Government of Western Australia
Department of Water and Environmental Regulation

Amendment Notice # 3

Licence Number	L8721/2013/1
Licence Holder	Karara Mining Limited
ACN	070 871 831
File Number:	2012/008499
Premises	Karara Minesite Beneficiation Plant M59/644, M59/645, G59/38 and L59/99 PERENJORI WA 6620
Date of Amendment	03/08/2018

Amendment

The Chief Executive Officer (CEO) of the Department of Water and Environmental Regulation (DWER) has amended the above Licence in accordance with section 59 of the *Environmental Protection Act 1986* (EP Act) as set out in this Amendment Notice. This Amendment Notice constitutes written notice of the amendment in accordance with section 59B(9) of the EP Act.

Date signed: 3 August 2018

Alana Kidd

Manager, Resource Industries

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

Definitions and interpretation

Definitions

In this Amendment Notice, the terms in Table 1 have the meanings defined.

Table 1: Definitions

Term	Definition
ACN	Australian Company Number
Category/ Categories/ Cat.	categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
CEO	means Chief Executive Officer. CEO for the purposes of notification means: Director General Department Administering the *Environmental Protection Act 1986* Locked Bag 33 Cloisters Square PERTH WA 6850 info@dwer.wa.gov.au
Delegated Officer	an officer under section 20 of the EP Act
Department	means the department established under section 35 of the *Public Sector Management Act 1994* and designated as responsible for the administration of Part V, Division 3 of the EP Act.
DMIRS	Department of Mines, Industry Regulation and Safety
DWER	Department of Water and Environmental Regulation
EPA	Environmental Protection Authority
EP Act	*Environmental Protection Act 1986* (WA)
EP Regulations	*Environmental Protection Regulations 1987* (WA)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
Existing Licence	The Licence and Amendment Notices issued under Part V, Division 3 of the EP Act and in force prior to the commencement of and during this Review
Internal embankment	Dividing wall
KML	Karara Mining Limited
Licensee	Karara Mining Limited

Licence Holder	Karara Mining Limited
m^3	cubic metres
Minister	the Minister responsible for the EP Act and associated regulations
MS	Ministerial Statement
mbgl metres below ground level	metres below ground level
mtpa	million tonnes per annum
Occupier	has the same meaning given to that term under the EP Act.
Prescribed Premises	has the same meaning given to that term under the EP Act.
Premises	refers to the premises to which this Decision Report applies, as specified at the front of this Decision Report.
Risk Event	as described in *Guidance Statement: Risk Assessment*
UDR	*Environmental Protection (Unauthorised Discharges) Regulations 2004* (WA)
PEC	Priority Ecological Community
RIWI Act	*Rights in Water and Irrigation Act 1914*
Risk Event	as described in *Guidance Statement: Risk Assessment*
Total Freeboard	is the Operational Freeboard + Beach Freeboard = 500mm with a subminimum of 300mm Operational Freeboard.
TDS	Total Dissolved Solids
TSF	Tailings Storage Facility

Amendment Notice

This amendment is made pursuant to 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.

The following guidance statements have informed the decision made on this amendment

- *Guidance Statement: Regulatory Principles (July 2015)*
- *Guidance Statement: Setting Conditions (October 2015)*
- *Guidance Statement: Decision Making (February 2017)*
- *Guidance Statement: Risk Assessment (February 2017)*
- *Guidance Statement: Environmental Siting (November 2016)*

Amendment background and description

On 8 January 2018, Licence L8721/2013/1 was amended to approve construction of a new wet Tailings Storage Facility (TSF) TSF 2A at Karara Mining Limited's (KML) Karara mine site.

On 25 June 2018, KML submitted an application for a further amendment to L8721/2013/1, for construction of an internal embankment to create Cell 1 and Cell 2 within TSF 2A due to requiring urgent tailings storage capacity, sooner than expected.

The amendment application seeks approval to construct an internal embankment from the central decant to the southern embankment of TSF Stage 2A, at a height of 10 m and 340 m in length The internal embankment will divide the TSF 2A deposition area into Cell 1 and Cell 2.

KML proposes that final construction of TSF 2A will now be completed in two phases, Phase 1 and Phase 2. Most of TSF 2A infrastructure will be constructed during Phase 1, when much of all four embankments of TSF 2A are constructed with a dividing wall also constructed to form Cell 1 and Cell 2 areas. Refer to Figure 2.

Tailings deposition will commence into Cell 1 initially. Once construction of Phase 2 (including Cell 2) is complete, tailings deposition will occur into both Cell 1 and 2 as required, with tailings eventually filling above the internal embankment to form one cell TSF 2A.

Karara has advised that the construction of all embankment walls of TSF 2A has commenced, is progressing on schedule, and is expected to be completed by March 2019.

There are no changes to the Category 5 design or production capacity of the Licence.

TSF 2A infrastructure

Construction of all four embankments TSF 2A are already advanced. Karara states that the TSF 2A perimeter embankments have been and are being constructed in accordance with *KML Mine Site Wet Tailings Storage Facility 2A and 2B Design Report,* Wave International, 3/04/2017 and as required by existing Licence condition 1.3.7.

There will be no changes to the design and construction of TSF 2A including perimeter embankments, decant access wall, decant, tailings and decant pipelines, spigots, piezometers, cut-off trench, seepage collection sump and stormwater management from external embankments.

None of the approved seepage control measures have been altered with the installation of the additional embankment. The main perimeter embankments are constructed with a full key trench in all areas required for TSF 2A and will be independent of the wall dividing Cell 1 and Cell 2. When tailings fill over the dividing wall, the TSF will function as single dam, as per original design and the perimeter embankment design has not been changed. When Phase 2

is completed, and the perimeter embankments constructed, tailings will be discharged from all the perimeter walls as per design.

Figure 1 below is the existing design plan of TSF 2A and Figure 2 below shows the updated TSF2A plan with the temporary dividing wall which creates and separates Cell 1 and Cell 2.

The entire TSF 2A storage area will be surrounded by an external stormwater embankment to a minimum height of 3 m. Flow of water north of TSF2A will be contained within the Drainage Retention area functioning as a pond as approved for TSF 2A. A stormwater retention pond wall approximately 4 m high has been constructed.

There are no changes to the Category 5 design or production capacity of the Licence.

Temporary Dividing wall

A construction haul road to link the TSF 2A north wall and south wall was built due to a three kilometre haul distance between the north side and south side, and was to be removed prior to final construction of TSF 2A. The wall was constructed to 5 m at the beginning of construction and will instead be constructed to requirements of the proposed internal embankment, with materials as detailed below.

The proposed internal embankment will be 10 m high and approximately 340 m in length and extends from the central decant tower to the middle of the southern embankment wall of TSF 2A. It will be constructed with Colluvium materials (mainly Gravelly Silty Clay/Gravelly Silt) sourced from the upper layers of the immediate surroundings of the dam.

The permeability of the Colluvium materials proposed for the internal embankment is 1.0×10^{-8} m/s in accordance with the existing licence. The embankment's batter angles will be 2H: 1V. Figure 3 below is a drawing for typical section.

