies have been identified that 18 species of waterbirds from eight families have been recorded on the playa. The licence holder has stated in their application that studies indicate that there have been no impacts observed on waterbirds from the discharge and metal toxicity from the discharge to waterbirds is also low due to the dilution during major flood events (GSM, 2022). However, it is clear that wading birds do visit the lakes and use invertebrates as a food source and are therefore considered to be the most sensitive environmental receptors in the system, due to the potential for some metals and metalloids to be biomagnified in local food webs.

3.3.3 Impacts from additional mine dewatering discharge from Granny smith and Windich pits and additional regulatory controls

Monitoring controls for dewater effluent emissions to Lake Carey

Lake Carey is one of the salt lakes in the Western Australia (WA), which has been receiving mine dewatering discharges for many years and therefore it can be considered as a disturbed lake rather than a pristine salt lake. Many salt lakes in WA are important food sources for bird

populations, who are migrating to these systems after a heavy rainfall to feed on brine shrimps and other aquatic organisms, and to breed (Pedler *et al*., 2017). Mine dewatering discharges can potentially cause significant environmental impacts into the ephemeral salt lakes and dependent organisms due to the elevated concentrations of metals and metalloids; however, a limited amount of work has been undertaken in this field in WA. Historically, concentrations of toxic pollutants in mine dewater were assessed by comparison with 80th percentile ANZECC 2000 marine water criteria, however, it is not appropriate and scientifically not defensible as it does not consider natural large changes in water quality due to the wetting and drying seasons and also the high level of resilience that Salt Lake aquatic organisms possess.

Based on the published literature, it was identified that the brine shrimp species are extremely resistant to high metal concentrations and commonly do not show adverse impacts from metal concentrations of less than about 5 mg/L (Brix et al., 2003; Sarabina et al., 2008). Yet, the hatching success of these species appears to be greatly reduced when the concentration of zinc in solution is greater than about 80 µg/L (Sarabina et al., 2008), and when the concentration of copper in solution is about 68 µg/L (Brix et al., 2006). According to the recent water quality testing of the Granny Smith pit water indicate that zinc concentrations are several folds higher than that of safe value. To ensure no adverse impacts from the mine dewater discharge, regular monitoring of these concentrations is crucial. Condition 23 has been updated to ensure discharge water quality is monitored at this new discharge point.

Hatching success of brine shrimp species associated with other metals including lead, cadmium, cobalt, nickel, chromium, iron, and manganese appears to be relatively unaffected at concentrations less than about 10 mg/L (Liu and Chen, 1987). Therefore, recent water quality analysis confirms that low concentrations of other metals and metalloid are unlikely to make significant impacts in Lake Carey. However, the low toxicity of metals to aquatic organisms in salt lakes only applies to systems where there is excess alkalinity in the water. Based on the recent data, mine dewater from Granny Smith pit and Windich pit contains residual alkalinity and therefore is unlikely to cause significant impacts on aquatic fauna in Lake Carey. However, it is extremely important that the acidity and alkalinity of the discharge water is monitored frequently to ensure minor dewater maintains an appropriate level of alkalinity.

According to the *National Guidelines for Dewatering in Potential Acid Sulfate Soil Areas* (Shand *et al.,* 2018), it was identified that the suitable level of alkalinity for sustaining a stable pH in dewatering discharges is 60 mg/L or higher as $CaCO_3$. Therefore, maintaining alkalinity levels in the discharge water above this level provides an additional margin of safety for the receiving environment.

Alkalinity in the discharge water (dewatering effluent) has historically been variable at the premises, often reported below 60 mg/L but typically with a stable average above 30 mg/L. In consideration of historical levels, a trigger value has been set for alkalinity for W3 only to ensure management response in the event alkalinity in the discharge water is reported below 15 mg/L. Work on aquatic fauna in salt lakes in the Wheatbelt (Degens et al. 2018) indicates that many species would die if the water had a complete loss of alkalinity. Should the alkalinity level fall below 15 mg/L, response actions are required, including addition monitoring of alkalinity and net acidity.

Specific management responses have also been conditioned if these triggers are exceeded, including increased monitoring frequency. Should trigger exceedances be repeated, further response action is required to prevent further exceedances.

Bioaccumulation and biomagnification of Selenium in wading bird species is considered to be another impact from the mine dewatering operations. It has the potential to biomagnify in the food webs and adversely affect developing chicks in bird eggs of the bird populations that rely on aquatic fauna from Salt Lake as a food source. Research has indicated that Selenium concentrations in discharge waters less than about 27 µg/L (Ohlendorf *et al*., 2009) would protect breeding bird populations on Salt Lakes. The Delegated Officer notes that the recent water quality data does not include the Selenium concentrations from the Granny Smith and

Windich pits. However, Selenium concentrations in the historical discharges from Granny Smith Mine were generally below 27 µg/L with some incident where the discharges have exceeded this concentration limit. Thus, regular monitoring of selenium concentrations in the mine dewater is required to ensure that the concentrations are not exceeding the recommended level and to determine whether management measures would be required to protect bird populations. Therefore, to adequately managed impacts from selenium, a target of <27 µg/L of selenium has been added for W3 only to condition 23.

In addition, elevated concentrations of metals and metalloids in sediments have the potential to cause adverse impacts on macroinvertebrates in wetlands and waterways. Therefore, to ensure no adverse impacts are generated due to the increase in mine dewater volumes, monitoring of metals and metalloid concentration in sediments should continue as per the existing condition 29 (this has been updated to include the new discharge point).

Annual ecological assessment

The licence currently requires the submission of a report (via the annual environmental report required by condition 34) addressing the environmental effects of mine dewater discharge to Lake Carey. This report includes the outcome of monitoring programme which contains analysis of water and sediment quality from the lake to determine differences between discharge and control sites, assess diatoms resting stages (dormant egg and seed bank) from the lake sediment and aquatic invertebrates from surface water on the lake and provides a comparison of the lake's ecology to previous monitoring programmes.

This assessment is required to ensure compliance with the objectives of the Hypersaline Management Plan (HMP) which is required by the ministerial statement No. 551 under Part IV of the *Environmental Protection Act 1986* (EP Act). This ministerial statement regulates the discharge of dewater from the wallaby underground mine.

