



<b>Licence Number</b>	L8308/2008/2
<b>Licensee</b>	CITIC Pacific Mining Management Pty Ltd
<b>ACN</b>	119 578 371
<b>Registered business address</b>	45 St Georges Terrace PERTH WA 6000
<b>Date of amendment</b>	9 June 2017
<b>Prescribed Premises</b>	Category 5: Processing or beneficiation of metallic or non-metallic ore Category 6: Mine dewatering discharge Category 12: Screening, etc. of material Category 52: Electric power generation Category 54: Sewage facility Category 57: Used tyre storage (general) Category 64: Class II putrescible landfill site Category 73: Bulk storage of chemicals, etc.
<b>Premises</b>	Sino Iron Project Mine Site Mining Tenements M08/123, M08/124, M08/125, M08/264, M08/265, M08/266, G08/54 and L08/126 MARDIE WA 6714

### Amendment

The Department of Environment Regulation (DER) has amended the above licence in accordance with section 59 of the *Environmental Protection Act 1986* as set out in this Amendment Notice.

Date signed: 9 June 2017

**Alana Kidd**  
**Manager Licensing – Resource Industries**

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

## Amendment Notice

This Notice is issued under section 59 of the *Environmental Protection Act 1986* (EP Act) to amend the licence issued under the EP Act for a prescribed premises as set out below. This notice of amendment is given under section 59B(9) of the EP Act.

## Amendment Description

### Controlled Surface Water Discharges

On 1 December 2016, CITIC submitted an application to DER for an amendment to Licence L8308/2008/2. This Amendment Notice is to assess and include six controlled surface water discharge points to the licence. These discharge points are to be within Edwards Creek and tributaries of Edwards and DuBoulay Creeks, to allow the discharge of excess water to the environment, to maintain safe operating conditions or freeboard onsite. This contingency will provide the Licensee with the ability to pre-plan controlled discharges of excess water associated with uncontrollable events (extreme rainfall/ cyclones) which can affect catchment areas onsite. Controlled discharges will only be considered when other water storage management options have been exhausted.

Rainfall catchment areas onsite include the mine pit, concentrator and Tailings Storage Facility (TSF) and process dams/ponds. The water containment structures and catchment surface areas along with capacities and optimal freeboard are shown in Table 1.

**Table 1. Water Containment Structures and Rainfall Catchment Areas**

Location		Capacity (m <sup>3</sup> )	Catchment / Surface Area (m <sup>2</sup> )	Safe Operating Freeboard (m)
Enviro Dam	Settlement Dam	140,000	1,700,000 (1.7km <sup>2</sup> )	0.5m
	Environment Dam	213,000		0.5m
Raw Water Dam		200,000	N/A	0.5m
TSF		1,425,000	7,350,000 (7.35km <sup>2</sup> )	0.3m
Mine Pit Shell		N/A	2,500,000 (2.5km <sup>2</sup> )	N/A

If water levels in these structures exceed the nominated safe operating conditions or freeboard, options will be investigated to use the water or transfer the water to another structure, with controlled discharge to the environment only considered once these options have been exhausted.

### **Pipelines and discharge points**

The Licensee will install a pipeline to each of six controlled surface water discharge locations with minimal disturbance (no additional clearing required). Trenches will only be installed in areas of mining infrastructure or where flood management is required. Controlled surface water discharge points will be constructed in a manner to minimise the discharge rate so that erosion and scouring is minimised. Multiple discharge points will be used to spread the flow and a layer of riprap will be installed to protect the receiving water bank from erosion. A map of the controlled surface water discharge points is shown in the "Amendments" section of this document.

## **Water Quality**

Baseline water quality monitoring has been conducted along Edwards and DuBoulay Creeks during rainfall events, indicating that natural flow is fresh upstream. As the water moves downstream into the tidal zone of the Fortescue River and flood plain salinity increases notably. Containment structure water quality monitoring has been conducted at the TSF Staging Dam and Environment Dam. Results of this monitoring are shown in Tables 2 and 3 with locations for surface water (SW), DuBoulay Creek (DB) and Edwards Creek (EC) are shown in Figure 1.

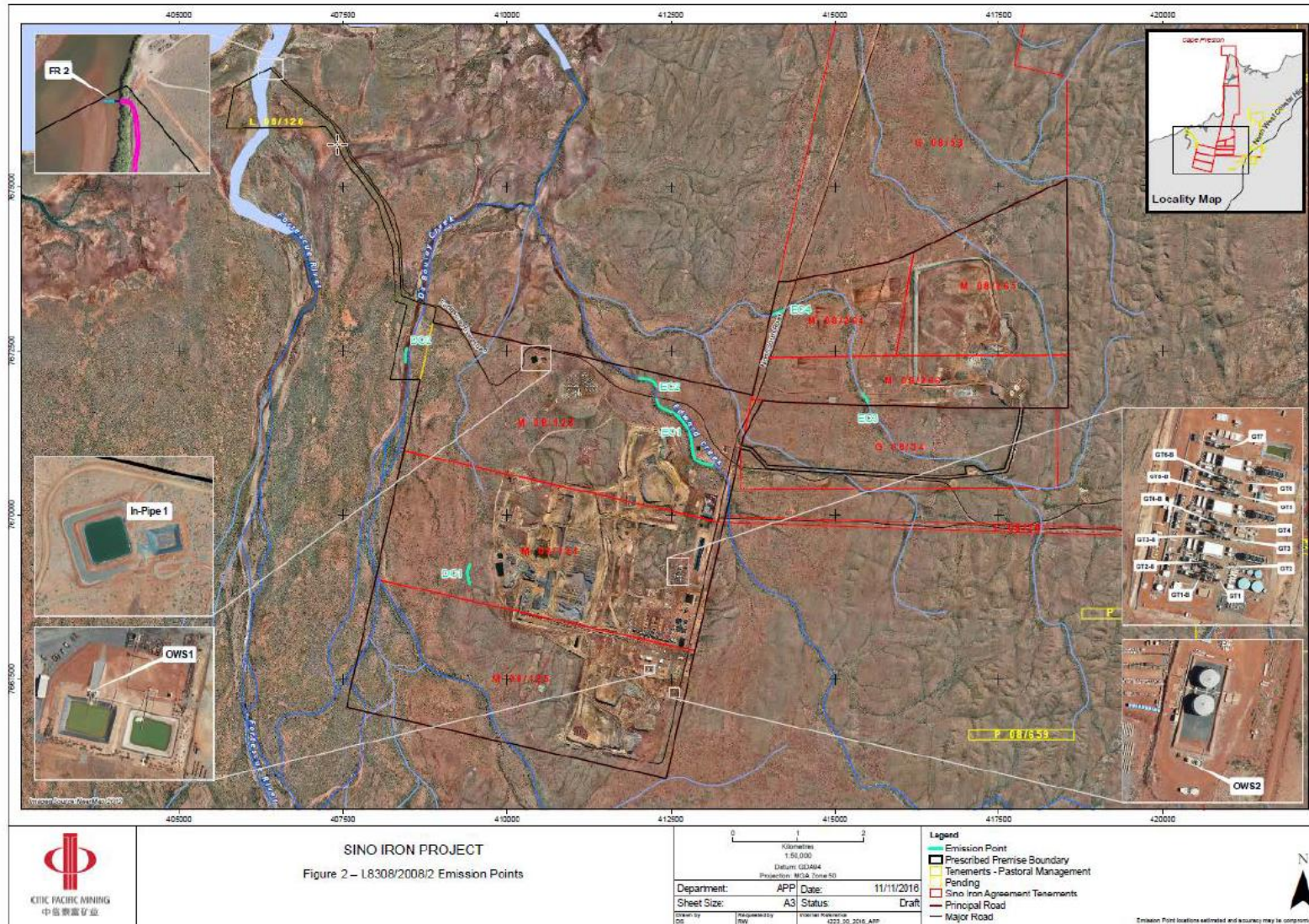
**Table 2. Baseline monitoring**

	Monitoring Locations – Refer to Figure 3									
	SW01	SW03	SW04	SW06	SW07	DB1	DB2	DB3	EC1	EC2
	16.03.2009	16.03.2009	16.03.2009	16.03.2009	16.03.2009	14.08.2014	14.08.2014	14.08.2014	07.07.2016	07.07.2016
pH	10.1	7.91	8.48	8.44	8.15	8.05	8.06	8.03	7.68	7.52
TDS (mg/L)	257	17900	418	6240	21700	39100	51400	55300	80	61
TSS (mg/L)	<1	36	24	12	36	484	10		-	-
Dissolved Oxygen (mg/L)	-	-	-	-	-	9.9	10.1	10.1	-	-
Total Nitrogen (mg/L)	0.3	<2.5	0.6	<0.5	1.2	<0.1	<0.1	<0.1	-	-
Total Phosphorus (mg/L)	0.03	<0.25	0.05	0.09	<0.10	<0.02	<0.05	<0.05	-	-
Boron (mg/L)	-	-	-	-	-	4.50	5.49	5.69	0.06	<0.05
Copper (mg/L)	0.002	0.004	0.004	0.003	<0.020	0.016	0.019	0.020	0.002	0.001
Nickel (mg/L)	<0.001	<0.005	0.003	0.001	<0.010	0.015	0.015	0.016	0.001	<0.001
Zinc (mg/L)	<0.005	0.012	0.017	0.056	<0.050	<0.050	<0.050	<0.050	0.040	<0.005