The fill volume will consume less than 1% of the overall tailings storage volume for Wet TSF 2A and therefore will not have a significant impact on the storage volume for the facility.

The total fill volume of Cell 1 is calculated to reach approximately 20% by completion of construction of Cell 2, using conservative assumptions of no evaporation or base area seepage.

Compliance reporting

Groundwater monitoring bores

Condition 1.3.7 requires installation of groundwater monitoring bores to enable detection of seepage from the TSF.

On 25 June 2018, as part of amendment application documents, KML submitted the *Karara Tailings Storage Facility – Groundwater Monitoring Plan,* Advisian, 13 June 2018 (Advisian, June 2018). The plan includes locations for two monitoring bores to the east of the TSF, and two to the south of the TSF. Locations were determined by existing geological and geophysical data and other information. The plan included nominal bore design and a recommended initial monitoring program.

Bore logs and baseline monitoring results for three constructed monitoring bores TSF-MB1-2018 (MB1), TSF-MB2-2018 (MB2), and TSF-MB3-2018 (MB3) were submitted on 25 July2018.

KML advised that monitoring bore TSF-MB4-2018 (MB4) was not able to be installed due to rain preventing access to the bore pad location. KML have advised that MB4 will be constructed after winter of 2018 (when safe access is assured) and prior to complete construction of TSF 2A.

US EPA LEAF test results were submitted on 12/2/2018. The results were provided after the due date as a result of laboratory analysis time constraints.

The Application states that monitoring shall be conducted in accordance with the *Karara Tailings Storage Facility – Groundwater Monitoring Plan* (13 June 2018). DWER has reviewed the proposed monitoring schedule, and has added Perchlorate (an explosives residue that may be found in the tailings) to the parameters to be monitored. The resulting monitoring program is incorporated into a new Licence condition as detailed in this Amendment Notice.

TSF 2A Phase 1

KML submitted a partial construction compliance report for TSF 2A Phase 1 on 2 August 2018. After submission of the final construction compliance report for TSF 2A Phase 1, and desktop assessment by DWER confirms construction compliance, KML may commence deposition of tailings into TSF 2A Cell 1.

Figure 1 TSF 2A layout - original design as approved in Amendment Notice 2, 8 January 2018

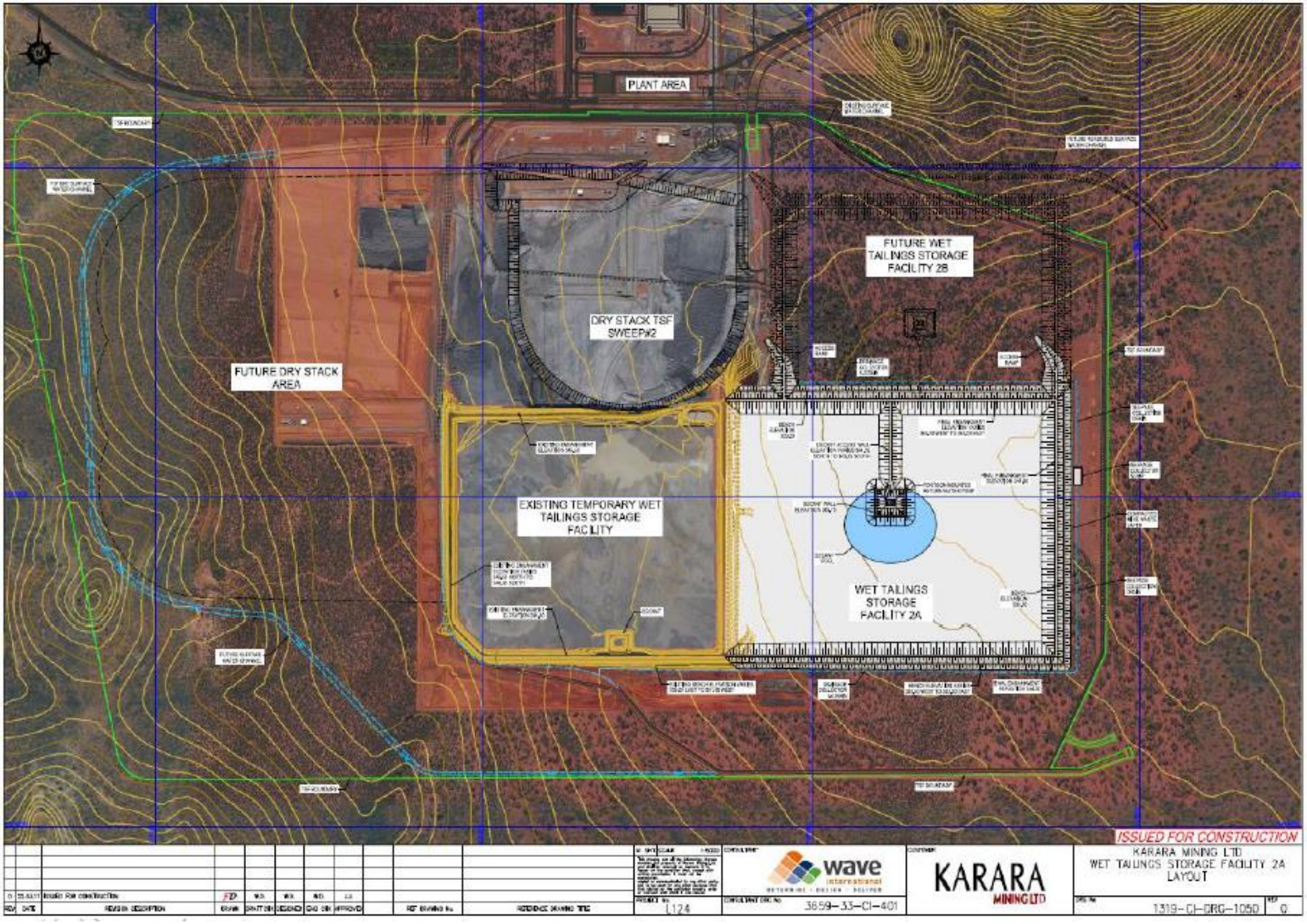


Figure 2: Proposed modified TSF 2A (dividing TSF 2A into Cell 1 and Cell 2)

