



Application for Licence Amendment

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

Choose an item.	L4680/1988/13
Choose an item.	FMR Investments Pty Ltd
ACN	009 411 349
File Number	2013/003899
Premises	Greenfields Processing Site Part mining tenement M15/1836 and Lot 102 on Plan 40393 Great Eastern Highway COOLGARDIE WA 6429 As defined by the Premises maps attached to the Revised Licence
Date of Report	27/07/2020
Proposed Decision	Revised licence granted

Carmen Standing
A/MANAGER, RESOURCE INDUSTRIES
REGULATORY SERVICES

An officer delegated by the CEO under section 20 of the EP Act

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1. Decision summary

Licence L4680/1988/13 is held by FMR Investments Pty Ltd (Licence Holder) for the Greenfields Processing Mill (Premises), located on mining tenement M15/1836 and Lot 102 on Plan 40393 Great Eastern Highway, approximately 3km north east of Coolgardie, Western Australia.

This Amendment Report documents the assessment of potential risks to the environment and public health from proposed changes (outlined below) to the emissions and discharges during the operation of the Premises. As a result of this assessment, Revised Licence L4680/1988/13 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. The Revised Licence has been granted in a new format with existing conditions being transferred, but not reassessed, to the new format.

2. Scope of assessment

2.1 Regulatory framework

In completing the assessment documented in this Amendment Report, the department has considered and given due regard to its Regulatory Framework and relevant policy documents which are available at <https://www.der.wa.gov.au>.

2.2 Amendment summary

On 4 April 2020 the Licence Holder submitted an application to the department to amend Licence L4680/1988/13 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act). The Licence Holder is seeking an approval to construct an embankment raise of 2.5m on cells A, B and C of the existing Tailings Storage Facility 3 (TSF3) located at the Greenfield's Processing Mill.

The Greenfield's Processing Mill is a standard carbon-in-leach gold mill, which toll treats ore from a variety of sources and has a nominal 1 400 000 tonnes per year capacity. The TSF complex is located approximately 200m east of the plant and is an above ground facility comprising of three TSFs (TSF1, TSF2 and TSF3). TSF1 and TSF2 are decommissioned and consist of one cell each. TSF3 is currently in use and consists of three cells; A, B and C. The cells of TSF3 surround TSF1 and TSF2 to the south and east (see Figure 1).

2.2.1 Construction phase

The Licence Holder is seeking approval to construct an embankment raise of 2.5 meters (m) on cells A, B and C of the existing TSF3 located at the Premises. The Licence Holder proposes to raise the perimeter containment embankments and cell dividing embankment of the existing TSF3 Cells A, B and C to provide ongoing tailings storage capacity.

The raising works will comprise embankment raising of the confining embankments of Cell A (Stage 3 lift), B and C (Stage 6 lift) by 1 x 2.5 m lifts from nominally RL 400.0 m to RL 402.5 m using upstream construction techniques. The decant access-way, decant link road and associated infrastructure on Cells A, B and C will also be raised as part of the proposed works. Embankment raising will utilise clayey material from a nearby borrow area and dried tailings borrowed from within Cell A.

At the RL 402.5 m level, Cell A will have a surface area of approximately 22.9 ha, Cell B will have a surface area of approximately 7.6 ha and Cell C will have an approximate surface area of 9.0 ha.

Each cell capacity has been estimated based on the following parameters:

- Minimum embankment freeboard: 300mm
- Tailings production: 1,000,000tpa (dry tonnes)
- Tailings dry density: 1.4t/m³
- Tailings beach slope: similar to existing, approximately 1% overall

Based on the above parameters raising the three cells will provide approximately 16 months capacity. The key dimensions of the TSF3 are presented in Table 1.

Table 1: Summary of key dimensions

Table 1: Summary of Key Dimensions			
Cell	A	B	C
Maximum embankment height, Stage 3/6	6.5 – 10.5 m	11.5 – 16 m	9.5 – 17.5 m
Upstream, slope angle	1V:2H		
Overall downstream, slope angle	1V:3H		
Embankment Crest Width	8 m		
Footprint area, Stage 3/6	22.9 ha	7.6 ha	9.0 ha
Tailings storage capacity, Stage 3/6	801,500 t	266,000 t	315,000 t
Embankment crest level – Stage 3/6	RL402.5 m		
Embankment crest level – Final	RL413 m		

(source: CMW Geosciences, 2020a)

This Amendment Report should be read in conjunction with the decision report and works approval (W5333/2012/1) for the original design and construction of TSF3 and Amendment Notices 1 and 2 for L4680/1988/13 (of which the Amendment Notices have now been amalgamated into the licence document as part of this amendment).



Figure 1: Layout of TSF complex on the Premises.

2.2.2 TSF lift design and stability

TSF 3 is located on freehold land (Lot 102 on Plan 40393). As such, the *Mining Act 1978* does not apply and a Mining Proposal is not required to authorise construction, operation or closure of the TSF. The *Mines Safety and Inspection Act 1994* and related Regulations do apply however.

DWER requested advice from DMIRS on 21 April 2020 with regard to the safety and stability of the proposed TSF3 embankment raises. DMIRS responded on the 20 July 2020 stating that applicant has adequately considered the geotechnical aspects of the proposal and that based on this the proposed works would have been approved by DMIRS. No further comments or recommendations were provided.

Key finding: DMIRS has no issues with the geotechnical aspects of the proposal.

2.2.3 Operations Phase

The Licence Holder plans to start tailings deposition into Cell A once the lift to that cell has been completed while construction of the stage 6 lift to Cells B and C are underway.

Tailings deposition into TSF3 (all cells) is conducted sub-aerially from a ring main located adjacent to the upstream crest of the embankment. Slurry is discharged via multiple spigots located at 20m centres as required. Tailings deposition is from several opened spigots at any given time. Sequential deposition occurs from the perimeter of the cells in thin layers with alternating the active deposition points. The aim is to maintain the supernatant water pond around the water recovery points (decant towers). Recovered water is returned to the processing plant.

Seepage is collected by an under drainage system draining to external sumps. The underdrainage system consists of an upstream underdrain and an upstream filter drain with a concrete lined drainage channel (toe drain) downstream of the embankments. The external sumps are pumped out with the collected water returned to the processing plant.