**Table 3. Containment structure monitoring**

	Crusher Slots		Enviro Dam - Environment	TSF Staging Dam	TSF Staging Dam* (Laboratory Analysis)	TSF Staging Dam* (Field Analysis)
	29.01.2016	04.07.2016	01.09.2014	01.09.2014	Average 2014-2016	
pH	7.69	7.46	8.81	8.60	8.6	8.3
TDS (mg/L)	16700	9260	2190	1160	1590.0	2016.8
TSS (mg/L)	<5	-	<5	28	-	-
Dissolved Oxygen (mg/L)	-	-	-	-	-	8.70
Total Nitrogen (mg/L)	13.3	-	4.8	7.0	-	-
Total Phosphorus (mg/L)	0.31	-	0.07	<0.05	-	-
Boron (mg/L)	0.962	0.34	1.38	1.02	-	-
Copper (mg/L)	0.0024	0.004	<0.001	0.001	0.001	-
Nickel (mg/L)	0.0015	0.005	0.001	0.002	0.0025	-
Zinc (mg/L)	0.01	0.009	<0.005	<0.005	<0.005	-
Actual Fibres (Fibres/mL)	-	-	981	<1,000	-	-





**Figure 1: Baseline surface water monitoring locations**

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It should also be noted that the samples were analysed for asbestos actual fibre content. The Australian Drinking Water Guidelines and World Health Organisation do not set standards for fibres in drinking water or regard fibres in drinking water as hazardous. The water is not used for human consumption, however, native fauna or cattle may consume this water. *“There is no consistent, convincing evidence that ingested asbestos is hazardous to health, and it is concluded that there is no need to establish a guideline for asbestos in drinking-water.”* (World Health Organization, 1996, Asbestos in Drinking-water).

DER internal specialist advice has confirmed that the existing literature suggests that impacts on human health by asbestos fibres in water are negligible, but there are potential environmental consequences for filter-feeding organisms like various species of shellfish. Information is documented in *‘Uptake of Chrysotile Asbestos Fibers Alters Growth and Reproduction of Asiatic Clams’* and *‘Effects of nanoparticles in Mytilus edulis gills and hepatopancreas - a new threat to marine life?’* However, as the area is highly tidal, it is not expected to be a habitat for filter feeders. The Licensee has stated that no studies have been commissioned on the presence of filter feeding organisms within the tributaries of Edwards and Du-Boulay Creeks, however, visual observations have only identified filter feeders (mussels and oysters) within tidal areas. The receiving environment at the proposed discharge locations is not anticipated to be conducive to filter feeding organisms due to the intermittent flows and soft-bottom substrates.

The Licensee has proposed to monitor pH and Total Dissolved Solids as part of the point source and ambient monitoring campaign. The following parameters have been ruled out by the Licensee for monitoring:

- Nutrients will not be monitored as these are ephemeral streams where algal is unlikely to accumulate and the area is within a pastoral station;
- Dissolved Oxygen cannot be ascertained in ephemeral creeks prior to rain events and during rain events Dissolved Oxygen will be at a maximum due to stream flow;
- Turbidity is expected to be high during a rainfall event in an ephemeral creek;
- Temperature will be ambient; and
- The application states that hydrocarbons have not been identified in any samples to date. Results have been provided from the Mine Dam and Environmental Dam for 2016. Samples from the Process/TSF streams have not been taken as this water originates from the Desalination Plant is maintained in a closed loop avoiding contamination from hydrocarbons, which is important for the magnetic separation of magnetite to be effective.

Limits for point source pH and Total Dissolved Solids have been set internally by the Licensee based on the baseline monitoring data collected. Water will only be discharged once it has been ascertained that pH is within the range of 6.5 – 9 pH units and Total Dissolved Solids is less than 10,000 mg/L at controlled surface water discharge points EC1, EC2, EC3, DC1; less than 20,000 mg/L at controlled surface water discharge point EC4, and less than 50,000 mg/L at controlled surface water discharge point DC2 as the salinity increases with proximity to the coast.

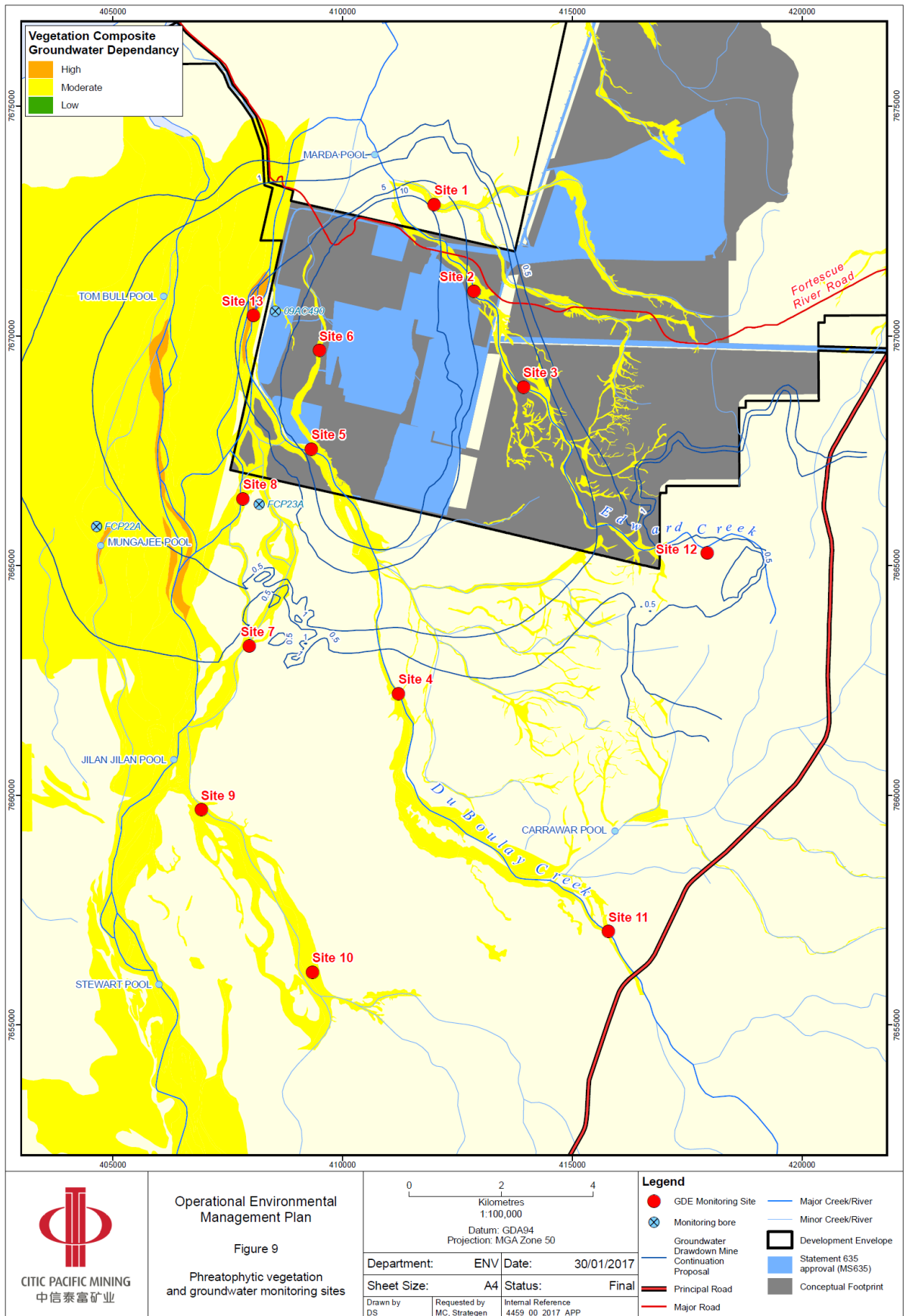
## **Vegetation**

The Office of the Environmental Protection Authority (OEPA) Ministerial Statement 635 condition 6 required the Licensee to implement a Pit Dewatering and Vegetation Monitoring Plan, with the purpose of this plan *to allow deep-rooted vegetation, by extending their root systems, the maximum opportunity to adjust to the dropping water regime by dewatering the pit as slowly as possible, commensurate with the requirements of mining. This Plan shall include monitoring of representative stands of creekline vegetation and other areas of conservation significance within the zone of groundwater depletion, to determine the extent of*

*effects of ground water drawdown on this vegetation.*

As a result, a series of Groundwater Dependent Vegetation monitoring sites are established within DuBoulay and Edwards Creeks and have been monitored since 2009. See Figure 2. The monitoring conducted for these sites can also be used to establish if the controlled surface water discharges are resulting in detrimental impacts to the vegetation. This data is reported to the Office of the Environmental Protection Authority.