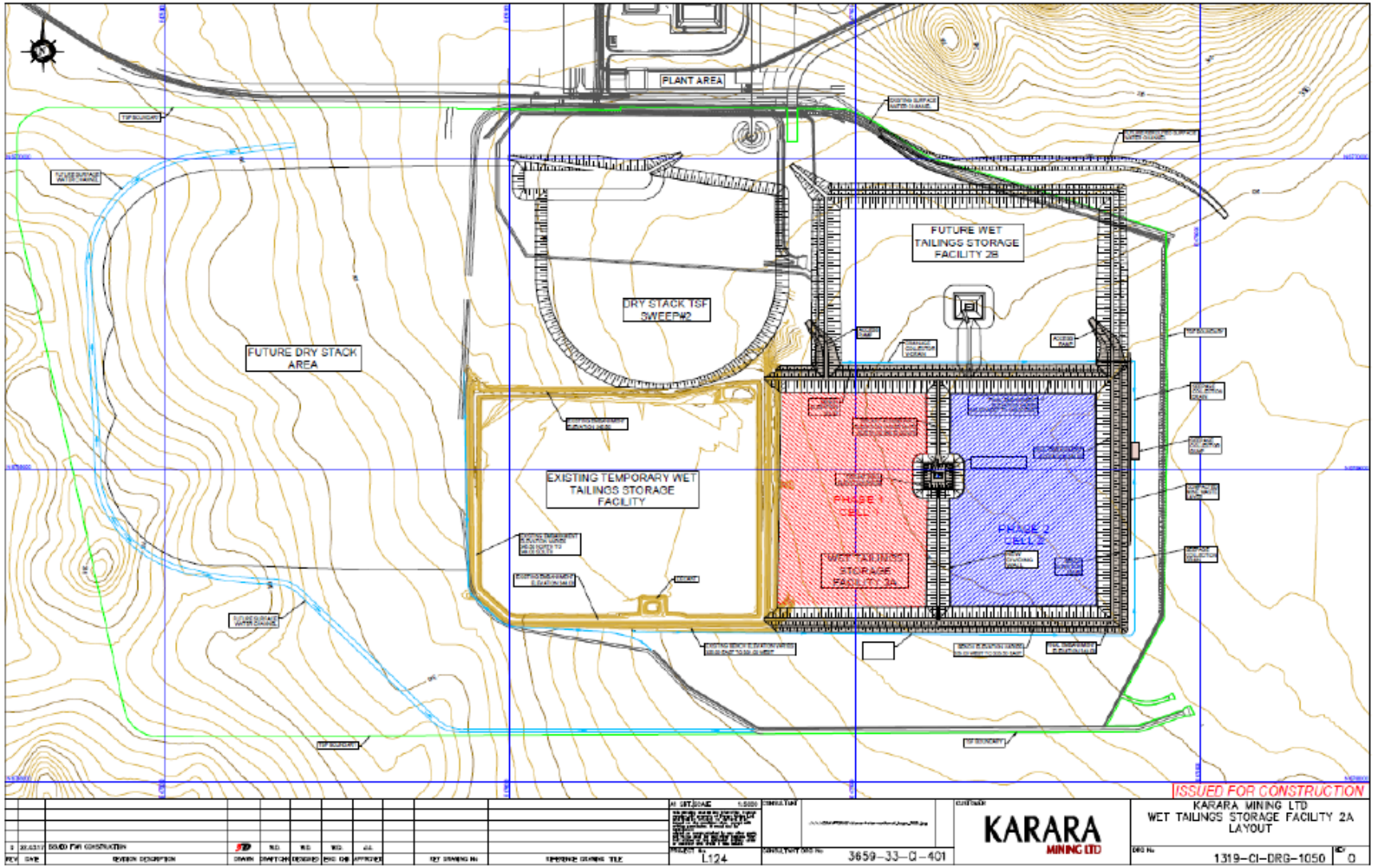
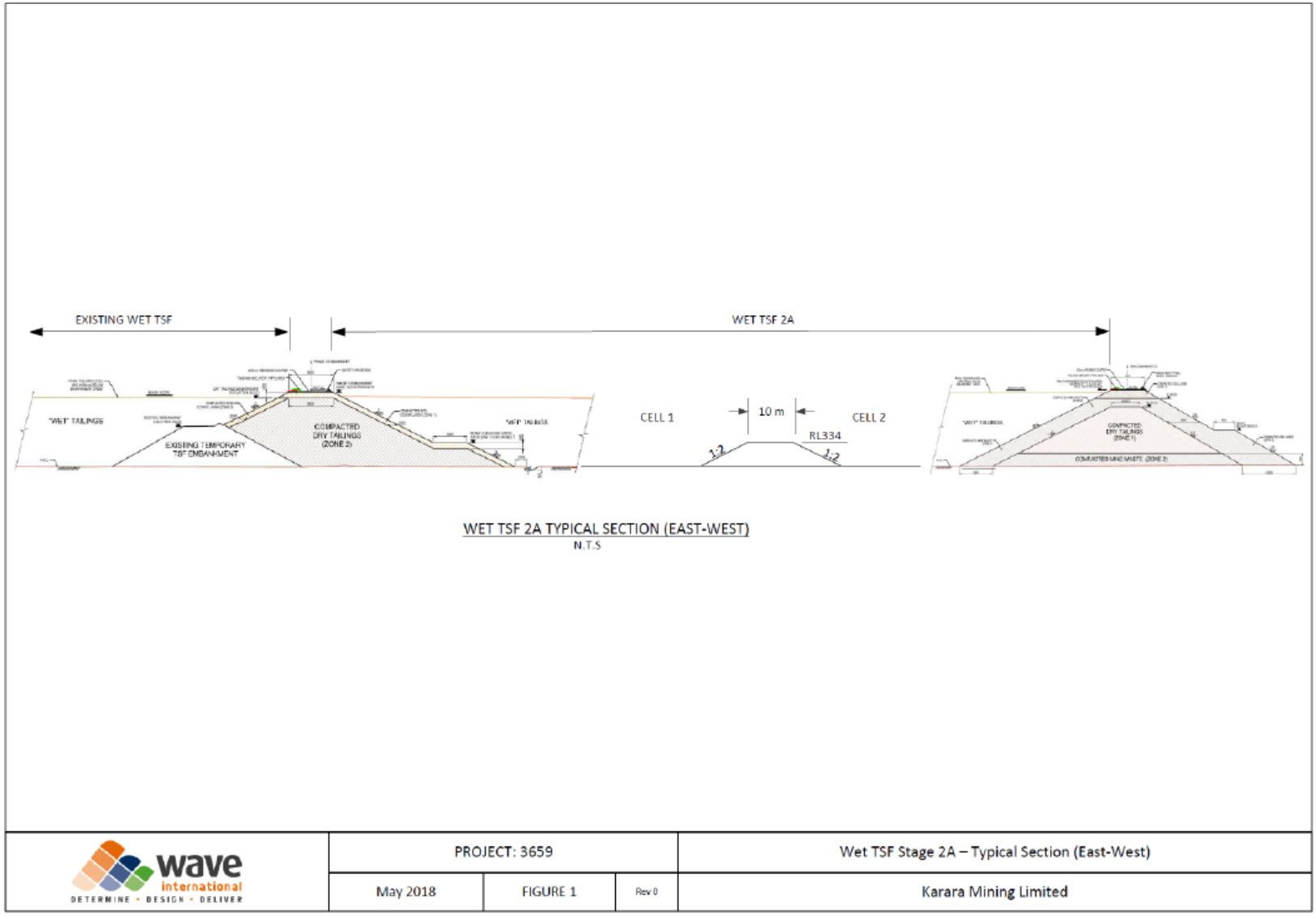


Figure 3: TSF 2A – typical section showing the location of the internal embankment



Other approvals

Table 2 outlines other approvals relevant to this assessment.