At the time of the assessment of the Part V licence amendment for the Wallaby Underground mine dewater discharge to Lake Carey, it was decided to avoid regulatory duplication by not replicating the requirement to undertake an annual ecological assessment of the lake as licence conditions and instead finding it sufficient to only condition the requirement to submit the annual ecological assessment carried out for the Part IV HMP through a report via condition 33.

With the addition of this new discharge point and increase in discharge volume from the granny smith project it has been determined that oversite of the cumulative impacts of all three discharge points on Lake Carey is required and therefore a condition has been added to the licence formally requesting the annual ecological monitoring be undertaken for all three discharge points. This monitoring is already being undertaken for the two wallaby discharge points as per the HMP and it has been determined that the monitoring should be extended to include the new discharge point area. The intent of this condition is to mimic what is already being undertaken by the licence holder in regard to the existing dewater discharge points with the additional of extending it to include the new discharge point area.

4. Consultation

Table 6 provides a summary of the consultation undertaken by the department.

Table 6: Consultation

Consultation method	Comments received	Department response
Local Government Authority advised of proposal 12 January 2023 – Shire of Laverton	Shire of Laverton replied on 14 January 2023 stating that "The Council does not have any comment to make on the amendment to L8435/2010/3."	Noted.

Department of Mines, Industry Regulation and Safety (DMIRS) advised of proposal 12 January 2023	DMIRS replied on 18 January 2023 advising that "Standard conditions imposed on the tenements associated with the Granny Smith mine require the construction or operation of the project and measures to protect the environment to be conducted in accordance with the approval documents listed in the conditions. Any alteration or expansion (regardless of whether there is additional ground disturbance required) beyond the activities as outlined in the approval documents cannot commence until a plan of operations (Mining Proposal) has been submitted and written approval obtained from DMIRS. DMIRS records indicate that we have not received any recent Mining Proposals related to development of underground operation. Based on the information provide it appears the activities detailed in the licence amendment may constitute an alteration or expansion to the existing approvals, thus a Mining Proposal would be required to be lodged to ensure compliance with tenement conditions imposed under the *Mining Act 1978*. It is strongly recommended GSM Mining liaise with DMIRS as soon as possible regarding the proposed underground project to determine whether a Mining Proposal is required and ensure compliance with the Mining Act."	Noted and informed the Licence Holder on 27 January 2023.
Licence Holder was provided with draft amendment on 19 July 2023	Refer to Appendix 1	Refer to Appendix 1
Licence Holder was provided with a second draft amendment on 23 November 2023	No comment received. The Licence Holder advised that they intended to provide comment, however due to several factors no comment was received (following several requests to extend the response due date).	The department determined to issue a third and final draft package to close out the assessment.
Licence Holder was provided with a third draft amendment on 8 April 2025.	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 7 provides a summary of the proposed amendments and will act as a record of implemented changes. All proposed changes have been incorporated into the Revised Licence as part of the amendment process.

Table 7: Summary of licence amendments

Condition no.	Proposed amendments
Cover Page	Removed surrendered mining tenements L38/50, L38/51 from the prescribed premises boundary mining tenements list
	Updated the prescribed premises category table to include the additional short term mine dewatering volume of 20 GL
Page 3	Updated the Licence history table to include the recent amendment information
Throughout licence	"Shall" has been replaced by "must" to make the wording of the licence consistent and to match with the current wording style
2 (Table 1)	Existing water transfer pond reference point has renamed as Wallaby water transfer pond and material has restricted to mine dewater from wallaby underground mine Granny Smith water transfer pond has been added to the containment infrastructure list and operational requirements has been added
5 (Table 2)	Granny Smith pit has removed the inspection table as it will no longer be an emission point
15	Removed "22 generators" from emission point A3 as these have been decommissioned.
16 (Table 7)	New discharge point – Eastern discharge point (W3) has been added to the licence and source of discharge water has included. Emission point name of the W2 corrected from "eastern" to "southern".
17 (Table 8)	Granny Smith pit has removed from the authorised emission points for TSF 3 seepage water as seepage water does not discharge to this pit and never has.
18 (Table 9)	Standing water limit requirement removed from the Granny smith pit as it will no longer be an emission point
23 in previous licence	Deleted redundant requirements for commissioning of LNG power station. Commissioning compliance documents were submitted in 2016. Authorised emission points to air for the power station remain on licence, specified under condition 15.
23 (Table 12) in the amended licence	New emission point included. New monitoring parameter, "Alkalinity" was added with a new discharge trigger value. New discharge trigger value was assigned to "Selenium" concentrations in the discharge water
24	New licence condition was added for management response following exceedances to trigger values set in condition 23.
29 in the amended licence	New licence condition was added to include annual ecological monitoring at all discharge points.
24 – 38 in the previous licence	Condition numbers were updated to match with the numbering system

30	New condition was added for the licence holder to develop a detailed ambient sediment sampling methodology in consultation with a NATA-accredited laboratory and submit this methodology to DWER by 30 October 2025.
33 (Table 18)	New emission point added (W3)
33 in the amended licence Table 18	Requirement to address the environmental effects of mine dewatering discharge to Lake Carey in the Annual Environmental Report has been removed as this will replace with the new ecological assessment requirement condition (condition 30 in the amended licence)
36 and 37	Removed LNG commissioning reporting requirements which have been completed.
40 in the amended licence	New condition was added to include the construction and installation requirements of the pumps, telemetry, and automatic shutoffs
41 and 42 in the amended licence	New condition was added to include the construction compliance reporting of the pumps, telemetry, and automatic shutoffs
Schedule 2	New schedule was added to the licence to give details of the minimum requirements of the annual ecological assessment.