**Figure 2: Phreatophytic vegetation and groundwater monitoring sites**



The Licensee has also committed to visually monitor the controlled surface water discharge point within three months of a discharge event to assess for signs of stress on native flora and fauna. This data is to be reported to DER.

### **Other Approvals**

The Licensee also holds a licence to extract water for the purpose of mine dewatering and other mining related operations under section 5C of the *Rights in Water and Irrigation Act 1914* through the Department of Water (GWL167151(6)).

#### Tailings Storage Facility 1B Lift

A licence amendment application was received by DER on 24 February 2017 as the embankment height of TSF1B has been increased from 28.8mRL to 33mRL. Construction was approved by works approval W4447/20081. The Department of Mines and Petroleum (DMP) approved this modification on the 11 January 2017.

The increase in TSF1B embankment height to 33mRL will not alter any of the established pollution controls, necessitate any changes to the ambient monitoring regimes or increase the prescribed tailings production rate of 35.8 Mtpa.

#### Bores BH08-08 (09DD600) and BH08-16 (09DD604)

On 30 September 2016 DER was advised that groundwater monitoring bore BH08-08 was damaged during earthworks for TSF2 and a replacement bore was required. TSF\_009 was included in the monitoring regime to replace the bore in November 2016. This update to Condition 3.7.1, Table 3.7.1 has been made in the licence during this amendment.

On 3 March 2017 DER was further advised that groundwater monitoring bore BH08-16 was damaged during earthworks for TSF2 and a replacement bore is required. As a drill-rig is necessary to be mobilised to site to drill the replacement bore, it may be a number of months before a sample can be taken. The Licensee will take interim samples from TSF\_006, an internal bore that is in the vicinity of BH08-16 as shown in Figure 3 below until the replacement bore is in place.

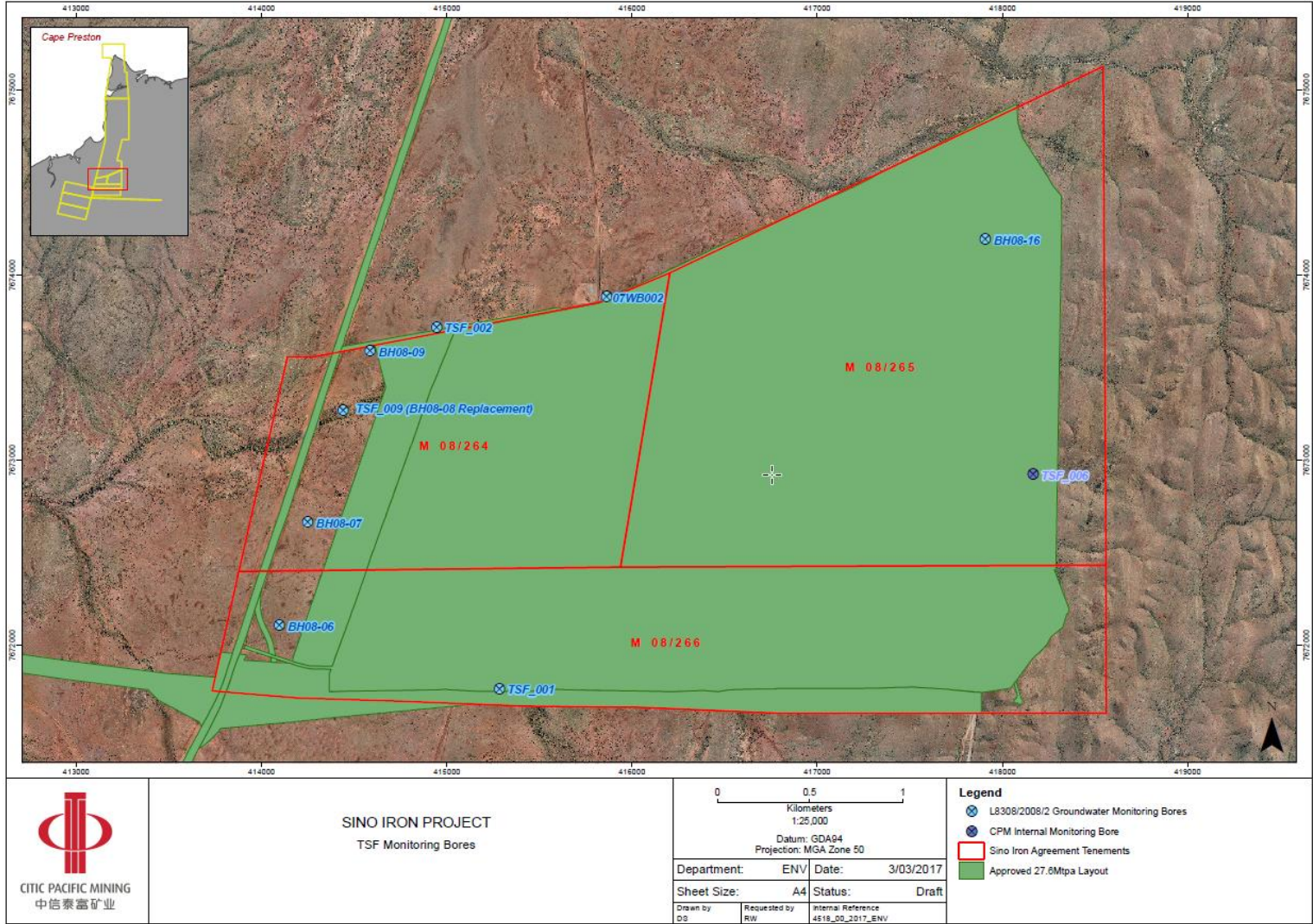


Figure 3: TSF monitoring bores

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## Location, environmental siting and potential receptors

Table 4 below lists the relevant human receptors in the vicinity of the prescribed premises.

Residential and Sensitive Premises	Distance from Prescribed Premises Boundary
Fortescue River Mouth recreational area (not a registered campsite by the City of Karratha)	More than 5 km to the north-west
Mardie Station Pastoral Lease	More than 20 km south-west
Fortescue River Roadhouse	More than 25 km to the south

Table 5 below lists the relevant environmental receptors in the vicinity of the prescribed premises.

Environmental receptor	Distance from Prescribed Premises Boundary
Fortescue River	More than 5 km to the north-west
Deboulay Creek	More than 2.5 km to the north
Edwards Creek	Onsite
Yaggobiddy Creek	Onsite

## Risk assessment

Tables 6 and 7 below apply a risk assessment to the potential emissions which may arise from the amendment application. Both tables identify whether these emissions present a material risk requiring regulatory controls.