Table 2: Relevant approvals

Legislation	Number	Approval summary relevant to this assessment
EP Act	MS 805	Approved 8 September 2009. Condition 6-5 requires the proponent to monitor impacts from mining and mining related activities due to: 1. dust; 2. saline water application for dust; 3. fire; and 4. feral species on the Blue Hills vegetation complex Priority Ecological Community (**PEC**) . Condition 6-6 requires proponent to immediately provide and implement a proposed management measures when outcome of minimizing disturbance or loss of the PEC. Attachment 4 replaced Attachment 3, 13 December 2017. Changes were made for "Inclusion of wet tailings cells within the final tailings storage facility landform, being a single dry stack tailings storage facility." Changes were incorporated into Table 2: Location and authorised extent of physical and operational elements of Attachment 4.
Environmental Protection and Biodiversity Conservation Act 1999	EPBC Approval Reference Number 2006/3017	Approved 29 October 2009
Rights in Water and Irrigation Act 1914 **(RIWI Act)**	GWL 158673	7 January 2011 Licence to abstract groundwater
Mining Act 1978	Reg. Id 24232	Approved 2 November 2009 Karara Iron Ore Project, Mining Proposal Years 1 to 6.
	Reg. Id 47541	Approved 19 June 2014 Interim Wet TSF Mining Proposal
	Reg. ID 56329.	Approved 22 October 2015 Mining Proposal – Wet tails expansion
	Reg. Id 70406	TSF Expansion Stage 2A Mining Proposal Received by Department of Mines, Industry Regulation and Safety (DMIRS)on 25/10/2017 – Approved 21 December 2017
	REG ID 75342	Amendment to Mining Proposal for Cell 1 approved 1 August 2018

Amendment history

Table 3 provides the instrument log of the licences and works approvals related to L8721/2013/1 that have been issued since 10/12/2009.

Table 3: Instrument log

Instrument	Issued	Amendment
W4596/2009/1	10/12/2009	Works Approval - Karara Landfill Facility
W4615/2009/1	12/02/2010	Works Approval - Karara Minesite Beneficiation Plant
W4620/2009/1	05/03/2010	Works Approval – Waste Water Treatment Plant
L8486/2010/1	09/12/2010	Licence – Waste Water Treatment Plant
L8721/2013/1	16/05/2013	Licence - Karara Minesite Beneficiation Plant
L8721/2013/1	26/09/2013	Amendment Licence - Karara Minesite Beneficiation Plant
W5545/2013/1	20/01/2014	Works Approval – wet tailings TSF1
W5664/2014/1	11/07/2014	Works Approval – wet tailings TSF2 (Stage 1 and Stage 2) Note: Karara has advised this TSF infrastructure will not be constructed.
L8721/2013/1	11/11/2015	Amendment to include wet TSF1 and amalgamate L8486/2010/1 (WWTP) and include the Landfill.
W5545/2013/1	17/12/2015	Amendment for raise and extension of wet TSF1.
L8721/2013/1	29/04/2017	Notice of Amendment to extend licence expiry date to 19 May 2021
L8721/2013/1	30/06/2017	Amendment Notice #1 to include Phase 1 (raise) of TSF1, change the premises boundary and increase category 5 production capacity.
L8721/2013/1	08/01/2018	Amendment Notice # 2 for the construction of TSF 2A
L8721/2013/1	This amendment	Amendment Notice # 3 for the construction of dividing wall within TSF 2A to create Cell 1 and Cell 2.

Location and receptors

The Karara Minesite is located about 230 kilometres (km) east of Geraldton. The closest sensitive human receptor is Karara Homestead about 7 km southwest of the TSF.

Table 4 below lists the sensitive land uses in the vicinity of the Prescribed Premises which may be receptors relevant to the proposed amendment.

Table 4: Environmental receptors and distance from activity boundary

Environmental receptors	Distance from Prescribed Premises
Priority Ecological Community (Blue Hills vegetation complex).	Occurs on ridges. Found on the premises and in the local vicinity (Figure 4 below for buffered locations).
One DRF, 20 Priority Flora and four other taxa of conservation significance.	Occurs on the premises and in the local vicinity (Figure 5 below for buffered locations).
Three invertebrate and 15 vertebrate species of conservation significance.	Recorded during a fauna survey of the mine site, or are very likely to be present.
Flora and fauna	Close vicinity to TSF2 Infrastructure as shown in Figure 6

Department of Biodiversity, Conservation and Attractions (DBCA) managed land	The Premises is located entirely within the DBCA managed land.
RIWI Act proclaimed Area - Gascoyne Groundwater Area – Mullewa/Byro Sub Area.	The Premises is located within the Gascoyne Groundwater Area.
Inland water body (~ 86 ha)	700 m north east of the TSF area.
Minor unconnected non perennial watercourses	On the premises and local vicinity.

Topography and drainage

The land at TSF 2A slopes west to east, with a 5 m difference in height between the western and eastern boundaries (Wave, 2017).

Meteorology

The Karara area has a semi-arid climate with hot dry summers and cool, moderately wet winters.

Australian Bureau of Meteorology summary statistics from rainfall records (1928 – 2017) at Karara Station No. 010195 are listed below.

Summary statistics for all years Information about climate statistics

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	21.2	23.6	26.5	21.5	35.9	42.0	41.9	38.7	21.3	10.0	12.8	12.8	312.0
Lowest	0.0	0.0	0.0	0.0	1.2	0.5	2.0	9.0	1.0	0.0	0.0	0.0	150.1
5th %ile	0.0	0.0	0.3	0.2	2.6	5.8	9.2	11.8	4.2	0.5	0.1	0.0	190.8
10th %ile	0.0	0.0	0.7	0.8	4.7	13.1	15.0	14.9	6.5	1.3	1.4	0.0	208.7
Median	9.9	9.2	17.1	13.9	29.5	35.6	40.6	33.3	18.2	7.5	9.6	6.8	300.2
90th %ile	57.0	69.9	70.8	54.1	80.9	83.3	71.9	68.8	35.6	18.3	30.1	36.8	414.7
95th %ile	76.2	88.0	81.3	58.2	98.4	101.4	76.2	83.6	43.1	33.2	38.2	43.7	464.9
Highest	109.6	120.6	144.4	68.8	149.4	129.1	119.6	128.4	77.0	51.0	45.4	49.5	495.8

The average evaporation rate expected at the premises based on observations at nearby Morawa and Meekatharra weather stations, indicates that evaporation exceeds average rainfall in every month of the year.