Groundwater levels are monitored using a network of monitoring bores and vibration wire piezometers while groundwater quality is monitored from a network of monitoring bores. Water quality is measured on a quarterly basis while standing water levels are measured monthly in bores MB301 to MB308 located along the southern and eastern boundaries of TSF3 (see Figure 2). Vibrating wire piezometers were installed into and through the perimeter embankments of Cells A, B and C as part of the Stage 2 construction. A total of 16 piezometers were installed and are notated as VWP201 to VWP208 (comprising 8 shallow and 8 deep piezometers) and are aligned along the same axis as the monitoring bores. To date the measured and inferred phreatic surface is within anticipated levels, with the highest level near the base of the starter embankment.

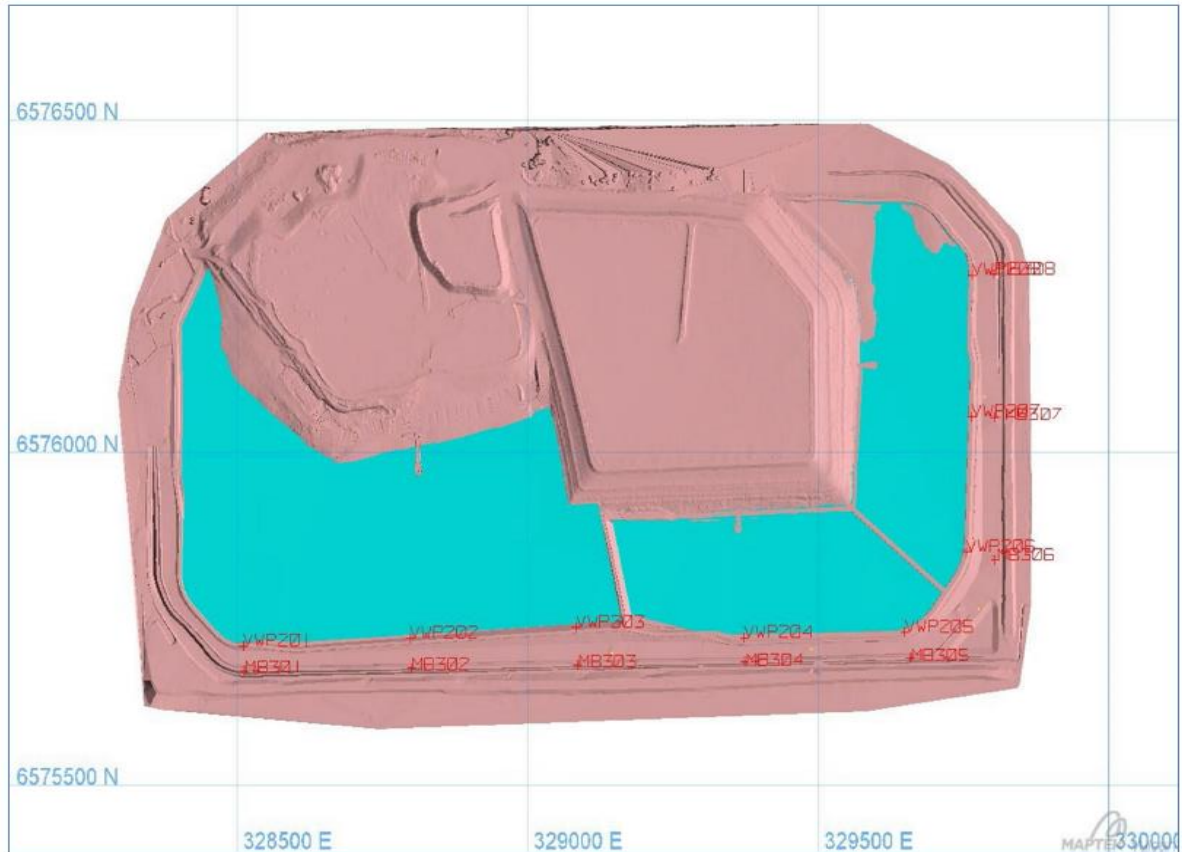


Figure 2: Location of monitoring bores and piezometers (CMW Geosciences Pty Ltd, 2020).

2.3 Consolidation of Licence

As part of this amendment package the department has consolidated the licence by incorporating changes made under the Amendment Notices as summarised in Table 1.

Table 1: Licences consolidated in this amendment

Instrument	Issued	Summary of approval
L4680/1988/13	22/10/2015	Licence granted
L4680/1988/13	26/04/2016	Notice of Amendment of Licence Expiry Dates. Expiry date amended to 31 October 2034.
L4680/1988/13	8/12/2017	Amendment Notice 1 to enable an embankment raise to TSF3 cells A, B and C by 2.5m to a height of RL397.5m.
L4680/1988/13	19/9/2019	Amendment Notice 2 to enable an embankment raise of TSF3 cells B and C to a height of RL400m.

The obligations of the Licence Holder have not changed in consolidating the licence. The department has not undertaken any additional risk assessment of the Premises related to previous Amendment Notices.

In consolidating the licence, the CEO has:

- updated the format and appearance of the Licence;

- revised licence condition's numbers, and removed any redundant conditions and realigned condition numbers for numerical consistency; and
- corrected clerical mistakes and unintentional errors.

The full consolidation of licence conditions as they relate to this Revised Licence are detailed in Section 0. Previously issued Amendment Notices will remain on the department's website for future reference and will act as a record of the department's decision making.

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 *Guidance Statement: Risk Assessments* (DER 2017).

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.