## Risk Assessment

**Table 6. Identification of emissions, pathway and receptors for inclusion of controlled surface water discharge points during construction**

Risk Event					Consequence rating	Likelihood rating	Risk	Reasoning	
Source/Activities	Potential Emissions	Potential Receptors	Potential Pathway	Potential Adverse Impacts					
<b>Construction, mobilisation and positioning of infrastructure</b>	Vehicle movements on unsealed access roads	Noise	Fortescue River Mouth recreational area is the nearest receptor located more than 5 km to the north-west	Air / wind dispersion	Health and amenity impacts	Slight	Unlikely	Low	The Delegated Officer considers the distance to the receptor to be too great for impacts to occur; given this is over 5km away and not a registered camp area.
		Dust			Health and amenity impacts	Slight	Unlikely	Low	No receptor present plus existing licence has dust monitoring requirements
	Construction of new discharge pipelines and points	Noise	Fortescue River Mouth recreational area is the nearest receptor located more than 5 km to the north-west	Air / wind dispersion	Health and amenity impacts	Slight	Unlikely	Low	The Delegated Officer considers the distance to the receptor to be too great for impacts to occur; given this is over 5km away and not a registered camp area.
		Dust			Health and amenity impacts	Slight	Unlikely	Low	No receptor present plus existing licence has dust monitoring requirements
	Disturbance of terrestrial vegetation for laying of pipeline	No emission	Terrestrial vegetation in the pathway of the pipeline	Direct impact	Loss of local biodiversity	N/A	N/A	N/A	Managed under Part IV (Ministerial Statement)

**Table 7: Identification of emissions, pathway and receptors for inclusion of controlled surface water discharge points during operation**

Risk Event					Consequence rating	Likelihood rating	Risk	Reasoning	
Source/Activities	Potential Emissions	Potential Receptors	Potential Pathway	Potential Adverse Impacts					
<b>Discharge of excess water</b>	Discharge to Edwards Creek and tributaries of Edwards and DuBoulay Creeks	Stormwater and process water discharged to surface waters	Riparian ecosystems Fauna in creeks (crabs, turtles fish etc.)	Direct discharge	Erosion of creek banks	Slight	Possible	Low	<p>The Delegated Officer considers that controlled surface water discharges will occur only as a last resort and will be pre-planned.</p> <p>The Licensee has committed to minimise erosion and scouring with the use of multiple discharge points to spread the flow, and a layer of riprap will be installed to protect the receiving water bank from erosion.</p> <p>The Delegated Officer therefore considers that impacts from the erosion of creek banks will be <b>slight</b> as the controlled surface water discharge points are all located onsite (so offsite impacts are not expected) and impacts are expected to be minimal, and the likelihood of occurrence is <b>possible</b>. The risk rating for erosion of creek banks is therefore <b>low</b>.</p>
					Disruption of normal ecosystem function from modifications to water quality Increased turbidity				



									<p>The Delegated Officer therefore considers that impacts from modifications to water quality will be <b>minor</b> and the likelihood of occurrence is <b>unlikely</b>. The risk rating for modification to water quality is therefore <b>medium</b>.</p>
					<p>Disruption of normal ecosystem function from inundation of riparian vegetation</p>	<p>Minor</p>	<p>Unlikely</p>	<p>Medium</p>	<p>The Delegated Officer considers that controlled surface water discharges will occur only as a last resort and will be pre-planned. Erosion and scouring is minimised, using multiple discharge points to spread the flow and a layer of riprap will be installed to protect the receiving water bank from erosion. This should ensure that pooling of water in areas does not occur and that water discharged should flow downstream along with natural flows. Discharge will predominantly occur immediately prior to after a rainfall event when water will likely be flowing through the creek lines. Visual monitoring of the discharge point will occur within three months of a discharge event to assess for signs of stress on native flora and fauna and monitoring is also conducted under OEPA Pit Dewatering and Vegetation Monitoring Plan.</p> <p>The Delegated Officer considers that impacts from inundation of riparian vegetation will be <b>minor</b> and the likelihood of occurrence is <b>unlikely</b>. The risk rating for inundation of riparian vegetation is therefore <b>medium</b>.</p>
<p><b>Transfer of excess water via pipelines</b></p>	<p>Controlled surface water discharge pipeline</p>	<p>Stormwater and process water discharge to land as a result of pipeline rupture/ leak</p>	<p>Vegetation adjacent to controlled surface water discharge pipeline</p>	<p>Direct discharge</p>	<p>Soil contamination inhibiting vegetation growth and survival</p>	<p>Slight</p>	<p>Unlikely</p>	<p>Low</p>	<p>The Delegated Officer considers that the quality of the water that would be discharged is reasonable, with a Total Dissolved Solids of less than 20,000 mg/L. Management controls in place by</p>

			<i>alignment</i>						<p><i>the Licensee include routine inspections of the pipeline during use and regular maintenance.</i></p> <p><i>The Delegated Officer considers that impacts from a rupture of the pipeline will be <b>slight</b> as the pipeline is located onsite in an already disturbed area (so offsite impacts are not expected) and impacts would be expected to be minimal as the water quality is not highly saline, and the likelihood of occurrence is <b>unlikely</b>. The risk rating for pipeline ruptures is therefore <b>low</b>.</i></p>
<b>Refuelling pump engines</b>	<i>Diesel used to refuel pump engines for pumping of water to the controlled surface water discharge points could potentially discharge during refuelling</i>	<b>Hydrocarbons</b>	<i>Vegetation adjacent to pump engines</i>	<i>Direct discharge</i>	<i>Potential suppression of photosynthetic and respiratory functions</i>	<i>Slight</i>	<i>Unlikely</i>	<i>Low</i>	<p><i>The Delegated Officer considers that the potential volumes of hydrocarbons that could be spilt during refuelling would be low. The Licensee also has infrastructure controls in place, such as a spill guard and bunding built within the generator and management controls in place, such as monthly inspections and spill kits available.</i></p> <p><i>The Delegated Officer considers that impacts from a spill to vegetation during refuelling will be <b>slight</b> as the pump is located onsite (so offsite impacts are not expected) and impacts would be expected to be minimal, and the likelihood of occurrence is <b>unlikely</b>. The risk rating for diesel spills is therefore <b>low</b>.</i></p>
			<i>Groundwater in the vicinity of pump engines</i>	<i>Infiltration from ground surface</i>	<i>Groundwater contamination</i>	<i>Slight</i>	<i>Unlikely</i>	<i>Low</i>	<p><i>The Delegated Officer considers that the potential volumes of hydrocarbons that could be spilt during refuelling would be low and the evaporation rates are high reducing the risk of seepage. The Licensee also has infrastructure controls in place, such as a spill guard and bunding built within the generator and</i></p>

									<p>management controls in place, such as monthly inspections and spill kits available.</p> <p>The Delegated Officer considers that impacts from a spill during refuelling to groundwater will be <b>slight</b> as the pump is located onsite (so offsite impacts are not expected) and impacts would be expected to be minimal, and the likelihood of occurrence is <b>unlikely</b>. The risk rating for pipeline ruptures is therefore <b>low</b>.</p>
<b>TSF1B lift</b>	Increase wall height from 28.8mRL to 33mRL	Tailings from potential wall break	Vegetation in the vicinity of the TSF	Direct discharge	Soil contamination inhibiting vegetation growth and survival	N/A	N/A	N/A	Managed by DMP under the Mining Act 1978.
<b>Bore BH08-16 removal</b>	Bore BH08-16 not operational due to damage	Seepage from the TSF	Soil and groundwater	Seepage to ground adjacent to the TSF and seepage from the base of the TSF with infiltration into soils	<p>Groundwater mounding</p> <p>Inundation of vegetation rooting zone and decrease in quality of habitat of subterranean fauna</p> <p>Soil contamination inhibiting vegetation growth and survival and health impacts to fauna</p>	Slight	Unlikely	Low	<p>The Delegated Officer considers that the potential for seepage can be detected as bore TSF_006 will be used in the interim until the replacement bore is installed.</p> <p>Groundwater monitoring from the 2015-2016 Annual Environmental Report does show that seepage is evident in the vicinity of the TSF, which the Licensee has stated is consistent with the modelling that was conducted prior to operation of the TSF. Bores further from the TSF show deeper groundwater indicating that seepage is localised beneath the TSF.</p> <p>The Delegated Officer considers that impacts from seepage from the TSF will be <b>slight</b> as the TSF is located onsite (so offsite impacts are not expected) and impacts would be expected to be minimal, and the likelihood of occurrence is <b>possible</b>. The risk rating for seepage</p>

									<i>is therefore <b>low</b>.</i>
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## Decision

The TSF1B height increase has been included in Condition 1.2.8, Table 1.2.3.

The Delegated Officer has determined that the key emissions associated with the inclusion of controlled surface water discharge points is discharge to surface water.

The Delegated Officer considers that the risks associated with these emissions are medium due to distances to sensitive receptors and the Licensee’s controls. Additional controls have been incorporated onto the licence including monitoring campaigns and limits.

The discharge points have been included in Condition 2.2.1, Table 2.2.1 along with Licensee controls.

Limits for pH and TDS have been included in Condition 2.2.2, Table 2.2.2.