Figure 4: Priority Ecological Community (buffered)

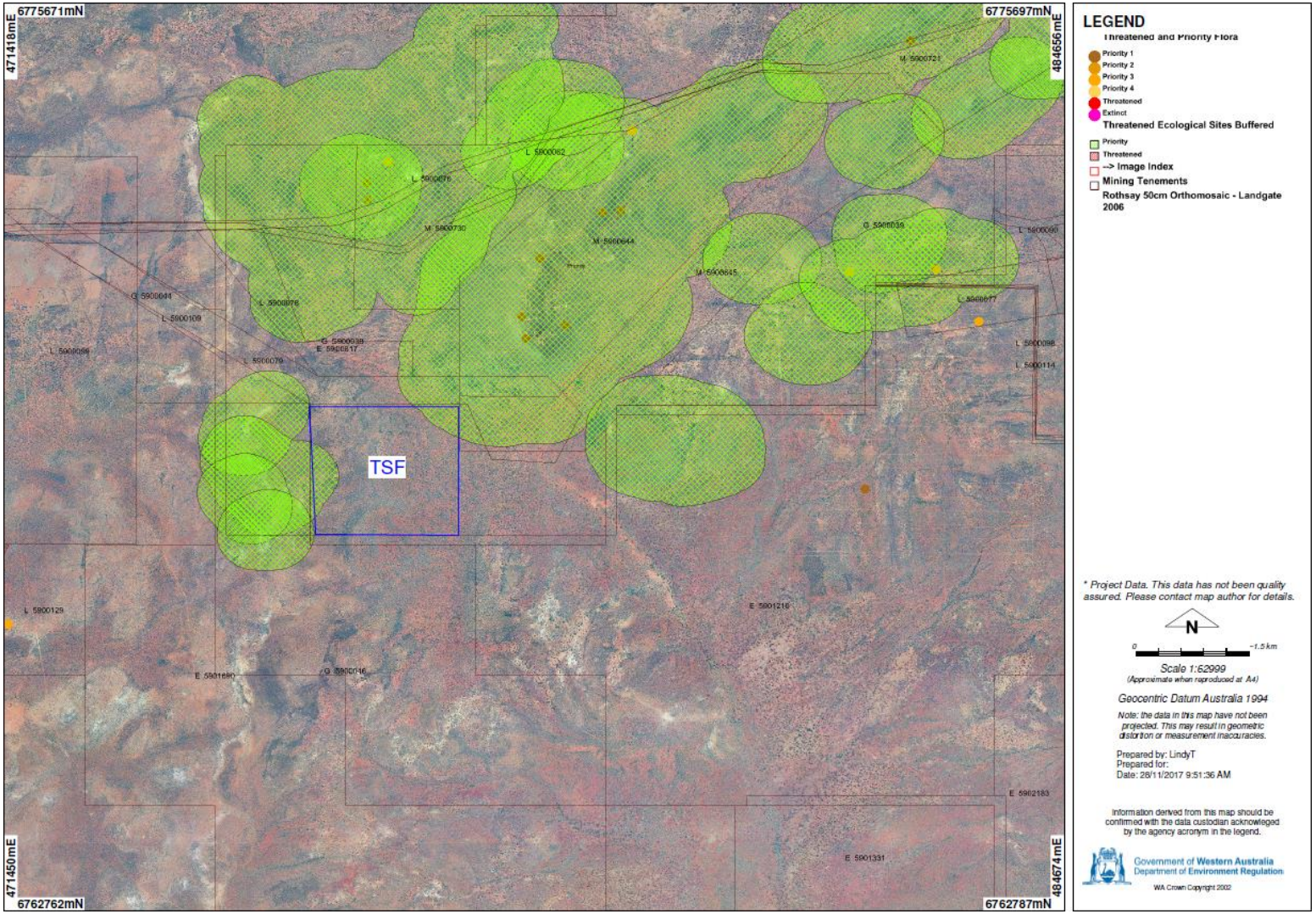


Figure 5: Priority flora (buffered)