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
Dust (construction)	Construction activities using machinery and vehicle movements on unsealed roads	Air/windborne pathway	<ul style="list-style-type: none"> • Embankment raises will be constructed using consolidated tailings and clayey material which will be required to have a minimum moisture content to allow adequate compaction of material. • Water carts will be used to minimise dust when required.
Noise (construction)	Construction activities using machinery and vehicle movements	Air/windborne pathway	<ul style="list-style-type: none"> • None • Licence Holder to comply with the <i>Environmental Protection (Noise) Regulations 1997</i>
Leachate (operations)	Tailings seepage leaching from base and sides of TSF	Seepage to soils and groundwater	<ul style="list-style-type: none"> • Original design of TSF3 includes a foundation layer consisting of an engineered clay liner constructed of clay material. Liner was constructed in two compacted layers of 150mm thickness each to achieve a permeability of 10⁻⁹ meters per second. • Minimize decant pond on TSF at all times. • Regular inspections of decant pump (and backup pump) and decant pond

Emission	Sources	Potential pathways	Proposed controls
			<p>size.</p> <ul style="list-style-type: none"> • Underdrainage system consisting of an upstream underdrain and an upstream filter drain with a concrete lined drainage channel (toe drain) downstream of the embankments. Drainage channel sumps pumped and water sent to return water dam. • Decant structures within each cell to remove supernatant water from the decant pond to the process water dam to be used within the processing plant. • A network of 8 groundwater monitoring bores (MB301 to MB308) surround TSF3 to monitor standing water level (SWL) and water quality. Three have recently been converted to recovery bores (MB302, MB304, MB305).
Tailings direct discharge	Overtopping of TSF	Direct discharge to surrounding soils / vegetation	<ul style="list-style-type: none"> • The embankment raises have been designed such that a 1 in 100-year AEP, 72-hour storm event of 107 mm can be temporarily stored within the facility. • Slurry water reporting to the decant will be continually removed from the storage area to maintain freeboard. • Total freeboard of 500mm (operating freeboard 300mm) to be maintained at all times. • Freeboard inspections occur once per shift.
Tailings direct discharge	Embankment wall failure	Direct discharge to surrounding soils / vegetation	<ul style="list-style-type: none"> • TSF lift designed to prevent embankment wall failure; • Settlement pins will be used for measuring vertical deformation in the embankments. These will be installed at 50m spacing along the crest of each embankment stage and measured on a monthly basis using real-time kinematic GPS. • Effective management of decant pond in each cell to ensure excess water is continually removed from the surface of the TSF • Decant pond to be kept away from the embankment walls. • 16 piezometers have been installed within embankments to monitor pore pressure (seepage) in 2017. Future piezometers will be installed progressively every three embankment raises (7.5m vertically).

Emission	Sources	Potential pathways	Proposed controls
			<p>For Cells A, B and C this will be at the stage crest (RL406.1m) and ultimate crest (RL413.6m).</p> <ul style="list-style-type: none"> Visual inspection of embankments for erosion and signs of movement occur daily. Visual inspection of decant pond location and size occur daily.
Tailings or saline/hypersaline return water direct discharge	Tailings or return water pipeline failures	Direct discharge to surrounding soils / vegetation	<ul style="list-style-type: none"> Tailings lines from the process plant to the TSF and return water lines from the decant to the process water dam will be located inside bunded open trenches to contain any spillage of materials resulting from pipeline leaks or bursts. Pipelines fitted with telemetry for monitoring of pressure and flow changes.

3.1.2 Receptors

In accordance with the *Guidance Statement: Risk Assessment* (DER 2017), 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 (*Guidance Statement: Environmental Siting* (DER 2016)).

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

Residential and sensitive premises	Distance from Prescribed Premises
Town of Coolgardie	3km south west of the premises.
Pastoral activities	The freehold land on which the TSF is situated is surrounded by pastoral leases and used for stock grazing.
Environmental receptors	Distance from Prescribed Premises
Major watercourses / waterbodies - Brown Lake (salt lake)	6km to the east.
Public drinking water source areas	The nearest is approximately 50km to the north
Ramsar Sites in Western Australia	None within 50km
Important wetlands – Western Australia	None within 50km
Department of Biodiversity, Conservation and Attraction managed land	Kangaroo Hills Timber Reserve 6km south west

	Kurawang Natujre Reserve 16km north east Karaminde Forest 18km south east
Threatened Ecological Communities and Priority Ecological Communities	None within 50km.
Threatened/Priority Flora	No records on or near the premises. The nearest recorded threatened or priority flora is south of the town of Coolgardie.
Native vegetation	Native vegetation surrounding TSF3 is woodland of <i>E. torquata</i> and <i>E. lesouefii</i> over mixed chenopod scrubland. Vegetation has been disturbed by mining activities.
Groundwater	<p>Groundwater in the local area is not used for potable uses. The groundwater near the TSF reports a fluctuating level of total dissolved solids (TDS) between 5,700mg/L and 90,000 mg/L (saline to hypersaline).</p> <p>There are no registered groundwater bores within 2.5km of the TSF.</p> <p>Groundwater flows in an easterly direction towards Brown Lake. The local groundwater systems in the Coolgardie area present as sub-vertical, disconnected fractured rock aquifer. The closest major aquifer is 2.5km to the south-east and is a Wollubar sandstone occurring in the Hannan Paleochannel.</p> <p>According to Geoscience Australia paleochannel GIS files (2001), Greenfields is not within a paleochannel but it is in close proximity to the Roe Paleochannel approximately 4km south-east of Greenfields.</p> <p>Additional information regarding groundwater is presented below.</p>

Review of groundwater monitoring data

Groundwater in the local area is not used for potable uses. The groundwater near the TSF reports a fluctuating level of total dissolved solids (TDS) between 5,700mg/L and 90,000 mg/L (saline to hypersaline). There are no registered groundwater bores within 2.5km of the TSF. Groundwater in the area is used for livestock drinking water and industrial (mining) uses.

Groundwater levels and water quality are monitored using a network of monitoring bores surrounding the TSF complex. Water quality is measured on a quarterly basis while standing water levels are measured monthly in bores MB301 to MB308 located along the southern and eastern boundaries of TSF3. Bores located downstream and in close proximity of Cell A are bores MB301, MB302 and MB303. Bores located downstream and in close proximity of Cell B are bores MB303, MB304, MB305 and MB306. Bores located downstream and in close proximity of Cell C, are bores MB306, MB307 and MB308. Refer to Figure 2 for layout of monitoring bores.

Water Quality

The existing Licence sets a limit for Weak Acid Dissociable Cyanide (WAD CN) in all groundwater monitoring bores of 0.5mg/L. The Licence Holder has reported being compliant

with the WAD CN limit since monitoring began in 2013, with the highest recorded WAD CN being 0.14mg/L (at bore MB303) during this time. WAD cyanide levels in bore MB303 have decreased from 0.14mg/L in June 2019 to 0.004 mg/L in September 2019. The highest recent (September 2019) WAD cyanide reading was 0.012 mg/L recorded in MB304. All WAD CN levels were below the licence limit of 0.5 mg/L.