Monitoring requirements for pH and TDS have been included in Condition 3.3.2, Table 3.3.1.

Ambient monitoring of pH and TDS has been included in Condition 3.7.1, Table 3.7.2 and for vegetation health in Table 3.7.3.

Bore BH08-08 has been removed and replaced by TSF\_009, and bore BH08-16 has been removed from Condition 3.7.1, Table 3.7.1.

Improvement Program Condition 4.1.1 has been updated to include IR2 for replacement of groundwater monitoring bore BH08-16.

Schedule 1 *Premises map, map of containment infrastructure and map of monitoring locations* and *Map of emission and monitoring points* has also been updated.

## Amendment History

Instrument	Issued	Amendment
L8308/2008/1	23/01/2014	Licence amendment to include the operation of PC1 and PC2 (W5005/2011/1), ML1 (W4447/2008/1) and the Biomax WWTP (W5273/2012/1).
L8308/2008/2	24/03/2016	Licence amended to increase the design capacity of category 5 (inclusion of PC3, PC4, ML2 to ML4 and TSF Stage 1) and category 64, inclusion of categories 12 and 57 and expansion of the premises boundary.
L8308/2008/2	28/07/2016	Licence amended to increase the design capacity of category 5 (inclusion of ML5 and 6).
L8308/2008/2	24/11/2016	Licence amended to include category 6 mine dewatering discharge for 2GL discharge.
L8308/2008/2	16/12/2016	Amendment Notice 1  Licence amendment to change the date of completion for Improvement program IR1 from 31 December 2016 to 30 June 2018





L8308/2008/2	9/06/2017	Amendment Notice 2  Licence amendment to include controlled surface water discharge points, TSF1B lift and modifications to groundwater monitoring bores BH08-08 and BH08-16.
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## Amendments

1. The licence is amended by the removal of the text shown in strikethrough below and the insertion of the bold text shown in underline below for Containment Infrastructure condition 1.2.8:

- 1.2.8 The Licensee shall ensure that waste material is only stored and/or treated within vessels or compounds provided with the infrastructure detailed in Table 1.2.3.

Table 1.2.3: Containment infrastructure		
Containment cell or dam number(s) as depicted in Schedule 1	Material	Infrastructure requirements
TSF Stage 1	Tailings and decant water	880 ha facility to a maximum height of 32.8mRL (TSF Stage 1) and <del>28.8</del> <b>33</b> mRL (TSF Stage 1B).  Tailings to be deposited from multiple discharge locations around the perimeter of the TSF.  Maintain an operational freeboard of 0.3 m.
Process Water Dam	Process water, return water from the TSF thickeners and treated wastewater from the Biomax WWTP	Lined process water dam, which will store process water, return water from the TSF and treated wastewater from the Biomax WWTP prior to reuse (i.e. within the hoppers and mills).
TSF Seepage Drains	Seepage water temporarily stored in drains prior to being pumped to the concentrator plant for reuse in processing	A series of finger drains (that will eventually be located underneath the future TSF Stage 2 embankment) will collect any potential seepage from TSF Stage 1.
Camp 123 Turkey's nest	Mine dewatering water	Lined with High Density Polyethylene Liner to meet a permeability of <10 <sup>-9</sup> m/s.  Maintain an operational freeboard of 0.5 m.

2. The licence is amended by the insertion of the condition below in bold text shown in underline for Infrastructure Requirements condition 1.2.14:

**1.2.14 The Licensee shall construct the controlled surface water discharge points in accordance with the requirements specified in the infrastructure requirements detailed in Table 1.2.6. The Licensee must not depart from the design and construction requirements specified in Table 1.2.6 except:**

- (a) **where such departure is minor in nature and does not materially change or affect the infrastructure; or**
- (b) **where such departure improves the functionality of the infrastructure and does not increase risks to public health, public amenity or the environment;**
- (c) **and all other conditions in this Licence are still satisfied.**



<b>Table 1.2.6: Infrastructure requirements</b>	
<b>Infrastructure</b>	<b>Requirements (Design and construction)</b>
<b><u>Controlled surface water discharge points:</u></b>	<b><u>Layer of riprap will be installed at each discharge point to protect the receiving water bank from erosion</u></b>
<b><u>EC1</u></b>	<b><u>Discharge pipe to Edwards Creek located approximately 300m north of the enviro dam to an existing rock armoured culvert that traverses the north-south infrastructure corridor</u></b>
<b><u>EC2</u></b>	<b><u>Discharge pipe to Edwards Creek to a rock armoured culvert that traverses the public Fortescue River Mouth access road</u></b>
<b><u>EC3</u></b>	<b><u>Discharge pipe to a tributary of Edwards Creek to a rock armoured section of a 2km creek diversion, that was required to protect the integrity of the TSF embankments, and eventually meets up to the natural flow path of the tributary downstream of EC4</u></b>
<b><u>EC4</u></b>	<b><u>Discharge pipe to a remnant tributary of Edwards Creek, which natural flows no longer traverse, and flows under the North-South road and intersects Edwards Creek downstream of EC1 and EC2 to a tidally affected area</u></b>
<b><u>DC1</u></b>	<b><u>Discharge pipe to a tributary of DuBoulay Creek that is within the footprint of the proposed west pit scheduled to be mined within the next five years</u></b>
<b><u>DC2</u></b>	<b><u>Discharge pipe to a tributary of DuBoulay Creek that has a width of 100m</u></b>

**Note 1: Where the details and commitments of the documents listed in condition 1.2.14 are inconsistent with any other condition of this Licence, the conditions of this Licence shall prevail.**

3. The licence is amended by the insertion of the bold text shown in underline for compliance requirements condition 1.2.15:

**1.2.15 The Licensee shall submit a compliance document to the CEO, following the construction of the controlled surface water discharge points. The compliance document/s shall:**

- (a) **be certified by a suitably qualified engineer and certify that the works were constructed in accordance with the construction requirements specified in Table 1.2.6;**
- (b) **provide a list of departures from the specified works certified by a suitably qualified engineer; and**
- (c) **be signed by a person authorised to represent the Licensee and contain the printed name and position of that person within the company.**

4. The licence is amended by the insertion of the bold text shown in underline for operational requirements of the controlled surface water discharge points condition 1.2.16:

**1.2.16. The Licensee shall operate the controlled surface water discharge points in accordance with the conditions of this Licence, following submission of the compliance document required under condition 1.2.15.**

5. The licence is amended by the insertion of the bold text shown in underline below for Point source emissions to surface water condition 2.2.1:

2.2.1 The Licensee shall ensure that where waste is emitted to surface water from the emission points in Table 2.2.1 and identified on the map of emission points in Schedule 1 it is done so in accordance with the conditions of this Licence.



<b>Table 2.2.1: Emission points to surface water</b>		
<b>Emission point reference and location on Map of emission points</b>	<b>Description</b>	<b>Source including abatement</b>
FR2	Discharge pipe to Fortescue River Mouth	Mine dewatering water discharged through a diffuser: (a) the diffuser shall be submerged beneath the water; (b) the diffuser shall be at least 10 m from the Fortescue River embankment; (c) the diffuser length shall be 21 m with ports 1.5 m apart, orientated downstream; and (d) the pipeline shall be equipped with a pressure monitoring system.
<u>EC1</u>	<u>Discharge pipe to Edwards Creek located approximately 300m north of the enviro dam</u>	<b><u>Stormwater and process water discharged in a controlled manner as a result of an uncontrollable event:</u></b> <b><u>(a) control the discharge rate so that erosion and scouring is minimised;</u></b> <b><u>(b) use multiple discharge points to spread the flow; and</u></b> <b><u>(c) maintain a layer of riprap to protect the receiving water bank from erosion.</u></b>
<u>EC2</u>	<u>Discharge pipe to Edwards Creek</u>	
<u>EC3</u>	<u>Discharge pipe to a tributary of Edwards Creek</u>	
<u>EC4</u>	<u>Discharge pipe to a remnant tributary of Edwards Creek</u>	
<u>DC1</u>	<u>Discharge pipe to a tributary of DuBoulay Creek within footprint of proposed west pit</u>	
<u>DC2</u>	<u>Discharge pipe to a tributary of DuBoulay Creek with a width of 100 metres</u>	

6. The licence is amended by the insertion of the bold text shown in underline below for Point source emissions to surface water condition 2.2.2:

2.2.2 The Licensee shall not cause or allow point source emissions to surface water that do not meet the limits listed in Table 2.2.2.