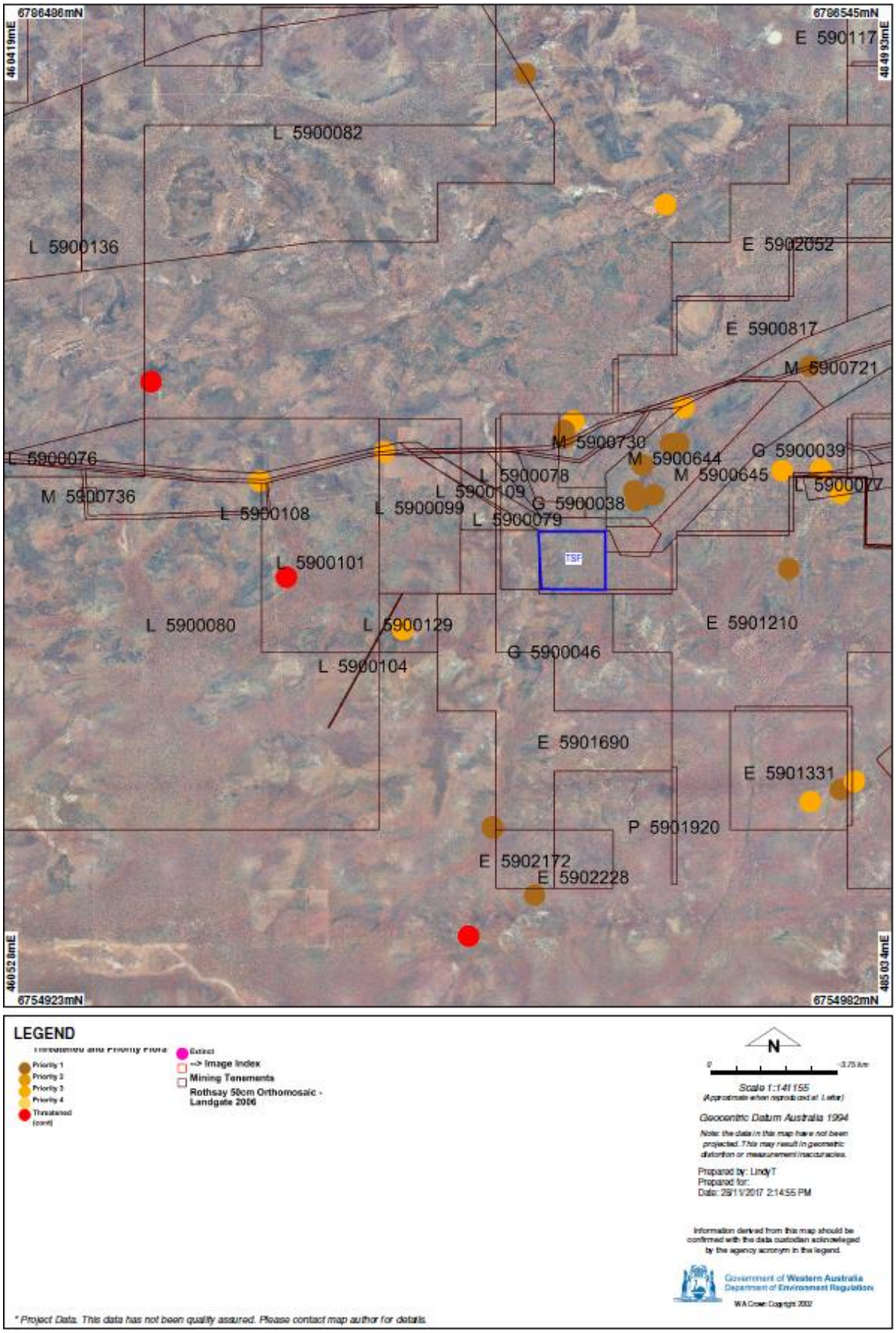
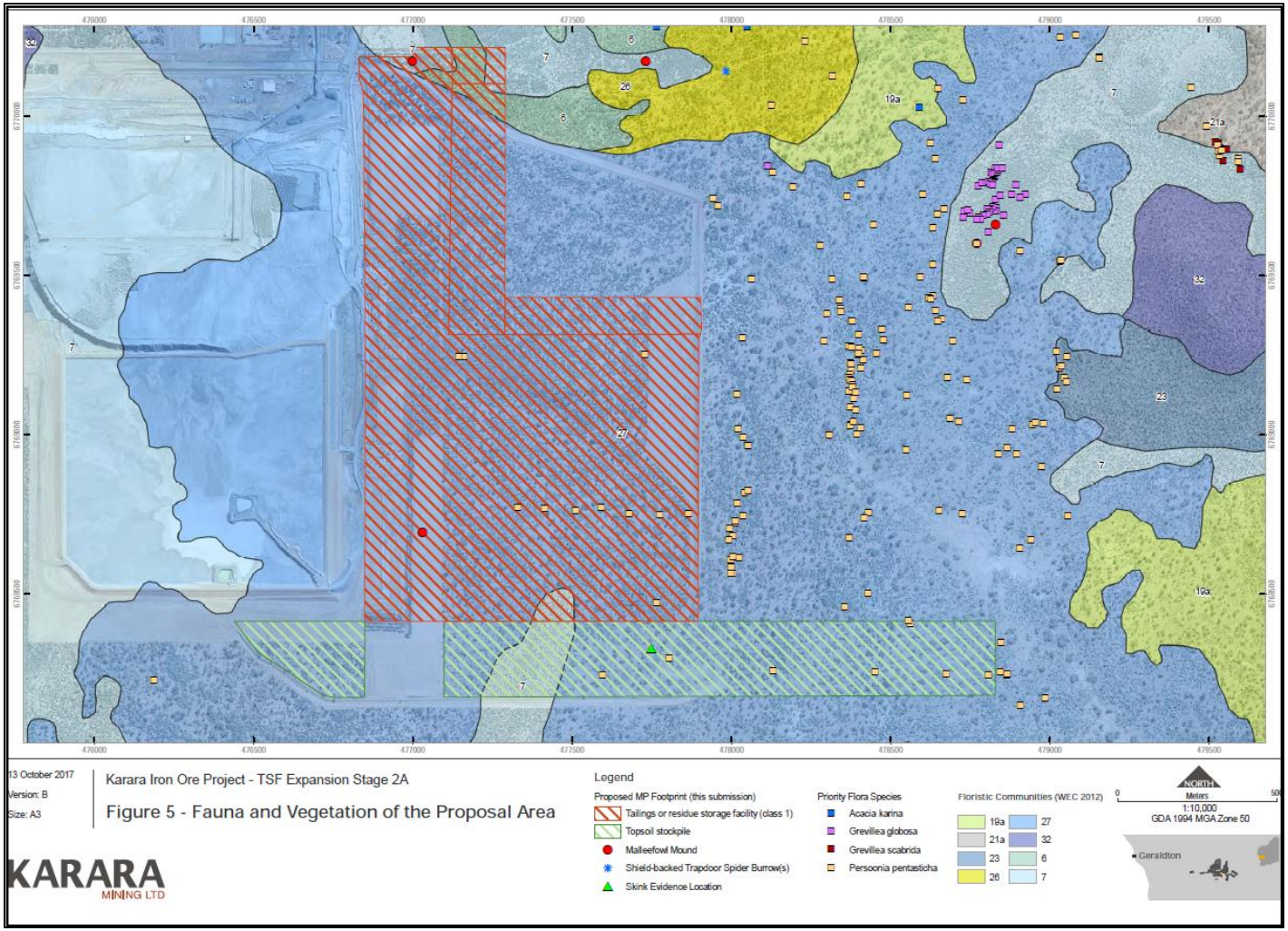


Figure 6: Fauna and vegetation in the immediate location of TSF 2 A and 2B



Risk assessment

The following risk events were assessed through Amendment Notice 2 for construction and operation of TSF 2A, and remain applicable to proposed TSF 2A Phase 1 and have not been reassessed for this amendment:

- Construction risk events
- Tailings leachate seepage through the base of the TSF 2A (Cell1 and Cell2)
- Tailings and return line spillage from pipeline failure.
- Dust associated with drying of tailings surface.

Risk of embankment failure has not been assessed because structural stability of TSF 2A embankments and the internal embankment is assessed, regulated and managed under the *Mining Act 1978,* which is administered by DMIRS.

Table 5 below describe the Risk Events associated with the amendment consistent with the *Guidance Statement: Risk Assessments*. The table identifies whether the emissions present a material risk to public health or the environment, requiring regulatory controls.

Table 5: Risk assessment for proposed amendments during operation

Risk Event						Consequence rating	Likelihood rating	Risk	Reasoning and Delegated Officer's decision
Source/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**				
Cat 5 Processing or beneficiation of metallic or non-metallic ore	Deposition of tailings into Cell 1 and Cell 2.	Tailings leachate lateral seepage	Vegetation of conservation significance including DRF and priority flora and a PEC	Lateral flow via the embankments including the internal embankment	Adverse impacts to the health and survival of a PEC, priority flora and other native vegetation (impact area limited to the seepage flow path).	**Moderate** Mid-level on site impacts	**Unlikely** The risk event will probably not occur in most circumstances, given the Applicant's controls. • Seepage controls proposed for the original design remain in place – drainage layers to toe drains through the southern and one third of the eastern embankment with drainage reporting to a seepage collection sump. • The internal embankment will be constructed	**Medium**	A PEC and priority flora and other native vegetation is located in the vicinity of the TEC, (Figures 4, 5 and 6). The PEC is located on ridges. The impact from seepage would be restricted to the area of seepage and seepage flow path initially around Cell 1 then with deposition into Cell 2 of TSF 2A. Topography at the TSF 2A site slopes down west to east. <u>Applicant controls</u> The total fill volume of Cell 1 is calculated to reach approximately 20% by the time Phase 2 is constructed (Karara expects construction of TSF 2 A to be completed by March 2019). Construction of all four TSF 2A embankments and decant access wall has progressed in accordance with TSF 2A design (constructed from compacted dry tailings (core permeability 3 x10-8m/s) and will be completed for Phase 1 as below. • A key trench has been constructed along the TSF 2A southern embankment footprint to allow seepage to be directed to the Seepage Collection Sump in

							from Colluvium materials (core is permeability 3 x10^{-8}m/s). • Spigots for subaerial deposition of tailings will be located at up to 70 m centres to disperse surface area of tailings for evaporation and in accordance with design for TSF 2A. • Tailings will be distributed from North, West and South embankments of Cell 1, initially, then with operation of Cell 2, from all four embankments.		accordance with design of TSF 2A for Phase 1 construction. • The northern section of TSF 2A has been constructed to function as a drainage layer for seepage collection by a toe drain reporting to the Seepage Collection Sump and will be progressed in accordance with design for TSF 2A for Phase 1. • Seepage through the internal embankment to Cell 2 will be contained by partially erected TSF 2A east embankment walls and key trench to direct seepage to the Seepage Collection Sump. • Construction of the eastern, southern and northern embankments of Cell 2 are already advanced and will contain seepage through the dividing wall. • Seepage from Cell 2 will be collected by the Seepage Collection Sump and in accordance to design of TSF 2A. . • The Dividing Wall will be constructed from Colluvium materials (core is permeability 3 x10-8m/s). • A decant water compartment, constructed of permeable rock fill decant walls, constructed in accordance with TSF 2A, will form part of the east wall of Cell 1 (to be confirmed by construction compliance documents). The Applicant's controls for TSF