Copper levels varied from <0.001 mg/L to 0.33 mg/L. September 2019 test results indicate copper levels in bore MB303 had declined to 0.1 mg/L. All levels were below the ANZECC (2000) livestock drinking water guideline of 0.5 mg/L.

Other metals were generally low or at the detection limits. Exceptions are noted below:

- Arsenic was elevated in bores MB306, MB307 and MB308, with a maximum of 3.6 mg/L (September 2018) in bore MB308. ANZECC (2000) livestock drinking guideline for Arsenic is 0.5mg/L.
- September 2019 test results indicate Manganese was elevated in bores MB303, MB304, MB305, with a maximum of 13 mg/L in bore 4. No guideline has been established for manganese in drinking water for livestock.
- September 2019 test results indicate Zinc was elevated in bores MB302, MB303 and MB305 with a maximum of 0.57 mg/L in bore MB305. ANZECC (2000) livestock drinking guideline for Zinc is 20mg/L.
- September 2019 test results indicate Nickel was elevated in in bores MB303, MB304, MB305 and MB307, with a maximum of 1 mg/L in bore MB304. ANZECC (2000) livestock drinking guideline for Nickel is 1 mg/L.

Elevated levels of metals within the groundwater, in particular around the south eastern embankments of TSF3 (near Cell B) indicate that seepage from the TSF may be impacting groundwater quality.

Monitoring surrounding the TSF shows a large variance of Total Dissolved Solids (TDS) in some bores. While most of the bores show TDS levels around the 10,000 to 20,000 mg/L mark, MB303 and MB307 show elevated TDS levels. The TDS levels of bore MB303 has shown a fairly constant increase since September 2015 and is now 43,000mg/L (September 2019), down from over 90,000 mg/L in September 2018. Bore MB307 has been consistently around 50,000 mg/L since recording began in 2013. The difference in TDS between these bores and the remaining bores, may suggest the TSF is seeping outside of expected levels.

Standing water levels

The existing Licence sets a limit for standing water levels (SWL) in all groundwater monitoring bores of a maximum water level of 4 meters below ground level (mbl) to minimise any potential impacts to localised groundwater-dependent flora. Since 2015 bores have shown an increasing trend in the SWLs, the trend is particularly evident in the bores on the southern side of the TSF (MB302, MB303, MB304 and MB305). SWLs have remained compliant with the licences SWL limit since 2013, with the exception of a recent breach from MB304 in December 2019, which displayed a SWL of 3.5 mbl (limit is 4mbl). It is understood that since July 2019 the Licence Holder has commenced weekly monitoring of bores close to the SWL limit of 4 mbl (bores indicating SWL <10mbl). The increasing SWL trends suggest further breaches may occur in the near future.

Rising groundwater has the potential to inundate the root zones of nearby vegetation. With the salinity of the groundwater being over 10,000 mg/L TDS, this would possibly cause vegetation deaths that intercept rising groundwater. The SWLs for the period August 2013 to June 2019 are presented in Figure 3.

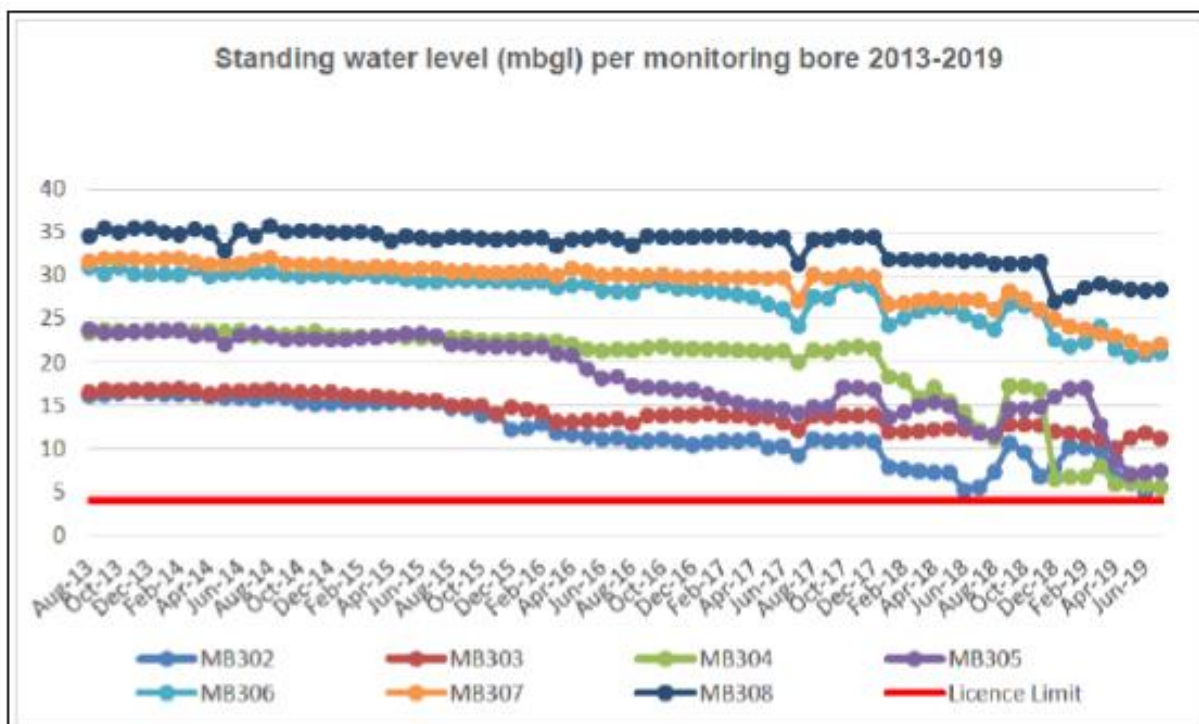


Figure 3: Standing water level (mbgl) for each monitoring bore 2013- July 2019
(Resource Engineering Consultants Pty Ltd, Jan 2020).

The monthly SWLs for August 2018 to December 2019 are presented in Table 4 below.

Table 4: Monthly standing water levels (mbgl) for each monitoring bore Aug 2018 – Dec 2019 (Resource Engineering Consultants Pty Ltd, Jan 2020).