References

1. Email titled “GSM Licence Amendment Application” and supporting documents dated 10/11/2022 authored by Claire Meacher, available at DWER records (DWERDT685765).
2. Degens B, Krassoi R, Galvin L, Reynolds, B, Micevska T 2018, *Net acidity indicates the whole effluent toxicity of pH and dissolved metals in metalliferous saline waters,* Chemosphere. 2018;198:492–500. doi: 10.1016/j.chemosphere.2018.01.129.
3. DER 2015, Guidance Statement: Setting Conditions, Perth, Western Australia.
4. Department of Water and Environmental Regulation (DWER) 2019, Guideline: Decision Making, Joondalup, Western Australia.
5. DWER 2020(a), Guideline: Risk assessments, Joondalup, Western Australia.
6. DWER 2020(b), Guideline: Environmental siting, Joondalup, Western Australia.
7. Brix, K.V., Cardwell, R.D. and Adams, W.J., 2003. Chronic toxicity of arsenic to the Great Salt Lake brine shrimp, Artemia franciscana. Ecotoxicology and Environmental Safety, 54, 169-175. The paper is available from web site https://www.researchgate.net/profile/Rick-Cardwell/publication/10931845_Chronic_toxicity_of_arsenic_to_the_Great_Salt_Lake_brine_shrimp_Artemia_franciscana/links/5c0098e392851c63cab0528c/Chronictoxicity-of-arsenic-to-the-Great-Salt-Lake-brine-shrimp-Artemia-franciscana.pdf
8. Chen, P-C. and Chen, J-C., 1987. Effects of heavy metals on the hatching rates of brine shrimp Artemia salina cysts. Journal of the World Aquaculture Society, 18, 78- 83.
9. Gregory, S.J., Ward, M.J. and John, J., 2009. Changes in the chemistry and biota of Lake Carey: a large Salt Lake impacted by hypersaline discharge from mining operations in Western Australia. Hydrobiologia, 626, 53-66.
10. John J, 1983, *The Diatom Flora of the Swan River Estuary, Western Australia*.
11. Ohlendorf, H.M., DenBleyker, J., Moellmer, W.O. and Miller, T., 2009. Development of a site-specific standard for selenium in open waters of Great Salt Lake, Utah. *Natural Resources and Environmental Issues*, 15, Article 4.
12. Pedler, R.D., Ribot, R.F.H. and Bennett, A.T.D., 2017. Long-distance flights and high-risk breeding by nomadic waterbirds on desert salt lakes. *Conservation Biology*, 32(1), 216-228
13. Sarabina, R., Del Ramo, J., Varó, I., Díaz-Mayans, J., and Torreblanca, A., 2008. Sublethal zinc exposure has a detrimental effect on reproductive performance but not on the cyst hatching success of Artemia parthenogenetica. Science of the Total Environment, 398, 48-52.
14. Shand, P., Appleyard, S., Simpson, S.L., Degens, B., Mosley, L.M., 2018, *National Acid Sulfate Soils Guidance: Guidance for the dewatering of acid sulfate soils in shallow groundwater environments*, Department of Agriculture and Water Resources. The document is available from web site https://www.waterquality.gov.au/issues/acid-sulfate-soils/dewatering-groundwater-environments.
15. Storer T, O’Neill K, Christie, E, Galvin L & van Looij E 2022, *The South West Index of River Condition, Module 2 – method summary: collection and analysis of aquatic biota, River Science Technical Series*, report no. 2, Healthy Rivers program, Department of Water and Environmental Regulation, Perth