									2A (Phase 1 and Phase 2) have contributed to lowering the risk and the Delegated Officer has therefore determined that these controls will be conditioned in the licence.
		Tailings	Vegetation of conservation significance including priority flora and a PEC.	TSF 2A Cell 1 overtopping due to overfilling or storm event.	Adverse impacts to the health and survival vegetation of conservation significance and a PEC in the path of the flow.	**Moderate** Mid-level on site impacts	**Unlikely** The risk event will probably not occur in most circumstances, given the Applicant's controls	**Medium**	A PEC and priority flora and other native vegetation is located in the vicinity of the TSF, (Figures 4, 5 and 6). The PEC occurs on ridges. Applicant's controls for TSF 2A Cell 1 remain the same as for TSF 2A and include: • Sized to contain a 1:100 year, 72 hour ARI rainfall event and 500 mm total freeboard - for planned storage amounts. • Minimum total freeboard of 500 mm maintained at the internal embankment Conditions for freeboard on the existing licence will apply at the internal embankment until Cell 2 is completed (i.e. 500 mm freeboard at the internal embankment)
	Operation of the TSF	Contaminated stormwater during heavy rainfall events	Vegetation of conservation significance including priority flora and a PEC	Land - flow path	Adverse impacts to the health and survival of vegetation of conservation significance and a PEC.	**Moderate** Mid-level on site impacts (infrequent and short term event)	**Unlikely** The risk event will probably not occur in most circumstances given the applicant's controls.	**Medium**	A PEC, priority flora and other native vegetation is located in the vicinity of the TSF, (Figures 4, 5 and 6). The PEC occurs on ridges. Topography at the TSF 2A site slopes down west to east. <u>Applicant's controls</u> Stormwater management controls have not changed and will be constructed during Phase 1 in accordance with infrastructure assessed for TSF 2A.

									• Stormwater runoff from the TSF landform will be directed by surface drains located at embankment perimeters to a Drainage Pond or Seepage Collection Sump sized to accommodate a 1 in 100 year 72 hour storm event. • The Drainage Pond area is north of TSF 2A is bounded by earthen bunds 4 m high. • A 1 m high berm will be constructed at the Retention Pond to retain stormwater and protect TSF 2A embankments. • Stormwater from northern and Southern external embankment walls will be directed to the Seepage Collection Sump. • The Applicant's controls have contributed to lowering the risk and the delegated Officer has therefore determined that these controls will be conditioned in the licence.

Decision

TSF 2A Phase 1 and TSF 2A Phase 2

The changed risks associated with staged operation of TSF 2A with the internal embankment in place are: embankment seepage during initial operation of Cell 1; overflow of Cell 1 or Cell 2. These risks are assessed as detailed in Table 5.

Applicant controls to manage the risks associated with operation of Cell 1 are conditioned for TSF 2A Phase 1 with requirements for construction, commissioning and operation.

Applicant controls to manage risk of operation of whole of TSF 2A (Cell 1 and Cell 2) are conditioned as Applicant's controls for TSF 2A Phase 2 of construction, with requirement for construction compliance reporting, prior to operation of Cell 2.

Groundwater monitoring

Condition 1.3.7 for monitoring bores will remain on the licence as construction of monitoring bore MB4 has not been completed. Groundwater monitoring conditions are added to the Licence to ensure monitoring commences with operation of Cell 1.

Leaf test results have been submitted and condition 1.3.8 is therefore removed.

Licence Holder's comments

The Licence Holder was provided with the draft Amendment Notice on 2 August 2018. Comments received from the Licence Holder have been considered by the Delegated Officer as shown in Appendix 2.

Amendment

1. Definitions of the Licence is amended by the deletion of the text shown in strikethrough below and the insertion of the bold italic underline text shown in underline below:

2.

'CEO' for the purposes of notification means:
Director General
Department Administering the *Environmental Protection Act 1986*
Locked Bag 33 Cloisters Square
PERTH WA 6850
~~info-der@dwer.wa.gov.au~~ ***info@dwer.wa.gov.au***

'Internal Embankment' means Dividing Wall

'Total Freeboard' means the Operational Freeboard + Beach Freeboard = 500mm with a subminimum of 300mm Operational Freeboard.

3. Condition 1.3.7 of the Licence is amended by the deletion of the text shown in strikethrough below and the insertion of the bold italic underline text shown in underline below:

1.3.7 The Licensee shall ensure that the requirements as detailed in Table 1.3.6 are met during the construction of TSF2A.

Table 1.3.6: Construction requirements		
~~**Location**~~ ***Infrastructure***	**Requirements**	**Location *maps* ~~and~~ construction details references**
~~TSF 2A~~	~~Sized to contain a 1:100 year ARI, 72 hour rainfall event for net operational storage capacity of 12 million m^3.~~ ~~Top of the embankment elevations will vary from RL 344.0 to RL 345.25 m AHD.~~ ~~Core of embankments constructed with material with hydraulic conductivity of 1.0 x 10^{-8} m/s or less.~~ ~~A key trench constructed along the southern embankment and one third section of the eastern embankment footprints to allow seepage to be directed to the Seepage Collection Sump.~~ ~~The northern section and the other two thirds of the eastern section embankment footprints, constructed to function as a drainage layer for seepage collection by a toe drain reporting to the Seepage Collection Sump.~~ ~~Constructed so that seepage will drain to a Seepage Collection Sump.~~ ~~Four piezometers installed in each embankment wall.~~ ~~Tailings delivery pipelines constructed of 250 mm diameter HDPE and Victaulic jointed steel lines.~~ ~~Tailings return pipelines constructed of 250 mm diameter HDPE.~~ ~~Tailings delivery and return water pipelines and pumps bunded by earthen trenches.~~ ~~A floating pontoon mounted pump constructed near the centre of the TSF and so that decant water is able to be pumped to the process plant via return pipeline.~~ ~~Spigots, for subaerial deposition of tailings, located on perimeter of embankments at up to 70 m centres.~~	~~Schedule 1: Map 6: TSF 2A layout, and Map 7: TSF draining and Drainage and Seepage Collection Sump~~
Seepage Collection Sump	Constructed so that water collected in the Seepage Collection Sump may be returned to the process plant or an operational wet TSF or reused as dust suppression. Constructed to accommodate a 1 in 100 year, 72 hour ARI rainfall event.	~~Schedule 1: Map 6: TSF 2A layout;~~ ***Schedule 1: Map 6: Map 6: Layout of TSF 2A (Cell 1 and Cell 2)*** Map 7: Seepage Collection Sump
~~Stormwater Drainage~~	~~Constructed so that surface water runoff from the TSF dry stack is collected by surface drains at TSF perimeter embankments and reports to the Drainage Retention Area.~~ ~~Constructed so that surface water runoff from wet cells TSF 1 and TSF 2A is collected by surface drains at TSF perimeter embankments and reports to the Seepage Collection Sump.~~ ~~Constructed to accommodate at least a 1 in 100 year, 72 hour ARI rainfall event.~~ ~~Retention pond wall approximately 4 m high.~~	~~Schedule 1: Map 8 TSF drainage and seepage plan~~