Month	MB301	MB302	MB303	MB304	MB305	MB306	MB307	MB308
Aug-18	empty	7.3	11.5	11.15	11.8	23.8	28.1	31.4
Sep-18	empty	10.6	12.8	17.3	14.6	26.8	28.2	31.4
Oct-18	empty	9.6	12.8	17.2	14.6	26.5	27.3	31.4
Nov-18	empty	6.8	12.7	16.8	14.8	26.1	26.1	31.6
Dec-18	empty	7.8	12	6.5	16	22.6	25	27
Jan-19	empty	10.2	11.8	6.7	16.9	21.8	24.1	27.6
Feb-19	empty	10.1	11.5	6.7	17	22.3	23.8	28.6
Mar-19	empty	9.8	11.1	8	12.8	24.1	23.3	29.1
Apr-19	empty	6.7	10	5.9	8.6	21.6	23.1	28.7
May-19	empty	6.7	11.3	6	7	20.7	22.4	28.4
Jun-19	empty	5.1	11.8	5.8	7.2	20.9	21.6	28.3
Jul-19	empty	5.5	11.5	5.7	7.6	20.8	21.5	28
Aug-19	empty	6	11	4.5	6.2	18.1	19.7	26.3
Sep-19	empty	6.1	11	4.9	7.2	18.2	19.8	27
Oct-19	empty	5.3	10.1	4.6	5.7	17.6	18.2	25.1
Nov-19	empty	5.3	10	4.2	5.5	17.7	18	25.2
Dec-19	10.4	5.2	10.1	3.5	5.1	18	17.7	25

A recent TSF Audit carried out in November 2019 found that no visual seepage was noted around the downstream embankment toes of TSF3, Cells A, B and C. However it was noted that seepage does not flow to the water recovery sumps within the toe drain. To fix this the Licence Holder has installed pumps within 3 of the 4 downstream seepage sumps to recover leachate water. Water is pumped to the HDPE lined water return dam, south east of the TSF.

In addition bores MB302, MB304, MB305 have been converted to recovery bores. The Licence Holder expects this to reduce the groundwater mounding around the TSF and manage the rise in groundwater levels observed in the bores downstream of Cell B and C.

Key findings:

- Elevated levels of metals within the groundwater, in particular around the south eastern embankments of TSF3 (near Cell B) indicate that seepage from the TSF may be impacting groundwater quality;
- Since 2015 bores have shown an increasing trend in the SWLs, the trend is particularly evident in the bores on the southern side of the TSF (MB302, MB303, MB304 and MB305). The increasing SWL trends suggest further breaches of the 4mbgl licence limit may occur in the near future. Rising groundwater has the potential to inundate the root zones of nearby vegetation.
- Licence Holder response to monitoring data was to convert three monitoring bores into recovery bores, change deposition from Cell B to Cell C and to install pumps within seepage sumps to help recover seepage water.

Risk Ratings

Risk ratings have been assessed in accordance with the *Guidance Statement: Risk Assessments* (DER 2017) for those emission sources which are proposed to change and takes into account potential source-pathway and receptor linkages as identified in Section 3.1.1. 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 3.1.1), 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 5.

The Revised Licence L4680/1988/13 that accompanies this Amendment Report authorises emissions associated with the operation of the Premises.

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

Table 5. Risk assessment of potential emissions and discharges from the Premises during construction and operation.

Risk Event					Risk rating ¹	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	C = consequence L = likelihood			
Construction								
Construction of TSF3 embankment raise involving machinery and vehicle movements	Dust	Air/windborne pathway causing impacts to health and amenity	Town of Coolgardie (3km away)	Refer to Section 3.1.1	C = Slight L = Unlikely Low Risk	Y	Updated Condition 8 (1.3.6) – Requirement to minimize dust by using water carts to wet down work areas during construction of this embankment lift.	Licence Holders controls to be conditioned. Construction requirement conditions have been updated to relate to this embankment lift to ensure works are constructed according to specifications outlined in the application.
	Noise		Adjacent mining operations	Refer to Section 3.1.1	C = Slight L = Unlikely Low Risk	Y	N/A	No regulatory controls required due to low risk. The <i>Environmental protection (Noise) Regulations 1997</i> apply.
Operation								
Deposition of tailings into raised TSF3 cells.	Tailings seepage	Seepage through floor and embankments of TSF3 to groundwater resulting in mounding of the water table. Inundation of native vegetation root zones with saline groundwater resulting in impacts to the health and survival of vegetation.	Native vegetation (woodland of <i>E. torquata</i> and <i>E. lesouefii</i> over mixed chenopod scrubland)	Refer to Section 3.1.1	C = Moderate L = Possible Medium Risk	N	<p>Existing condition 6 (1.3.4) – manage a seepage collection and recovery system and the supernatant pond on TSF to not exceed 15% total surface area</p> <p>Existing condition 17 (2.3.1) monitoring of standing water levels and water quality of groundwater surrounding TSF</p> <p>Updated condition 7 (1.3.5) – inspections of TSFs decant pond size and location added to table 2</p> <p>Updated condition 8 (1.3.6) – construction requirements updated to relate to current embankment raise. – construction of infrastructure as outlined in application documents</p> <p>New condition 10 Specified Action condition for a seepage management plan.</p> <p>Updated condition 16 (2.2.1) monitoring of seepage volumes recovered via a flow meter</p>	<p>Elevated levels of metals within the groundwater (some above the ANZECC (2000) livestock drinking water guidelines), in particular around the south eastern embankments of TSF3 (near Cell B) indicate that the TSF3 is potentially seeping above expected levels.</p> <p>Native vegetation may also be impacted by groundwater mounding in the vicinity of the TSF. A review of the groundwater monitoring SWL data indicates that since 2015 bores have shown an increasing trend in the SWLs, with the trend being particularly evident in the bores on the southern side of the TSF (MB302, MB303, MB304 and MB305). SWLs have remained compliant with the licence SWL limit since 2013, with the exception of a recent breach from MB304 in December 2019, which displayed a SWL of 3.5 mbgl (limit is 4mbgl). The increasing SWL trends suggest further breaches are possible in the near future.</p> <p>In response to the limit breach the Licence Holder has converted bores MB302, MB303 and MB304 into recovery bores and has increase monitoring to weekly in bores that were indicating SWL close to the limit (<10mbgl). Vegetation close to the TSF was visually inspected at the start of 2020, with the licence holder stating that no visual vegetation stress of death has been noted in the vicinity of the rising non-compliant bore MB304. Deposition of tailings was also moved to cell C, from cell B (above MB304). More recent SWL monitoring now indicate the below levels - Bore levels from 01/01/2020: MB301: 10.4m, MB302: 5.2m, MB303: 10.1m, MB304: 3.5m, MB305: 5.1m, MB306: 18m, MB307: 17.7m, MB308: 25m.</p> <p>Pumps were also installed within the TSF3 toe drain to help with the removal of seepage collected in the drain.</p>