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

Condition	Summary of Licence Holder's comment on 23 November 2023	Department's response (8 April 2025)	Licence Holder's Revised Response (1 May 2025)	Department's response
23, 24	Request removing the proposed alkalinity trigger value given the low risk/probability of ASS occurrence, adequate buffering capacity within the lake during flood events (related to the calcareous geology) and natural lake characteristics. However, as a contingency action, keep the proposed laboratory analysis of alkalinity in the water quality suite as part of DWER licence conditions comprising water emissions monitoring for W1, W2 and W3, as well as the water and sediment quality suites that are analysed for the Lake Carey annual ecological monitoring program. Further justification to remove the alkalinity trigger value is provided below: <u>Acid sulfate soil risk</u> The National Guidelines for Dewatering in Potential Acid Sulfate Soil Areas (Shand et al. 2018), and therefore the proposed alkalinity trigger value of >60 mg/L, are unlikely to be applicable to the current and proposed dewatering discharge to Lake Carey from the Wallaby Project and Granny Smith Complex Underground Project (GSCUP). Mining and dewatering activities associated with the Wallaby Project and proposed GSCUP are located within an area classified as an 'Extremely Low Probability of Occurrence'. <u>Water quality</u> Water quality data indicates that alkalinity (bicarbonate) within the discharge and pit waters over time (2001 to 2023) has been variable, ranging from 8 to 350 mg/L at W1, 35 to 71 mg/L at W2, 43 to 130 mg/L in the Granny Smith Pit and 17 to 104 mg/L in Windich Pit. The majority of records at W1 (63%) and Granny Smith Pit (91%) have remained above the Shand et al. (2018) trigger value of 60 mg/L, however at W2 and Windich Pit, alkalinity has typically been below 60 mg/L (mean 46 mg/L and 43 mg/L, respectively). Regardless, pH at the discharge outfalls on Lake Carey and in the pits has remained consistent over time, generally classified as circumneutral (6.5 to 7.5) and alkaline (>7.5) (Foged 1978), respectively, which is reflective of the lake system during flooding (Outback Ecology and Actis Environmental Services 2013; Stantec 2019). Control site ranges (CSRs; based on data collected from 2001 to 2017), specifically developed for Lake Carey surface waters	The alkalinity criterion in the national groundwater dewatering guidance document was set at 60 mg/L to provide an additional margin of safety for the receiving environment. However, given alkalinity in dewater has historically been variable at the premises, often dipping below 60mg/L but typically with a stable average above 30 mg/L, the Delegated Officer has determined to revise the alkalinity management trigger to a minimum value of 30 mg/L as $CaCO_3$ for alkalinity/bicarbonate ion concentrations. The less conservative trigger value is considered acceptable with an additional trigger for net acidity. The reason for measuring total acidity is that work on aquatic fauna in salt lakes in the Wheatbelt (Degens et al. 2018) indicated that many species would die if the water had a net acidity (i.e. the value of total acidity-alkalinity is positive). This would be unlikely to take place when the alkalinity of the discharge was greater than 60 mg/L as CaCO3, but could potentially take place when the alkalinity of the water is below this value. The Delegated Officer has therefore set two triggers, including a revised alkalinity trigger and a new net acidity trigger. Additional requirements for management response to an exceedance of these triggers have been added to mitigate potential impacts to aquatic fauna. The preferred monitoring interval is monthly, however the department considers that two-monthly (i.e. every two months) is acceptable and has amended the condition accordingly. Although bicarbonate ion concentrations in groundwater pumped from the Granny Smith mine have been high for a long period of time this does not mean that these conditions would always persist with ongoing dewatering, as it can take many years of pumping before an acidification event is triggered during a mine dewatering program. Further, acid sulfate soil risk maps only apply to the distribution of shallow soils and are not applicable to regolith or rocks below the water table. Sulfide mineral accumulations commonly occur in regolith or bedrock below the water table in areas that are mapped as having a low acid sulfate soil disturbance risk. This is particularly the case in the vicinity of mine sites like the Granny Smith mine, where accessory sulfide minerals like pyrite commonly accompany ore minerals. These sulfide minerals (particularly pyrite) can be exposed to oxygen due to the lowering of the water table by mine dewatering, and this can generate acidity that is released into groundwater. The acidity can be neutralised through the chemical reaction with bicarbonate ions, which in poorly buffered aquifers can lead to the release of metals into groundwater at environmentally harmful levels. This would particularly be the case if the bicarbonate ion concentration in groundwater were to drop below 60 mg/L as CaCO3. Increased metal concentrations in the dewatering effluent would have the potential to cause harmful effects on invertebrates in the discharge area in Lake Carey. As acidification and the release of metals into groundwater	Request that the trigger for alkalinity for W3 is site specific, according to Lake Carey control site data. Based on this data, it is proposed to reduce the DWER alkalinity trigger of 30 mg/L to 15 mg/L. The proposed trigger is based on the analysis of regional control site water quality data from Lake Carey, predominately collected during flood events. Gold Fields have been an active member of the Lake Carey Catchment Management Group (LCCMG) since its formation in 2001, and have joint-funded numerous regional monitoring surveys, including three major flood studies (undertaken in 2011, 2017 and most recently in 2024). This has resulted in the collection of a robust water quality dataset, with a total of 44 records for alkalinity available from the regional control sites. Of these records, four (9%) were below the proposed 30 mg/L trigger, with a minimum of 16 mg/L, indicating that Lake Carey has naturally low alkalinity at certain stages of the hydroperiod. Therefore, based on the analysis of this data, we propose an alkalinity trigger of <15 mg/L apply to the W3 discharge outfall. Noting that if the trigger for alkalinity is exceeded, Gold Fields will also test acidity and net acidity (indicating overall acidic load in surface water) to ensure the balance between the two factors is maintained and poses no risk to aquatic biota. Any acidic conditions that would result in the mobilisation of potential contaminants during flooding will be detected through the increased monitoring frequency of pH, alkalinity and acidity, as specified in the proposed licence amendment. Appropriate response actions or specified measures will then be implemented if required. Therefore, we propose that there is no trigger applied for positive net acidity at any of the discharge outfalls. Request the trigger for alkalinity apply to discharge point W3 only, as few exceedances have been recorded at W1 and W2 overtime. Based on the extensive historic water quality data (2001 to 2023) from W1 and W2, only a single exceedance of either the proposed triggers (30 mg/L and 15 mg/L) have been recorded since 2001. Therefore, request the management and monitoring of W1 and W2 remain consistent with the existing licence conditions, and no trigger for alkalinity be applied to W1 and W2. Proposed modifying the wording of Condition 24 (b) (iii) to remove 'lime dosing' and having Gold Fields determine the appropriate mitigation and management actions if such an exceedance were to occur. Therefore, given the nature of the receiving environment and possible mitigation options, we are proposing to amend the wording of Condition 24 (b) (iii) to the following: *An agreed appropriate response action or specified measures that were taken following the multiple trigger exceedances at W3 to minimise the likelihood of environmental harm to aquatic fauna at the discharge location.*	1. Revise alkalinity trigger from 30 to 15 mg/L for W3 The Delegated Officer has determined to revised the alkalinity trigger level to 15 mg/L, noting the data presented indicated Lake Carey has areas of naturally low alkalinity. 2. Remove alkalinity trigger at W1, W2 The department has determined to remove the alkalinity trigger at discharge points W1 and W2 based on historical data indicating alkalinity rarely falls below the trigger level at W1 and W2. Alkalinity levels will continue to be monitored per licence conditions with results reviewed by the department to determine the necessity of an alkalinity trigger at W1 or W2. 3. Remove net acidity trigger at W1, W2, W3 The Delegated Officer agrees to remove the trigger for net acidity, on the condition that an exceedance of the alkalinity trigger at W3 will require additional monitoring of alkalinity, acidity, net acidity and pH. Condition 24(b) has been added to reflect this amendment. 4. Amend description of Condition 24(b)(III) The Delegated Officer has decided to amend the existing condition to remove "lime dosing" as an example of a response action, even though the current wording allows for flexible responses. The Department will assess the suitability of proposed response actions once the report required by condition 24(c) is submitted.