<b>Table 2.2.2: Point source emission limits to surface water</b>			
<b>Emission point reference</b>	<b>Parameter</b>	<b>Limit (including units)</b>	<b>Averaging period</b>
FR2	pH <sup>1</sup>	6-9 pH units	Spot sample
	Temperature <sup>1</sup>	<65 °C	
	Total Dissolved Solids <sup>1</sup>	<70,000 mg/L	
	Nitrate	<50 mg/L	
	Cadmium	<0.1485 mg/L	
	Chromium (VI)	<0.1188 mg/L	
	Cobalt	<0.027 mg/L	
	Copper	<0.0351 mg/L	
	Lead	<0.1188 mg/L	
	Mercury	<0.0108 mg/L	
	Nickel	<1.89 mg/L	
	Silver	<0.0378 mg/L	
	Vanadium	<2.7 mg/L	
	Zinc	<0.405 mg/L	
Total Recoverable Hydrocarbons	<15 mg/L		
<u>EC1</u>	<u>pH<sup>1</sup></u>	<u>6.5-9 pH units</u>	
<u>EC2</u>	<u>Total Dissolved Solids<sup>1</sup></u>	<u>&lt;10,000 mg/L</u>	
<u>EC3</u>			
<u>DC1</u>			
<u>EC4</u>	<u>pH<sup>1</sup></u>	<u>6.5-9 pH units</u>	
	<u>Total Dissolved Solids<sup>1</sup></u>	<u>&lt;20,000 mg/L</u>	
<u>DC2</u>	<u>pH<sup>1</sup></u>	<u>6.5-9 pH units</u>	
	<u>Total Dissolved Solids<sup>1</sup></u>	<u>&lt;50,000 mg/L</u>	

Note 1: In-field non-NATA accredited analysis permitted.



7. The licence is amended by the insertion of the bold text shown in underline below for Monitoring of point source emissions to surface water condition 3.3.2:

3.3.2 The Licensee shall undertake the monitoring in Table 3.3.1 according to the specifications in that table.

<b>Table 3.3.1: Monitoring of point source emissions to surface water</b>				
<b>Emission point reference</b>	<b>Parameter</b>	<b>Units</b>	<b>Frequency</b>	<b>Method</b>
FR2 – monitoring conducted in-pipe from a sampling tap	Volumetric flow rate	m <sup>3</sup> /day	Daily	AS/NZS 5667.6
	pH <sup>1</sup>	pH units	Monthly	AS/NZS 5667.1
	Temperature <sup>1</sup>	°C		
	Dissolved Oxygen <sup>1</sup>	mg/L		
	Electrical Conductivity <sup>1</sup>	µS/cm		
	Total Dissolved Solids	mg/L		
	Total Suspended Solids	mg/L		
	Total Nitrogen	mg/L		
	Bioavailable Nitrogen	mg/L		
	Nitrate	mg/L		
	Ammonia	mg/L		
	Total Phosphorus	mg/L		
	Bioavailable Phosphorus	mg/L		
	Bioavailable Organic Carbon	mg/L		
	Chlorophyll a	mg/L		
	Aluminium	mg/L		
	Arsenic	mg/L		
	Boron	mg/L		
	Cadmium	mg/L		
	Chromium (III)	mg/L		
	Chromium (VI)	mg/L		
	Cobalt	mg/L		
	Copper	mg/L		
	Iron	mg/L		
	Lead	mg/L		
	Mercury	mg/L		
	Manganese	mg/L		
	Nickel	mg/L		
Selenium	mg/L			
Silver	mg/L			
Strontium	mg/L			
Vanadium	mg/L			
Zinc	mg/L			
Total Recoverable Hydrocarbons	mg/L			
Camp 123 Turkey's nest	pH <sup>1</sup>	pH units	Monthly	AS/NZS 5667.1
	Temperature <sup>1</sup>	°C		
	Dissolved Oxygen <sup>1</sup>	mg/L		
	Electrical Conductivity <sup>1</sup>	µS/cm		
	Total Dissolved Solids	mg/L		
	Total Suspended Solids	mg/L		
	Total Nitrogen	mg/L		
	Bioavailable Nitrogen	mg/L		
	Nitrate	mg/L		
	Ammonia	mg/L		
	Total Phosphorus	mg/L		
	Bioavailable Phosphorus	mg/L		
	Bioavailable Organic Carbon	mg/L		
	Chlorophyll a	mg/L		
Aluminium	mg/L			
Arsenic	mg/L			



	Boron	mg/L		
	Cadmium	mg/L		
	Chromium (III)	mg/L		
	Chromium (VI)	mg/L		
	Cobalt	mg/L		
	Copper	mg/L		
	Iron	mg/L		
	Lead	mg/L		
	Mercury	mg/L		
	Manganese	mg/L		
	Nickel	mg/L		
	Selenium	mg/L		
	Silver	mg/L		
	Strontium	mg/L		
	Vanadium	mg/L		
	Zinc	mg/L		
	Total Recoverable Hydrocarbons	mg/L		
<b>EC1</b>	<b>pH<sup>1</sup></b>	<b>pH units</b>	<b>Prior to</b>	<b>AS/NZS 5667.6</b>
<b>EC2</b>	<b>Total Dissolved Solids<sup>1</sup></b>	<b>mg/L</b>	<b>discharge</b>	
<b>EC3</b>				
<b>EC4</b>				
<b>DC1</b>				
<b>DC2</b>				

Note 1: In-field non-NATA accredited analysis permitted.

8. The licence is amended by the insertion of the bold text shown in underline below for Ambient environmental quality monitoring condition 3.7.1:

3.7.1 The Licensee shall undertake the monitoring in Table 3.7.1, Table 3.7.2 and Table 3.7.3 according to the specifications in that table.

<b>Table 3.7.1: Monitoring of ambient groundwater quality</b>				
<b>Monitoring point reference and location as depicted in Schedule 1</b>	<b>Parameter</b>	<b>Units</b>	<b>Averaging period</b>	<b>Frequency</b>
09NC565 10NC585 (Control) 09NC564 09NC566	pH <sup>1</sup>	<b>pH units</b>	Spot sample	Six monthly
	Total Nitrogen	mg/L		
	Total Phosphorus	mg/L		
	Total Dissolved Solids	mg/L		
	Lead	mg/L		
	Mercury	mg/L		
	Copper	mg/L		
	Chromium (hexavalent)	mg/L		
	Arsenic	mg/L		
	Nickel	mg/L		
	Zinc	mg/L		
	Cadmium	mg/L		
	Total Recoverable Hydrocarbons	mg/L		
Standing Water Level <sup>2</sup>	Mbgl	Spot sample	Monthly	
TSF_001 BH08-06 (09DD598) BH08-07 (09DD599) BH08-08 (09DD600) <b>TSF_009</b> BH08-09 (09DD602) TSF_002 BH08-16 (09DD604) <b>Replacement bore to</b>	Standing Water Level <sup>2</sup>	Mbgl	Spot sample	Monthly
	Oxidation Reduction Potential <sup>1</sup>	mV	Spot sample	Quarterly
	pH <sup>1</sup>			
	Dissolved Oxygen <sup>1</sup>	mg/L		
	Temperature <sup>1</sup>	°C		
	Electrical Conductivity <sup>1</sup>	µS/cm		
	Total Dissolved Solids	mg/L		
	Total Sulfur	mg/L		
Calcium	mg/L			





<b>be installed (IR2)</b> 07WB002 (07NC256)	Sodium	mg/L	Spot sample	Six monthly
	Total Alkalinity	mg/L		
	Chloride	mg/L		
	Magnesium	mg/L		
	Potassium	mg/L		
	Sulfate (SO <sub>4</sub> <sup>2-</sup> )	mg/L		
	Bicarbonate (HCO <sub>3</sub> <sup>-</sup> )	mg/L		
	Carbonate (CO <sub>3</sub> <sup>2-</sup> )	mg/L		
	Aluminium	mg/L		
	Lead	mg/L		
	Mercury	mg/L		
	Copper	mg/L		
	Chromium (hexavalent)	mg/L		
	Nickel	mg/L		
	Zinc	mg/L		
	Cadmium	mg/L		
	Cobalt	mg/L		
	Iron	mg/L		
Manganese	mg/L			

Note 1: In-field non-NATA accredited analysis permitted.

Note 2: Standing water level should be determined prior to collection of other water samples.