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				
							<p>A recent TSF Audit (2019), carried out by Resource Engineering Consultants Pty Ltd, also indicated that the supernatant pond within cell B was up against the embankment wall. This could contribute to seepage through the embankments. The audit also recommended that an operations manual for TSF3 be created to better outline seepage management for the TSF (originally the manual for TSF2 was being used and adapted for TSF3). An operations manual for TSF3 has now been developed and has been submitted to DWER.</p> <p><u>Additional regulatory controls</u></p> <p>As seepage is likely to increase due to the construction of this TSF embankment lift it has been deemed necessary to include a specified action condition within the licence requiring the Licence Holder to develop of plan for the long term management of mounding groundwater levels in the vicinity of TSF3. The plan will also require the Licence Holder to propose locations (either onsite or offsite whichever is deemed the most appropriate location) for new groundwater monitoring bores to replace those that have been converted to recovery bores. <u>A licence amendment will be required to add these new monitoring bores to condition 16 in the future.</u></p> <p>Condition 6 has also been updated to require the decant pond to be kept away from embankments at all times (as per operations manual - CMW Geosciences Pty Ltd 2020a).</p> <p>Condition 7 has also been updated to require inspections of the supernatant ponds size and location on a daily basis (as per operations manual – CMW Geosciences Pty Ltd 2020a)</p> <p>A limit for SWL and WAD CN already exist on the licence and the Licence Holder is expected to continue managing seepage from TSF3 in order to comply with these limits.</p>	
	Tailings release - TSF overtopping	Direct discharge of tailings slurry to land resulting in smothering and contamination of soils and vegetation with material high in heavy metals and toxic substances.	Adjacent offsite native vegetation and soils	Refer to Section 3.1.1	C = Major L = Rare Medium Risk	Y	<p>Existing condition 5 (1.3.3) – freeboard to be maintained on TSF3.</p> <p>Existing condition 7 (1.3.5) – inspections of TSFs for freeboard to occur daily.</p> <p>Updated condition 8 (1.3.6) – construction requirements updated to relate to current embankment raise. – construction of infrastructure as outlined in application documents.</p>	<p>Licence Holders controls to be conditioned.</p> <p>The embankment raises have been designed such that a 1 in 100-year AEP, 72-hour storm event of 107 mm can be temporarily stored within the facility.</p> <p>Condition 8 has been updated to ensure this TSF lift is constructed in accordance with specifications outlined in application document.</p> <p>Existing conditions 5 and 7 adequately manage this risk event.</p>

Risk Event					Risk rating ¹	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	C = consequence L = likelihood			
	Tailings / saline water release - Tailings or return water pipeline leak or rupture	Direct discharge of tailings slurry or saline return water to land resulting in smothering and contamination of soils and vegetation	Adjacent offsite native vegetation and soils	Refer to Section 3.1.1	C = Minor L = unlikely Medium Risk	Y	Existing condition 3 (1.3.1) – pipelines to be banded, telemetry or automatic cut-outs in event of failure.	N/A – No additional conditions are required to adequately manage this risk event.
	Tailings release – embankment failure	Direct discharge of tailings slurry to land resulting in smothering and contamination of soils and vegetation with material high in heavy metals and toxic substances.	Adjacent offsite native vegetation and soils	Refer to Section 3.1.1	C = Major L = Rare Medium Risk	Y	<p>Updated condition 7 (1.3.5) – inspections of TSFs decant pond size and location added to table 2</p> <p>Updated condition 6 (1.3.4) - New requirement to keep decant pond away from TSF embankments</p>	<p>Licence Holders controls to be conditioned.</p> <p>Recent TSF Audit (2019) outlined that the decant pond was up against the perimeter embankment dividing wall between Cell B and Cell C. DWER compliance inspection in November 2019 also confirmed this. This is not acceptable practice as it can increase seepage in the external embankment which could affect embankment stability. The TSF Audit outlines stability analyses and that the factor of safety against a failure through the embankments is greatly influenced by the position of the phreatic surface. To reduce the risk of embankment failure, the TSF Audit recommends that the TSF should be operated such that the decant pond is located as far away from the perimeter embankments as practical. As a result of this advice condition 6 has been updated to require the decant pond to be kept away from the TSF embankments at all times.</p> <p>DWER has sought advice from DMIRS geotechnical specialists in regards to the safety and stability of the proposed lift. DMIRS is satisfied that the lift has been designed in accordance with their TSF guidelines and that there is no issues with stability and that the geotechnical aspects of this project has been adequately considered.</p>

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the *Guidance Statement: Risk Assessments* (DER 2017).

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

4. Consultation

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

Table 6: Consultation

Consultation method	Comments received	Department response
<p>Department of Mines, Industry Regulation and Safety (DMIRS) advised of proposal 21 April 2020.</p>	<p>Final comments received on 20/07/2020.</p> <p>Based on the information provided in the amendment application DMIRS provides the following comments;</p> <p>'This office has now concluded that the proponent has, technically speaking, considered the geotechnical aspects of this project and based on this, the project may be approved, however, there appears to be one administrative aspect that was not attended to in the documentation.</p> <p>This office was unable to find an issued "CERTIFICATION OF COMPLIANCE - Tailings storage facility design report" that is required to certify the design, as per Appendix 2 of the Department's Guideline titled "Guide to the preparation of a design report for tailings storage facilities (TSFs)" dated August 2015'</p>	<p>Noted that if this proposal was required to be submitted to DMIRS it would approve the design of the lift in-regards to safety and stability.</p>
<p>Licence Holder was provided with draft amendment on 21 July 2020. Comments received on 22 July 2020.</p>	<p>Please change M15/154 to M15/1836 as the area that had been subleased off Focus has been extracted from M15/154 and converted to M15/1836 which is held by FMR Investments (Emits Report). A copy of the map is provided below and in Attachment 2 to the Licence Amendment. The tenement area remains the same as that on M15/154.</p> <p>No new piezometers are required to be installed. Vibrating wire piezometers were installed into and through the perimeter embankments of Cells A, B and C as part of the Stage 2 construction in 2017. A total of 16 piezometers were installed and are notated as VWP201 to VWP208 (comprising 8 shallow and 8 deep piezometers) and are aligned along the same axis as the monitoring bores.</p>	<p>Requested changes have been made.</p>

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.