Condition	Summary of Licence Holder's comment on 23 November 2023	Department's response (8 April 2025)	Licence Holder's Revised Response (1 May 2025)	Department's response
	(Stantec 2019), indicate that alkalinity (bicarbonate) typically exceeds >60 mg/L, with a mean of 92 mg/L and an 80th percentile of 138 mg/L (Table 1-2). This suggests that the lake has sufficient buffering capacity to maintain conditions during flooding, and there is no risk of acidification from the dewatering discharge. Elevated metals risk assessment Several environmental risk assessments have been completed to investigate the potential effects of elevated metal concentrations in the current Wallaby and proposed pit discharge waters (MWH 2015;2016; Stantec 2021a; b;2022). The results of these assessments indicate that the natural environmental characteristics of the lake as well as hydrogeochemical processes within the system reduce the potential mobilisation of metals and potential toxicity (bioavailability) to the aquatic biota of Lake Carey during flood events, and include: • natural attenuation of metals; • reduced metal toxicity due to the alkaline pH, elevated salinity (high ionic concentrations), metal oxides, fine clays and organics; and • the inherent resilience of biota to elevated metals.	is one of the most significant environmental risk factors associated with mine dewatering, it is important that this risk is assessed at regular intervals during a groundwater dewatering program. It is considered that the current monitoring frequency in the discharge area in Lake Carey is too low to adequately assess the acidification risk. The simplest way of assessing whether acidification could be a significant environmental risk would be to measure the bicarbonate ion concentration in the dewatering effluent at regular intervals during a mine dewatering program. This measurement is much more sensitive than pH measurements for detecting an acidification trend, as bicarbonate ion concentrations in groundwater may show a declining trend many months before the pH of groundwater decreases. Further, unlike metals analysis, monitoring alkalinity can be done in the field using a simple alkalinity test kit. An exceedance of the alkalinity trigger value is intended to initiate additional monitoring, while a second exceedance should initiate a management response to prevent further exceedances.		
23, 24	Request removing the proposed selenium trigger value. The Se concentration of 0.027 mg/L is not suitable, as it was developed as a site-specific water quality standard for the Great Salt Lake in the northern part of the US (Ohlendorf et al. 2009), which has unique geochemistry. A desktop investigation examining the potential effects of elevated metals in the Wallaby dewatering discharge to the aquatic invertebrates and waterbirds of Lake Carey (MWH 2015) found Se concentrations within the Wallaby discharge water were mostly below a more conservative Se trigger value (0.002 mg/L). Further, the natural lake conditions and hydrogeochemical processes reduce the inherent and residual risk of elevated metals (including Se) to the aquatic biota and water birds on Lake Carey during flooding. This is supported by long-term monitoring programs and regional flood studies completed on the lake to date (Donato Environmental Services 2013; Outback Ecology and Actis Environmental Services 2013; Stantec 2019;2023), which have found no apparent impacts to the diversity, abundance or productivity of	The Delegated Officer has determined to keep the Se trigger value of 0.027 mg/L in dewatering effluent. The department recognises that extensive work has been undertaken to develop site-specific water and sediment quality criteria for a range of metals and metalloids in the dewatering discharge area in Lake Carey and that many invertebrates in the lake are highly tolerant to elevated concentrations of many metals and metalloids. However, selenium is considered to pose a significantly greater risk to sensitive environmental receptors than most other metals and metalloids that are discharged to Lake Carey and therefore this metalloid needs special consideration, given: • Selenium concentrations can readily reach levels of environmental concern in water and sediments in salt lake systems due to the high rate of evaporation in these systems; and • Selenium is readily bioaccumulated within invertebrates in salt lake ecosystems, and can then be biomagnified within local food-webs to affect bird species which use brine shrimp and other invertebrates as a food source. The excessive intake of selenium in these food sources can lead to birth deformities in hatching chicks, which can have a significant impact on populations of birds that periodically visit salt lakes. That is, birds feeding in salt lakes are considered to be the most sensitive environmental receptors for elevated selenium levels, and	Request the selenium trigger applies only to discharge outfall W3 and management and monitoring of W1 and W2 remain consistent with the existing licence conditions, with no trigger value for selenium at W1 and W2. Dewatering discharge has occurred from W1 since 2001, with W2 coming online in 2007. During this time Gold Fields have conducted quarterly water monitoring from both discharge outfalls for the analysis of a suite of metals and trace elements. This has resulted in a combined dataset of 139 records for Se collected between 2001 and 2023. During this period, Se concentrations were below the proposed trigger value for the majority (>85%) of records, with most results below analytical detection limits. However, it should be noted that in some instances, notably between 15/02/2015 and 09/12/2017, the limits of reporting were above the proposed trigger value. In addition, the results of sediment quality monitoring conducted in the vicinity of the W1 and W2 discharge outfalls since June 2019 show that Se concentrations at these sites have also remained below analytical detection limits (<5 mg/kg). This is consistent with control site records, suggesting there is no accumulation of Se in the sediments due to the discharge. Further, Se concentrations recorded from the discharge and control sites were substantially below the Lake Carey Control Site Ranges (CSRs) 20th percentile (9.2 mg/kg), based on 95 records. This highlights that Se within the Lake Carey environment and discharge water is present in naturally low concentrations and does not pose a risk to waterbirds. The previous desktop investigation (MWH 2015) also addressed concerns from DWER in relation to potential risks posed by Se to waterbirds from the dewatering discharge. As per the DWER request, risks were assessed against Lemly (2007), which outlines a procedural framework for determining selenium pollution risk from mining in accordance with the U.S. *National Environmental Policy Act* and takes into account differences in factors such as habitat and geographical location. Based on the outcomes of the desktop investigation, the	1. Remove selenium trigger from discharge points W1, W2 to surface water The Delegated Officer has decided to remove the selenium trigger for discharge points W1 and W2. This decision comes after reviewing the provided site data that shows historically low selenium levels in discharge water at these points, with 85% of results falling below the proposed trigger value. Additionally, selenium levels in sediments at the discharge outfall sites are historically low when compared to control sites. Natural selenium levels in sediment at Lake Carey control sites, ranging from a 20th percentile of 9.2 mg/kg to an 80th percentile of 15.6 mg/kg, also support this decision. The data further indicates that discharges at W1 and W2 since 2001 are unlikely to be causing selenium accumulation in the sediment at these outfall locations.