<b>Table 3.7.2: Monitoring of ambient surface water quality</b>				
<b>Monitoring point reference and location as depicted in Schedule 1</b>	<b>Parameter</b>	<b>Units</b>	<b>Averaging period</b>	<b>Frequency</b>
FR1 (1 km downstream of discharge point) FR2 (discharge point) FR3 (1 km upstream of discharge point) FR4 (18 m upstream of discharge point) FR5 (18 m downstream of discharge point)	pH <sup>1</sup>	pH units	Spot sample	Monthly during discharge to obtain dilution data for a 12 month period from the date of submission of the compliance documentation for the mine dewatering discharge infrastructure required by Condition 5.3.1.
	Temperature <sup>1</sup>	°C		
	Dissolved Oxygen <sup>1</sup>	mg/L		
	Electrical Conductivity <sup>1</sup>	µS/cm		
	Total Dissolved Solids	mg/L		
	Total Suspended Solids	mg/L		
	Total Nitrogen	mg/L		
	Bioavailable Nitrogen	mg/L		
	Nitrate	mg/L		
	Ammonia	mg/L		
	Total Phosphorus	mg/L		
	Bioavailable Phosphorus	mg/L		
	Bioavailable Organic Carbon	mg/L		
	Chlorophyll a	mg/L		
	Aluminium	mg/L		
	Arsenic	mg/L		
	Boron	mg/L		
	Cadmium	mg/L		
	Chromium (III)	mg/L		
	Chromium (VI)	mg/L		
	Cobalt	mg/L		
	Copper	mg/L		
	Iron	mg/L		
	Lead	mg/L		
	Mercury	mg/L		
	Manganese	mg/L		
	Nickel	mg/L		
	Selenium	mg/L		
	Silver	mg/L		
	Strontium	mg/L		
Vanadium	mg/L			
Zinc	mg/L			
Total Recoverable	mg/L			



	Hydrocarbons			
<b>500m downstream of the discharge points:</b>	<b>pH<sup>1</sup></b>	<b>pH units</b>	<b>Spot sample</b>	<b>During the discharge where it is safe to do so</b>
<b>EC1 (ambient)</b> <b>EC2 (ambient)</b> <b>EC3 (ambient)</b> <b>EC4 (ambient)</b> <b>DC1 (ambient)</b> <b>DC2 (ambient)</b>	<b>Total Dissolved Solids<sup>1</sup></b>	<b>mg/L</b>		<b>In the event that it is not safe to do so, comparison should be made to historic data with reason justified</b>

Note 1: In-field non-NATA accredited analysis permitted.

**Table 3.7.3: Monitoring of ambient vegetation health**

Monitoring point reference and location as depicted in Schedule 1	Parameter	Averaging period	Frequency
FR2 (discharge point)	Visually estimate the average foliage cover	Visual inspection	Annually
	Score the health condition		
	General environmental description of the site and record any changes since previous monitoring		
	Take replicate photographs of foliage density and shadow areas beneath trees.		
<b>Areas of stream discharge:</b>	<b><u>Signs of stress on native flora and fauna</u></b>	<b><u>Visual inspection</u></b>	<b><u>Within three months of discharge</u></b>
<b>EC1</b> <b>EC2</b> <b>EC3</b> <b>EC4</b> <b>DC1</b> <b>DC2</b>			

9. The licence is amended by the insertion of the bold text shown in underline below for Improvement Program condition 4.1.1.

4.1.1 The Licensee shall complete the improvements in Table 4.1.1 by the date of completion in Table 4.1.1.

**Table 4.1.1: Improvement program**

Improvement reference	Improvement <sup>1</sup>	Date of completion
IR1	The Licensee shall certify that the point source air emission levels from each turbine unit of the Power Station for oxides of nitrogen (NO <sub>x</sub> ) and carbon monoxide (CO) of <25 ppmv and <50 ppmv, respectively, have been met at full load.	30 June 2018
<b>IR2</b>	<b><u>The Licensee shall install a replacement groundwater monitoring bore for BH08-16 (09DD604). The Licensee shall monitor from this groundwater monitoring bore as per Condition 3.7.1, Table 3.7.1 following its installation.</u></b>	<b><u>30 June 2017</u></b>

Note 1: All units are referenced to STP dry at 15% O<sub>2</sub>

10. The licence is amended by the insertion of the bold text shown in underline below for Annual Environmental Report condition 5.2.1.

5.2.1 The Licensee shall submit to the CEO an Annual Environmental Report within 120 calendar days after the end of the Anniversary Date. The report shall contain the information listed in Table 5.2.1 in the format or form specified in that table.



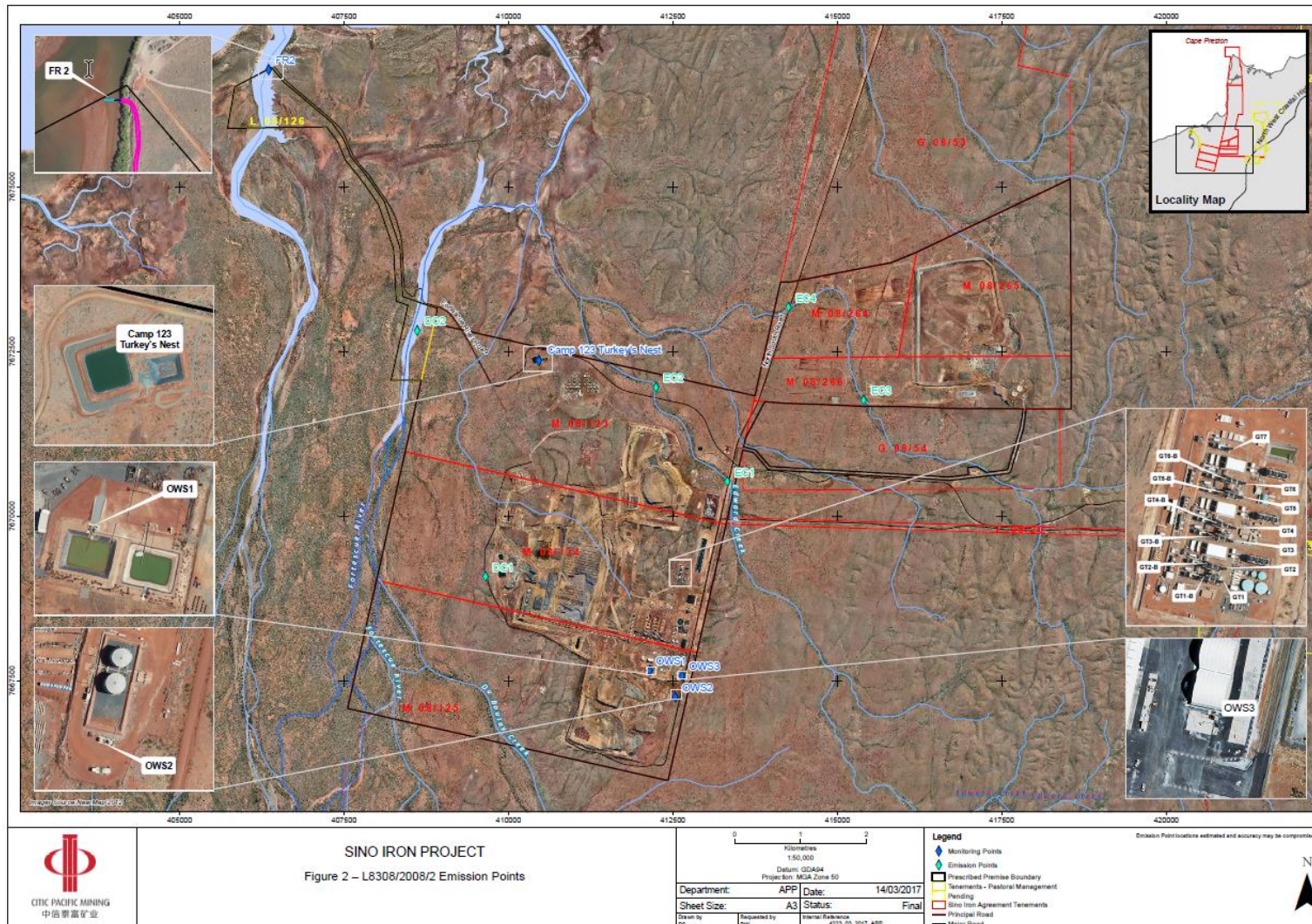
<b>Table 5.2.1: Annual Environmental Report</b>		
<b>Condition or table (if relevant)</b>	<b>Parameter</b>	<b>Format or form<sup>1</sup></b>
-	Summary of any failure or malfunction of any pollution control equipment and any environmental incidents that have occurred during the annual period and any action taken	None specified
Table 3.3.1	Volumetric flow rate, pH, Temperature, Dissolved Oxygen, Electrical Conductivity, Total Dissolved Solids, Total Suspended Solids, Total Nitrogen, Bioavailable Nitrogen, Nitrate, Ammonia, Total Phosphorus, Bioavailable Phosphorus, Bioavailable Organic Carbon, Chlorophyll a, Aluminum, Arsenic, Boron, Cadmium, Chromium (III), Chromium (VI), Cobalt, Copper, Iron Mercury, Lead, Manganese, Nickel, Selenium, Strontium, Zinc, Total Recoverable Hydrocarbons	WR1
Table 3.4.1	pH, Biochemical Oxygen Demand, Total Suspended Solids, <i>E.coli</i> , Total Nitrogen and Total Phosphorus	LR1
Table 3.5.1	Inert Waste Type 1, Inert Waste Type 2, Special Waste Type 1, Special Waste Type 2, Clean Fill, Putrescible Waste, Contaminated Solid Waste and Other wastes	None specified
Table 3.6.1	pH, Biochemical Oxygen Demand, Total Suspended Solids, <i>E.coli</i> , Total Nitrogen, Total Phosphorus, Total Recoverable Hydrocarbons, Combined decant water and seepage water recovery volumes and volume of tailings deposited	None specified
Table 3.7.1	pH, Total Nitrogen, Total Phosphorus, Total Dissolved Solids, Lead, Mercury, Copper, Chromium (hexavalent), Arsenic, Nickel, Zinc, Cadmium, Total Recoverable Hydrocarbons, Standing Water Level, Oxidation Reduction Potential, Dissolved Oxygen, Temperature, Electrical Conductivity, Total Sulfur, Calcium, Sodium, Total Alkalinity, Chloride, Magnesium, Potassium, Sulfate (SO <sub>4</sub> <sup>2-</sup> ), Bicarbonate (HCO <sub>3</sub> <sup>-</sup> ), Carbonate (CO <sub>3</sub> <sup>2-</sup> ), Aluminum, Cobalt, Iron and Manganese	None specified
Table 3.7.2	pH, Temperature, Dissolved Oxygen, Electrical Conductivity, Total Dissolved Solids, Total Suspended Solids, Total Nitrogen, Bioavailable Nitrogen, Nitrate, Ammonia, Total Phosphorus, Bioavailable Phosphorus, Bioavailable Organic Carbon, Chlorophyll a, Aluminum, Arsenic, Boron, Cadmium, Chromium (III), Chromium (VI), Cobalt, Copper, Iron, Mercury, Lead, Manganese, Nickel, Selenium, Strontium, Zinc, Total Recoverable Hydrocarbons  A comparison of the data obtained against baseline results shall be provided.	None specified
Table 3.7.3	Visually estimate the average foliage cover Score the health condition General environmental description of the site and record any changes since previous monitoring Take replicate photographs of foliage density and shadow areas beneath trees.  <b><u>Signs of stress on native flora and fauna at areas of stream discharge:</u></b> <b><u>EC1, EC2, EC3, EC4</u></b> <b><u>DC1, DC2</u></b>	None specified
1.2.12	Annual water balance for the TSF	None specified
3.3.1	Discharge commencement and cessation date and times recorded, along with tidal data from measurement locations.	None specified
5.1.2	Compliance	Compliance Report
5.1.3	Complaints summary	None specified