Summary of amendments

Table 7 provides a summary of the proposed amendments and will act as record of implemented changes. All proposed changes have been incorporated into the Revised Licence as part of the amendment process.

Table 8 provides a summary of the changes made to the licence as part of the consolidation of amendment notices into the licence document and the updating of the licence template.

Table 7: Summary of licence amendments

Condition no.	Proposed amendments
Format of licence	Updated to the new licence format. Renumbering and deletion of redundant conditions has occurred as a result. See table 8. Terms 'Licensee' has been replaced with 'Licence Holder'.
Condition 2	Reference to Amendment Notice 1 has been deleted and replaced with reference to figure 4 in schedule 1.
Condition 4	Containment infrastructure table has been updated to include TSF1 and TSF2 which are decommissioned TSFs. Even though they are not active TSFs they are still classified as containment infrastructure and should be on the licence.
Condition 6	This condition has been updated to include a requirement to manage the supernatant ponds so that they are maintained around the decant tower within each cell and kept away from embankments at all times.
Condition 7	This condition has been updated to include a requirement for the supernatant ponds to be inspected daily for size and location of the pond.
Condition 8, Table 3	Existing construction requirements have been kept in the licence as all works have not been completed yet (and compliance documentation not received) for the previously approved embankment lift. This section has been updated to make it clearer what infrastructure is to be constructed. This condition has been updated to include construction requirements for an embankment lift to 402.5m for each cell.
Old condition 1.3.8	Submission of a closure plan. Deleted as requirements of condition have been met.
New condition 10	Specified action condition to submit a seepage management plan for TSF3.
Condition 17	Reference to monitoring bores that have been converted into recovery bores have been removed from this condition. Reference to daily monitoring of TDS of supernatant pond within the active TSF cell has been removed as no longer relevant. <u>A licence amendment will be required to include new monitoring bore locations in the future.</u>

Condition 25	Wording updated to clarify that a single compliance document is required for the previously approved works (embankment lifts Stage 5/2). Updated to reflect the new wording of this condition the new template. Wording makes it clear that a compliance document is required for each item of infrastructure prior to operation of the works.
Condition 26	New condition requiring an Environmental Compliance Report for the new Stage 6/3 embankment lifts to TSF3. Wording makes it clear that a compliance document is required for each item of infrastructure prior to operation of the works.
Condition 27	Numbering updated to refer to new condition and new condition numbering.
Schedule 1	New figures added (Figures 5 – 8)

Table 8: Consolidation of licence conditions in this amendment

Existing condition	Condition summary	Revised licence condition	Conversion notes
1.1.1 1.1.2	Interpretation and definitions	N/A Interpretation section, Definitions	1.1.1 is Redundant condition and is now covered by the interpretation section of the revised licence. 1.1.2 Definitions has been moved to the back of the licence in Table 10.
1.1.3	Australian or other standard	Interpretation section	Redundant condition and covered by new interpretation section. Revised to current licensing format.
1.1.4	Reference to code of practice	Interpretation section	Redundant condition and covered by new interpretation section. Revised to current licensing format.
1.1.5	Emissions	N/A	Redundant condition and has been deleted.
1.2.1	Pollution control and monitoring equipment	Condition 1	New numbering and update to wording format.
1.2.2	Recovery and removal of spills	N/A	Redundant condition. Adequately covered by EP (Unauthorised Discharges) Regulations 2004. Deleted from licence.
1.2.3	Maintain TSF stormwater diversion channels	Condition 2	New numbering and update to wording format
1.3.1	Pipelines	Condition 3	New numbering and update to wording format

Existing condition	Condition summary	Revised licence condition	Conversion notes
1.3.2	Containment infrastructure	Condition 4	New numbering and update to wording format
1.3.3	Freeboard	Condition 5	New numbering and update to wording format
1.3.4	TSF management	Condition 6	New numbering and additional requirements added. See table 7.
1.3.5	Inspections	Condition 7	New numbering and additional requirements added. See table 7.
1.3.6	Construction of infrastructure	Condition 8	New numbering and additional requirements added. See table 7.
1.3.7	Departure from requirements for construction.	Condition 9	New numbering and update to wording format.
1.3.8	Mine Closure Plan	N/A	Condition deleted as mine closure plan has been submitted to DWER.
2.1.1	Monitoring standards	Condition 11	New numbering and update to wording format.
2.1.2	Monitoring frequency periods	Condition 12	New numbering and update to wording format.
2.1.3	Record of production or throughput data relevant to monitoring	Condition 13	New numbering and update to wording format.
2.1.4	Calibration of monitoring equipment	Condition 14	New numbering and update to wording format.
2.1.5	Calibration not met	Condition 15	New numbering and update to wording format.
2.2.1	Process monitoring	Condition 16	New numbering and update to wording format.
2.3.1	Groundwater monitoring	Condition 17	New numbering and update to wording format.
3.1.1	Information and records to be legible etc.	Condition 18	New numbering and update to wording format.
3.1.2	Persons in charge	Condition 19	New numbering and update to wording format.

Existing condition	Condition summary	Revised licence condition	Conversion notes
3.1.3	Annual Audit compliance report	Condition 20	New numbering and update to wording format.
3.1.4	Complaints	Condition 21	New numbering and update to wording format.
3.2.1	Annual environmental report	Condition 22	New numbering and update to wording format.
3.2.2	Annual environmental report to include additional information	Condition 23	New numbering and update to wording format.
3.2.3	Non annual reporting	Condition 24	New numbering and update to wording format.
3.2.4	Construction compliance	Condition 25	New numbering and update to wording format.
-	Construction compliance	Condition 26	New condition
3.2.5	Construction compliance	Condition 27	New numbering and update to wording format.
3.2.6	TSF Audit	Condition 27	No change.
3.3.1	Notification requirements	Condition 28	New numbering and update to wording format.
Definitions	Terms and their definitions	Definitions, Table 10	Definitions moved to back of licence within table 10. New definitions added as required.
Schedule 1: Maps	Premises map and monitoring bore maps	Schedule 1: Maps	No change to map premises map and monitoring bore maps New figures added for construction diagrams for TSF3 lift.
Schedule 2: Notification and forms	N1 form	N/A	No change.