Condition	Summary of Licence Holder's comment on 23 November 2023	Department's response (8 April 2025)	Licence Holder's Revised Response (1 May 2025)	Department's response
	aquatic invertebrates and waterbirds associated with the dewatering discharge. However, as a contingency action, propose laboratory analysis of selenium be maintained in the water quality suite as part of water emissions monitoring for W1, W2 and W3. The analysis of selenium is also included in the water and sediment quality suites, as part of the Lake Carey annual ecological monitoring program.	not aquatic invertebrates, which are merely vectors for transporting selenium to the birds. It is for this reason that the recommended trigger level of 27 µg/L was developed in the USA for protecting birds. This criterion was developed over a period of several years and involved toxicity testing and ecological modelling to track the transport and fate of selenium through a food web consisting of algae, brine shrimp, insects and birds to identify a water quality criterion that would prevent developing bird foetuses from teratogenic effects caused by selenium. Such a water quality criterion for selenium in salt lake systems has yet to be developed in Australia. However, the department's contaminated site experts consider that it would be likely that the transmission of selenium through food webs in local salt lake ecosystems would be similar to those in the USA, and has consequently recommended that the 27 µg/L selenium water quality criterion is used until a more suitable local value has been developed. Given the potential for elevated selenium concentrations to cause significant environmental effects, the use of a guideline value that has been developed using sound toxicity testing and ecological modelling is considered to be preferable to the use of a criterion that is based on a statistical analysis of a water quality dataset. The Delegated Officer acknowledges that the concentrations of selenium in sediments and water in Lake Carey would be highly variable, and would vary with rainfall-induced wetting and drying cycles in the lake. Consequently, immediately after a heavy rainfall event, the discharge of selenium in dewatering effluent would have a negligible impact on selenium concentrations in the water column in the lake. However, after a prolonged dry spell, there would be a risk that water pooling in the area where dewatering effluent is discharged would have a selenium concentration similar to that in the discharge water. It is under these conditions where the risk of selenium causing impacts on bird populations would be highest and why a concentration trigger for selenium of 27 µg/L is imposed on the discharge of dewatering effluent to Lake Carey.	characteristics of Lake Carey, including low (oligotrophic) primary productivity, lentic waters and inorganic sediments, corresponding with the maximum Se concentration in the discharge waters (0.025 mg/L), a 'minimal' ecological risk classification was applied, based on the Lemly (2007) framework (MWH 2015). Gold Fields acknowledges that during the drying phase of a flood event, surface waters persisting in the vicinity of the discharge outfalls may have Se concentrations similar to the discharge water, from evapoconcentration and increased influence of the dewatering discharge. However, during this period, surface waters will also likely be more saline becoming hypersaline due to the discharge, and provide unsuitable habitat for waterbird foraging, thereby limiting exposure of waterbirds to potential Se toxicity. To promote sound environmental stewardship and ensure potential environmental impacts and harm are prevented, Gold Fields will continue to monitor Se from the existing discharge outfalls W1, W2 and W3, and will ensure that the appropriate detection limits are applied from NATA-accredited laboratories to analyse the results against the proposed trigger value.	
29	Request the removal of Condition 30 and Schedule 2. Instead, maintain the existing ecological monitoring program survey design and sampling methods at the premises, to ensure there is robust comparisons with historical datasets to determine trends over time and identify potential dewatering discharge impacts on the lake's ecology. The survey design and methods can be outlined comprehensively (with supporting tables and figures) in an ecological monitoring program appended to the licence.	Aquatic monitoring requirements (including chemical analysis) have been specified in the licence to provide greater monitoring control of the potential cumulative impacts of all three discharge points on Lake Carey. Further, improved oversight of ecological monitoring is necessary given several contaminants in dewater have consistently exceeded environmental protection guidelines and localised increases have been reported in some concentrations over time. The Delegated Officer agrees that the existing ecological monitoring program meets the requirement for sufficient and appropriate control and discharge site locations at W1, W2 and W3 and has removed the specification of a minimum two control sites and four discharge sites. A figure displaying the new W3 monitoring sites overlaid on dewater inundation area (including historic events etc.) has been added in Schedule 2 of the licence. The number of control and test or 'discharge' sites is also	Gold Fields will develop Sampling and Analysis Guidelines for Salt Lakes in the Goldfields at least 12-months prior to any planned discharge from W3, to allow for review and comment. This guidance will describe sampling methods applicable to Lake Carey, in dry and flooded conditions, based on the current state of knowledge of salt lake ecology, and best practice monitoring techniques. In the interim, Gold Fields proposes that the *Baseline Aquatic Ecology Study of Lake Mackay and Peripheral Wetlands* technical report, prepared for the Agrimin Limited Mackay Potash Project may be used as a suitable reference document (available online at: https://www.epa.wa.gov.au/sites/default/files/PER_documentation2/Appendix%20J%20Lake%20Mackay%20Aquatic%20Ecology%20Report_v3%20(1).pdf). These methods were successfully applied to characterise the environmental values of the largest salt lake in Western Australia (Lake Mackay) as part of environmental impact assessment for the Mackay Sulphate of Potash Proposal. summary of these sampling methods, for dry and flooded conditions, are provided in Table 3 and can be applied to the licence amendment.	Following review of the proposed methods, the Delegated Officer has determined to amend some of the specified methods in Schedule 2 as follows: <u>Water quality monitoring</u> • Clarified that non-NATA accredited analysis permitted for pH, temperature, dissolved oxygen and electrical conductivity <u>Sediment sampling</u> • Composition sampling methodology amended to the proposed method of scraping the top 2 cm of lake sediment across 30 cm of the playa surface using a sterilised 250 mL glass jar <u>Wet phase macroinvertebrate sampling</u> • AUSRIVAS method (Storer et al. 2022) replaced with proposed sample collection method as detailed in *Baseline Aquatic Ecology Study of Lake Mackay and*