Note 1: Forms are in Schedule 2

11. Replacement of the *Premises map, map of containment infrastructure and map of monitoring locations* to the following:



The Premises is shown in the map below. The black line depicts the Premises boundary.  
 The location of the containment infrastructure defined in Table 1.2.3 is shown below.  
 The locations of the emission point defined in Table 2.3.1 is shown below.  
 The location of the monitoring points defined in Tables 3.4.1, 3.5.1 and 3.7.1 are shown below.

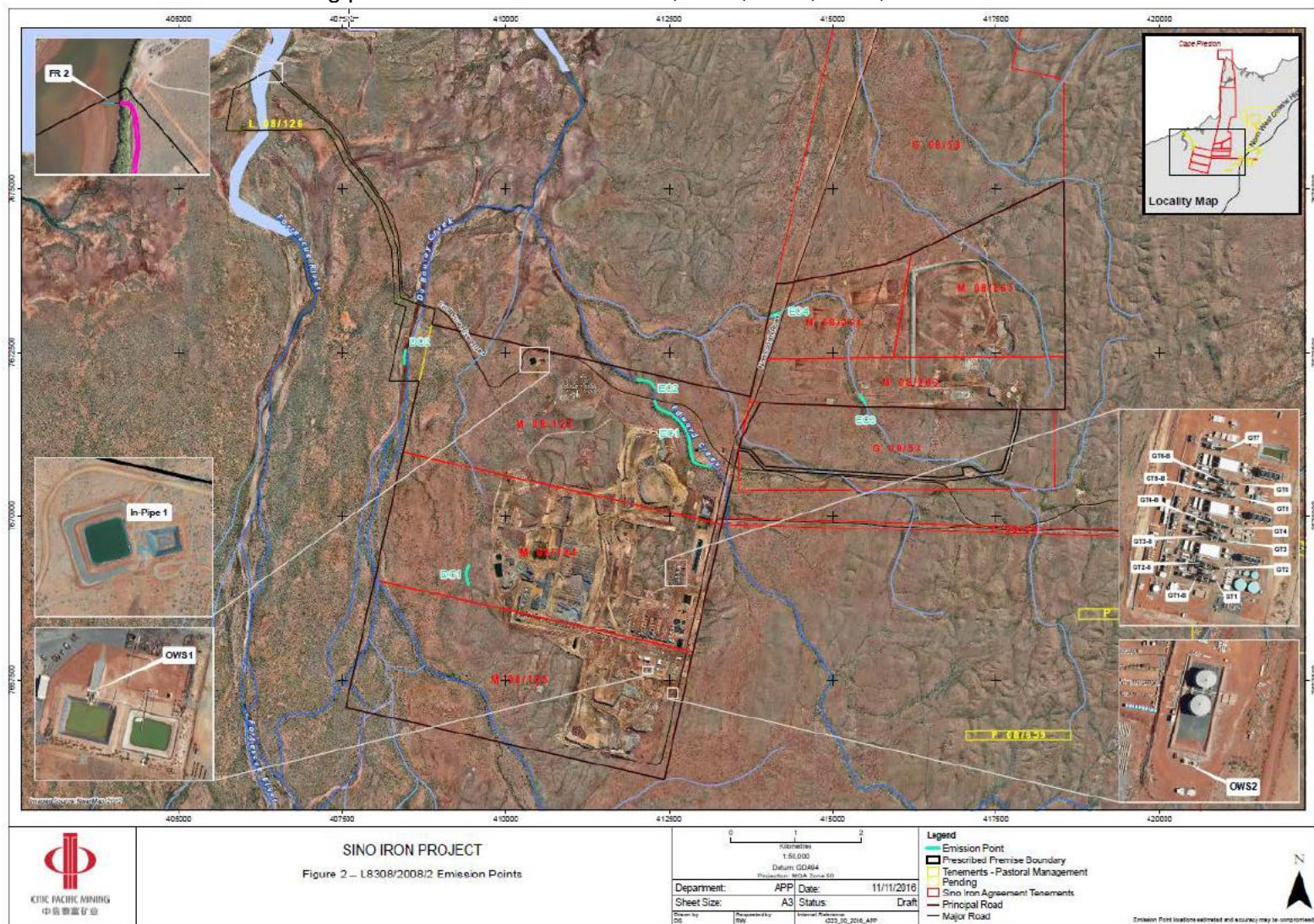




12. Replacement of the first map of *Map of emission and monitoring points* to the following:

The locations of the emission points defined in Tables 2.1.1 and 2.2.1 are shown below.

The locations of the monitoring points defined in Tables 3.2.1, 3.3.1, 3.4.1, 3.6.1, 3.7.2 and 3.7.3 are shown below.



## References

World Health Organization (1996), Asbestos in Drinking-water, Background document for development of WHO Guidelines for Drinking-water Quality

Scott E. Belanger, Donald S. Cherry, John Cairns Jr. (1986), Uptake of Chrysotile Asbestos Fibers Alters Growth and Reproduction of Asiatic Clams

Angela Koehler, Ute Marx, Katja Broeg, Sieglinde Bahns, Jana Bressling (2008), Effects of nanoparticles in *Mytilus edulis* gills and hepatopancreas - a new threat to marine life?