References

1. CMW Geosciences Pty Ltd 2020, *Tailings Storage Facility No.3 Cells A, B and C Upstream embankment raising from RL400m to RL402.5m Greenfields Mill Design Report for Works Approval Application*, FMR Investments Pty Ltd, Perth, Western Australia.
2. CMW Geosciences Pty Ltd 2020a, *Tailings storage facility No. 3 Greenfields Mill, near Coolgardie WA Operations Manual*, FMR Investments Pty Ltd, Perth, Western Australia.
3. Department of Environment Regulation (DER) 2016, *Guidance Statement: Environmental Siting*, Perth, Western Australia.
4. DER 2017, *Guidance Statement: Risk Assessments*, Perth, Western Australia.
5. DER 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
6. Resource Engineering Consultants Pty Ltd 2020, *TSF Annual Audit 2019 Greenfields Mill FMR Investments Pty Ltd*, Perth, Western Australia.

Appendix 1: Application validation summary

SECTION 1: APPLICATION SUMMARY (as updated from validation checklist)				
Application type				
Works approval	<input type="checkbox"/>			
Licence	<input type="checkbox"/>	Relevant works approval number:		None <input type="checkbox"/>
		Has the works approval been complied with?	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Has time limited operations under the works approval demonstrated acceptable operations?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	
		Environmental Compliance Report submitted?	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Date Report received:		
Renewal	<input type="checkbox"/>	Current licence number:		
Amendment to works approval	<input type="checkbox"/>	Current works approval number:		
Amendment to licence	<input checked="" type="checkbox"/>	Current licence number:	L4680/1988/13	
		Relevant works approval number:	N/A	<input type="checkbox"/>
Registration	<input type="checkbox"/>	Current works approval number:	None	<input type="checkbox"/>
Date application received	4/4/2020			
Applicant and Premises details				
Applicant name/s (full legal name/s)	FMR Investments Pty Ltd			
Premises name	Greenfields Mill			
Premises location	Part mining tenement M15/1836 and Lot 102 on Plan 40393 Great Eastern Highway COOLGARDIE WA 6429			
Local Government Authority	Coolgardie			
Application documents				
HPCM file reference number:	2013/003899-1~7			
Key application documents (additional to application form):	TSF3 design report Geotechnical investigation Construction details document Design drawings			
Scope of application/assessment				

<p>Summary of proposed activities or changes to existing operations.</p>	<p><u>Licence amendment</u></p> <p>The Licence Holder is seeking approval to construct an embankment raise of 2.5 meters (m) on cells A, B and C of the existing TSF3 located at the Greenfields processing mill. The Licence Holder proposes to raise the perimeter containment embankments and cell dividing embankment of the existing TSF3 Cells A, B and C to provide ongoing tailings storage capacity.</p> <p>The raising works will comprise embankment raising of the confining embankments of Cell A, B and C by 1 x 2.5 m lifts from nominally RL 400.0 m to RL 402.5 m using upstream construction techniques. The decant access-way, decant link road and associated infrastructure on Cells A, B and C will also be raised as part of the proposed works. Embankment raising will utilise clayey material from a nearby borrow area and dried tailings borrowed from within Cell A.</p>
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Category number/s (activities that cause the premises to become prescribed premises)

Table 1: Prescribed premises categories

Prescribed premises category and description	Assessed production or design capacity	Proposed changes to the production or design capacity
<p>Category 5 - Processing or beneficiation of metallic or non-metallic ore: premises on which –</p> <p>(a) Metallic or non-metallic ore is crushed, ground, milled or otherwise processed;</p> <p>(b) Tailings from metallic or non-metallic ore are reprocessed; or</p> <p>Tailings or residue from metallic or non-metallic ore are discharged into a containment cell or dam</p>	<p>1,400,000 tonnes per annual period</p>	<p>No change</p>

Legislative context and other approvals

<p>Has the applicant referred, or do they intend to refer, their proposal to the EPA under Part IV of the EP Act as a significant proposal?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	<p>Referral decision No: Managed under Part V <input type="checkbox"/> Assessed under Part IV <input type="checkbox"/></p>
<p>Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	<p>Ministerial statement No: EPA Report No:</p>
<p>Has the proposal been referred and/or assessed under the EPBC Act?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	<p>Reference No:</p>
<p>Has the applicant demonstrated occupancy (proof of occupier status)?</p>	<p>Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>	<p>Certificate of title <input checked="" type="checkbox"/> General lease <input type="checkbox"/> Expiry: Mining lease / tenement <input checked="" type="checkbox"/> Expiry: Other evidence <input type="checkbox"/> Expiry:</p>

Has the applicant obtained all relevant planning approvals?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>	Approval: Expiry date:
Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	CPS No: N/A No clearing is proposed.
Has the applicant applied for, or have an existing CAWS Act clearing licence in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Application reference No: N/A Licence/permit No: N/A No clearing is proposed.
Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Application reference No: Licence/permit No: permit not required.
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Name: N/A Type: Has Regulatory Services (Water) been consulted? Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Regional office:
Is the Premises situated in a Public Drinking Water Source Area (PDWSA)?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Name: N/A Priority: P1 / P2 / P3 / N/A Are the proposed activities/ landuse compatible with the PDWSA (refer to WQPN 25)? Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
Is the Premises subject to any other Acts or subsidiary regulations (e.g. <i>Dangerous Goods Safety Act 2004, Environmental Protection (Controlled Waste) Regulations 2004, State Agreement Act xxxx</i>)	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Mines Safety and Inspection Act 1994 <i>and related regulations.</i>
Is the Premises within an Environmental Protection Policy (EPP) Area?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Is the Premises subject to any EPP requirements?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	

<p>Is the Premises a known or suspected contaminated site under the <i>Contaminated Sites Act 2003</i>?</p>	<p>Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>	<p>Classification: possibly contaminated – investigation required (PC–IR) Date of classification:</p>
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