Condition	Summary of Licence Holder's comment on 23 November 2023	Department's response (8 April 2025)	Licence Holder's Revised Response (1 May 2025)	Department's response
		considered acceptable. Reference to the minimum number of sites has been removed and replaced with reference (in revised Schedule 2) to the 2022 Annual Ecological Assessment site locations, noting that these locations are expected to be reassessed annually for ongoing relevance. Currently, localised impacts are largely discounted by the licence holder due to the periodic floods diluting containment levels, however there is little consideration of accumulation of salt and contaminants for the wider area. There is also little clarity on how the habitat in the immediate discharge zone compares to the wider community (e.g. are resting stages of invertebrates found as commonly elsewhere), and whether the continued addition of salts will eventually cause a shift towards a less diverse, more salt-tolerant assemblage of biota in the future.		*Peripheral Wetlands.*
	Regarding proposed condition 30(a) – water sampling: • Recommended only dissolved metals are analysed from water samples given that only the bioavailable portion of metals within the surface waters will be toxic to aquatic biota, and to align with historic monitoring; • During dry conditions, only analyse total metals from sediment samples to align with historic data collection. However, the analysis of bioavailable metals can be included during flood events; and Remove the proposed replicate and composite sediment sampling, however, additional discharge and control sites in relation to proposed discharge from W3 will be added to the program.	Total metals concentrations must be assessed as this captures any contaminants bound to sediment particles that may be released under certain conditions, such as changes to pH or hardness. However, the department's technical experts advise that if a stable relationship between Total and 'Bioavailable' fractions can be demonstrated, then collection of only filtered samples may be acceptable upon review. Further, if concentrations for a contaminant(s) are demonstrated to remain below levels of concern and with no increasing trend for at least three years, the licence holder may request an amendment to remove these parameters from the analytical suite. Use of the 20th and 80th percentiles based on control site range data for water quality from 2001-2017 is supported and appears to generally align with literature on tolerance of representative species. That said, the contemporary approach to establishing compliance limits uses upper threshold limits (UTLs) determined from existing monitoring data from the Granny Smith mine site. In the long-term, if the increased discharges via W3 are proposed beyond 13 months, the Delegated Officer would encourage development of new hardness-modified site-specific trigger values (SSTV) for contaminants of potential concern (as per Smith *et al* 2020). Alternatively, treatment options should be investigated to maintain contaminant levels below current conditions.	Dissolved metal concentrations in water and total metal concentrations in the sediments of the lake, including cobalt, copper, lead, manganese, nickel and zinc, have consistently been elevated in comparison to the Lake Carey control site range 80th percentile and ANZG (2018) DGVs at the W1 and W2 discharge outfalls. However, there have been no cumulative trends found in metal concentrations, with a high degree of variation also evident over time (Stantec 2023). Gold Fields propose to include the analysis of total and dissolved metals from surface waters during sampling of future flood events. This is considered the most likely period for exposure of aquatic biota to potentially elevated concentrations of metals in relation to the discharge. Gold Fields are also agreeable to the review and revision of existing Lake Carey CSRs during future flood events and the implementation of appropriate management actions, where required, to prevent environmental harm. This could include, if needed, the development of site-specific trigger values for potential contaminants of concern at the discharge outfall W3. A summary of sampling methods, including monitoring water and sediment quality, from the baseline aquatic ecology study of Lake Mackay and peripheral wetlands report is provided, with the full report available online at:https://www.epa.wa.gov.au/sites/default/files/PER_documentation2/Appendix%20J%20Lake%20Mackay%20Aquatic%20Ecology%20Report_v3%20(1).pdf. It is proposed that these methods will form the basis of a detailed sampling and analysis guidelines for salt lakes funded by Gold Fields for implementation across Lake Carey.	As proposed, the Delegated Officer has conditioned that water quality sampling is to include total and dissolved metals to capture any contaminants bound to sediment particles that may be released under certain conditions, such as changes to pH or hardness. Sediments are to be analysed for total and dissolved metals in the wet phase and only total metals in the dry phase.
	Regarding proposed condition 30(b) – sediment sampling: To align with historic data collection, it is also recommended that only total metals are analysed from sediment samples during dry conditions. However, the analysis of bioavailable metals can be included during flood events; the period when aquatic biota may be exposed to potentially elevated metal concentrations in surface waters. The sediments of Lake Carey are known to display a high chemical heterogeneity, consistent with other Australian salt lakes. This natural variation is adequately captured by the number and spatial	The Delegated Officer agrees with the approach to only specify total metals analysis during dry conditions, with bioavailable metals (lab) added during flood events. However, composite and replicate samples are to remain a requirement during sediment sample collection (although minimum replicate samples has been revised to 3). Composite samples are considered standard practice, particularly for heterogenous sediments. They also do not increase analytical cost or have a significant effect on staff time. Replicates (3 minimum) are also a critical component for any monitoring program to ensure greater confidence in representativeness as well as statistical analysis. The current spatial array of sites is designed to detect differences across the area (identify any localise issues), not as replicants of discharge. However, if homogeneity	Gold Fields acknowledge that composite sampling is important to adequately capture the heterogeneity that exists within salt lake sediments. The current monitoring program follows NATA-accredited laboratory methods for sediment collection (as per laboratory instructions) and effectively equates to composite sampling methods. These methods involve the collection of the top 2 cm of lake sediment using a sterilised 250 mL glass jar, which is scraped approximately 30 cm across the playa surface. Additional scraping is made until the jar is filled, with the compaction of sediments to remove voids. Gold Fields propose that surface sediments be collected from a 1 m x 1 m quadrat at each site, utilising the method described above. A summary of these sampling methods is provided. Gold Fields is committed to sound environmental stewardship and the comprehensive monitoring of dewatering discharge and will develop Sampling and Analysis Guidelines for Salt Lakes in the Goldfields. In the interim, Gold Fields proposes that the *Baseline Aquatic Ecology Study of Lake Mackay and Peripheral Wetlands* technical report, prepared for the Agrimin Limited Mackay	The Delegated Officer has determined that the proposed method for sediment sampling is accepted (noting the addition of condition 30) and notes that the licence holder has stated that it follows NATA-accredited laboratory methods for sediment collection and effectively equates to composite sampling methods. The composition sampling methodology has been amended to the proposed method of scraping the top 2 cm of lake sediment across 30 cm of the playa surface using a sterilised 250 mL glass jar.

Condition	Summary of Licence Holder's comment on 23 November 2023	Department's response (8 April 2025)	Licence Holder's Revised Response (1 May 2025)	Department's response
	distribution of the existing monitoring sites, and the duration of monitoring, which has been ongoing since 1999 in dry and flooded conditions. It is recommended that current methods for sampling and analysing sediment chemistry, outlined in Section 3.3 of the Lake Carey Annual Ecological Assessment 2022 Report are continued, to provide robust comparison of data over time. The proposed replicate and composite sediment sampling is therefore not required. However, additional discharge and control sites in relation to proposed discharge from W3 will be added to the program, as mentioned above.	can be demonstrated, then replicates can potentially be reduced. None of the proposed changes to methods effects comparability, as the intent is to compare representative samples over time (i.e., a composite sample is directly compared to the historical single samples). Photographs of the sediment sampling area at each site have also been specified to enable the department to assess representativeness of samples.	Potash Project may be used as a suitable reference (available online at https://www.epa.wa.gov.au/sites/default/files/PER_documentation2/Appendix%20J%20Lake%20Mackay%20Aquatic%20Ecology%20Report_v3%20(1).pdf). A summary of these sampling methods, for dry and flooded conditions, can be applied to the licence amendment. Propose removing replicate sampling given the scale and scope of the monitoring program is robust, and collection of replicates from the same sites will be spatially related as the sample is a composite sample by nature – the samples taken from a 1 m x 1 m square. If additional replicate samples are taken by the same method in the same area they would be a field duplicate; if it is the strong preference of DWER to have a replicate sampling program in place (minimum of 3 samples), then GSM will accept this. **<u>Additional information in response to questions from department was provided 17/07/2025</u>** **Department Question:** **Regarding the methodology for collecting a composite sediment sample, GSM advised that "*The current monitoring program follows NATA-accredited laboratory methods for sediment collection (as per laboratory instructions) and effectively equates to composite sampling methods*." The method involves "*the collection of the top 2 cm of lake sediment using a sterilised 250 mL glass jar, which is scraped approximately 30 cm across the playa surface*". Can GSM provide a copy of the laboratory advice/instructions regarding the proposed methodology?** We have followed up with our NATA accredited lab, ALS, and a detailed documented methodology isn't currently available for distribution. In lieu of that, ALS have worked with Stantec to provide the following: The current monitoring program follows NATA-accredited laboratory methods for sediment collection (as per laboratory instructions and the existing, DWER-accepted sampling plan) for salt lakes in Western Australia. Current sampling of Lake Carey is functionally equivalent to the collection of composite samples over a small and ecologically relevant sample support volume. The methods applied, which have been ongoing and consistent since 2000, involve the collection of surface lake sediment at each site using a sterilised 250 mL glass jar provided by the laboratory. Sediment is scraped into the jar (avoiding contact) across approximately 30-50 cm of the playa surface to a depth of 2-3cm (excluding voids where possible). Each sample is subsequently stored in a cool esky and transported to the laboratory for analysis as soon as practicable for analysis. To meet the intent of this query, GSM propose that a condition to develop a detailed sampling methodology in consultation with a NATA-accredited laboratory be included on the licence, with this methodology submitted to DWER by 30th October 2025 for review and approval. **Department question:** **Regarding sediment sampling, GSM requested the removal of the requirement to collect replicate samples, noting this was agreed in a meeting with DWER on 23 January 2024. Can GSM please elaborate on the justification for removing replicates?** We have sought advice on this item and believe the existing sediment monitoring program to be scientifically robust, having been applied consistently since 2000, following the protocols of the NATA-accredited laboratory. Over time, this approach has built a long-term and scientifically robust dataset, comprising approximately 750 records. The dataset spans more than 25 years and includes both local and regional sampling under dry and flood conditions. The current method involves the collection of surface sediment from each site using a sterilised 250 mL glass jar, sampling across a 30-50 cm transect to a depth of 2-3 cm. This effectively constitutes a small-scale composite sample, capturing spatial variability across the sampling area.	Replicate sampling is to remain a requirement with a minimum of three replicates per sample to be analysed to assess heterogeneity and rule out spike results. Condition 30 has been added to the licence for the licence holder to develop a detailed sampling methodology in consultation with a NATA-accredited laboratory, with this methodology submitted to DWER by 30 October 2025. Replicate sampling is to remain a requirement with a minimum of three replicates per sample to be analysed to assess heterogeneity and rule out spike results.

Condition	Summary of Licence Holder's comment on 23 November 2023	Department's response (8 April 2025)	Licence Holder's Revised Response (1 May 2025)	Department's response
			In considering the suggestion of using larger composite volumes or introducing replicate samples, compositing samples into a single, larger volume may reduce the ability to detect small-scale spatial variability, which has been an important feature of the historical dataset. Additionally, the use of replicate samples from the same location may introduce a form of pseudo-replication due to spatial autocorrelation, potentially leading to misleading conclusions in statistical analysis. These samples are not truly independent, as they are collected from within close proximity and may reflect similar conditions There are also views that changing the sampling methodology at this point may also affect the comparability of future data with the historical dataset, and it could take several years to re-establish a new baseline with equivalent statistical power. The current method, by contrast, has proven effective in detecting exceedances, and trigger levels are reviewed and updated regularly (every three to five years) to incorporate new data and ensure continued scientific robustness. That said, GSM remains committed to maintaining a scientifically rigorous and defensible program. Should DWER have a strong preference to have a replicate sampling program in place (minimum of 3 samples), then GSM will accommodate this.	
	Regarding proposed condition 30(c) – macroinvertebrate sampling: The macroinvertebrate design should consider that limited aquatic invertebrate sampling is completed during dry conditions for the existing ecological monitoring program. This is because the discharge waters are extremely hypersaline (>250,000 mg/L TDS) and are considered inhospitable for aquatic invertebrate emergence and survival. Instead, during dry conditions aquatic invertebrate resting stages are assessed from the lake sediments at the discharge and control sites. This assessment aims to ensure that the persistence of eggs from the resident crustaceans continues in the sediments, to allow for emergence during the next flood event. The collection methods for resting stages and aquatic invertebrates during dry conditions, are provided in Sections 3.6 and 3.7, respectively, of the Lake Carey Annual Ecological Assessment 2022 Report. Conversely, during flood events aquatic invertebrates are comprehensively sampled, using several methods. This includes sampling with a 53 µm mesh net, which is towed through the water column to sample zooplankton, and a 250 µm D-frame mesh net, which is used to sample macroinvertebrates, targeting the benthic environment. As the lake system is extremely large, to adequately capture the littoral zone, 30 x 30 m L-shaped transect are conducted within the littoral zone of the lake, using both nets to sample aquatic invertebrates (Stantec 2019).	The Delegated Officer agrees with the dry season sampling rationale and supports the existing dry season sampling program. This condition has been amended accordingly. Conversely, the condition was amended to specify wet-phase sampling only during flood events using the AUSRIVAS method (Storer *et a*l 2022).	Request the AUSRIVAS method is replaced with more applicable sampling for the collection and analysis of aquatic invertebrates from Lake Carey during flood events. AUSRIVAS was designed for the sampling of rivers and streams and does not adequately sample zooplankton, which is a dominant component of salt lake aquatic invertebrate fauna in Australia (Williams 1998). Gold Fields will develop Sampling and Analysis Guidelines for Salt Lakes. This will include relevant methods for capturing the micro and macroinvertebrate community inhabiting Lake Carey during flooding. A summary of the proposed sampling methods for aquatic invertebrates during flooded conditions are provided. In the interim, it is proposed that the *Baseline Aquatic Ecology Study of Lake Mackay and Peripheral Wetlands* technical report may be used as a suitable reference document (available online at: https://www.epa.wa.gov.au/sites/default/files/PER_documentation2/Appendix%20J%20Lake%20Mackay%20Aquatic%20Ecology%20Report_v3%20(1).pdf).	The Delegated Officer is satisfied with the proposed sample collection method as detailed in *Baseline Aquatic Ecology Study of Lake Mackay and Peripheral Wetlands,* noting that is will also cover an area equal to or greater than the existing 10 m x 10 m transect.

Condition	Summary of Licence Holder's comment on 23 November 2023	Department's response (8 April 2025)	Licence Holder's Revised Response (1 May 2025)	Department's response
	Regarding proposed condition 30(d) – aquatic fauna sampling: Baited box traps are typically used to sample aquatic vertebrate fauna (such as fish) and decapods (including yabbies, gilgies and marron), which are not found in Western Australian salt lakes. These traps are considered unsuitable to assess zooplankton and macroinvertebrates within temporary inland water environments.	Agreed. Requirement to use baited box traps has been removed. Method has been revised to three replicate sediment samples per site with three slides per sample analysed from the top 5 mm of each sample (as per John 1983). Sample analysis following methods described in 2022 Annual Ecological Assessments.	N/A	N/A