	~~Drainage Retention Area constructed with a 1 m high bund to contain flow of water north of TSF 2A.~~	
TSF 2A (Cell 1 and Cell 2) ***TSF 2A Phase 1***	***Construction of all embankments pertaining to Cell 1 and partial construction of all embankments pertaining to Cell 2 completed*** ***Construction of embankments of Cell 2 progressed to enable seepage from Cell 1 collected into Cell 2 to be able to be directed to a seepage collection sump.*** ***Core of all TSF 2A embankments constructed with material with hydraulic conductivity of 1.0 x 10^{-8} m/s or less.*** ***A key trench constructed along the southern embankment of TSF 2A and one third section of the eastern embankment of TSF 2A footprints to allow seepage to be directed to the Seepage Collection Sump.*** ***The northern section of TSF 2A and the other two thirds of the eastern section of TSF 2A embankment footprints, constructed to function as a drainage layer for seepage collection by a toe drain reporting to the Seepage Collection Sump.*** ***Constructed so that seepage will drain to a Seepage Collection Sump.*** ***Tailings delivery pipelines constructed of 250 mm diameter HDPE and Victaulic jointed steel lines.*** ***Tailings return pipelines constructed of 250 mm diameter HDPE.*** ***Tailings delivery and return water pipelines and pumps bunded by earthen trenches.*** ***A decant tower and pump constructed near the centre of TSF 2A and so that decant water is able to be pumped to the process plant via return pipeline.*** ***Spigots, for subaerial deposition of tailings, located on perimeter of western, northern and southern embankments of Cell 1 at up to 70 m centres.*** ***Internal Embankment*** ***An internal embankment constructed between decant and Southern Embankment of TSF 2A to form Cell 1 and Cell 2. Located as shown in Schedule 1: Map 6*** ***Embankment approximately 340 m in length, from the central decant tower to the middle of the southern embankment of TSF 2A.*** ***Constructed to a height 10 metres above ground level.*** ***Dividing wall batter angles of 2H: 1V.***	***TSF 2A embankments - As described and drawn in KML Mine Site Wet Tailings Storage Facility 2A and 2B Design Report, Wave International, 3/04/2017.*** ***Schedule 1: Map 6: TSF 2A (Cell 1 and Cell 2) layout.*** ***Schedule 1: Map 8: TSF 2A stormwater infrastructure***

	Dividing wall constructed to hydraulic conductivity of 1.0 x 10^{-8} m/s or less.	
TSF2 A (Cell 1 and Cell 2) ***TSF 2A Phase 2***	***Construction of completion of Cell 2 and whole of TSF 2A.*** ***TSF 2A sized to contain a 1:100 year ARI, 72 hour rainfall event for net operational storage capacity of TSF 2A of 12 million m^3.*** ***Core of all embankments constructed with material with hydraulic conductivity of 1.0 x 10-8 m/s or less.*** ***Top of the TSF 2A embankment elevations will vary from RL 344.0 to RL 345.25 m AHD.*** ***Spigots, for subaerial deposition of tailings, located on perimeter of TSF 2A west, north, south and east embankments at up to 70 m centres.*** ***Four piezometers installed in each TSF 2A embankment wall.*** ***Constructed so that seepage from TSF 2A (both Cell 1 and Cell 2) will drain to a Seepage Collection Sump.*** ***Constructed so that water collected in the Seepage Collection Sump may be returned to the process plant or an operational wet TSF or reused as dust suppression.***	***TSF 2A embankments - As described and drawn in KML Mine Site Wet Tailings Storage Facility 2A and 2B Design Report, Wave International, 3/04/2017.*** ***Schedule 1: Map 6: TSF 2A (Cell 1 and Cell 2) layout.*** ***Schedule 1: Map 8: TSF 2A stormwater infrastructure***
TSF (dry stack and wet cells) groundwater monitoring bores	At least two bores located to the east of the TSF (one bore in the natural surface drainage channel and the other within 50 m of the TSF) and two bores to the south of the TSF, to enable seepage from the TSF to be detected and monitored (indicative locations as shown in Map 6. Bore locations to be determined by use of existing geological and geophysical data or electromagnetic geophysical survey to ensure that the bores are located on structural features that are likely to be significant seepage pathways from the TSF. Final siting of monitoring wells determined under advice by an experienced hydrogeologist. Well installation and construction (including preparation of well construction logs) in accordance with the National Environmental Protection (Assessment of Site Contamination) Measure 1999 – Schedule B, Section 8.2. To be installed with three metre long screens placed across the top of the groundwater table. To be surveyed to allow the top of the bore casing and ground level to (Australian Height Datum) at each location to be accurately determined.	~~Schedule 1: Map 8: TSF drainage and seepage plan and indicative monitoring locations~~ ***Schedule 1: Map 9: Groundwater monitoring bore locations***

4. The Licence is amended by the deletion of the following Condition 1.3.8 as shown in strikethrough below:

~~1.3.8 The Licensee shall conduct a US EPA LEAF (leaching etc.) test 1313 on tailings sample(s) and submit the results to the CEO within one month of the date of this amendment.~~

5. Condition 3.1.1 of the Licence is amended by the insertion of the bold italic text shown in underline below:

3.1.1 The Licensee shall ensure that:

(a) all water samples are collected and preserved in accordance with AS/NZS 5667.1;
(b) all wastewater sampling is conducted in accordance with AS/NZS 5667.10;
(c) ***all groundwater sampling is conducted in accordance with AS/NZS 5667.11;*** and
(d) all laboratory samples are submitted to and tested by a laboratory with current NATA accreditation for the parameters being measured unless indicated otherwise in the relevant table.

6. The Licence is amended by the insertion of the following condition 3.4.1 for ambient groundwater monitoring:

Ambient environmental quality monitoring

3.4.1 The Licensee shall undertake the monitoring in Table 3.4.1 according to the specifications in that table.

Table 3.4.1 Monitoring of ambient groundwater quality				
Monitoring point reference and location	***Parameter***	***Units***	***Averaging period***	***Frequency***
TSF-MB1-2018 (MB1) ***TSF-MB2-2018 (MB2)*** ***TSF-MB3-2018 (MB3)*** ***TSF-MB4-2018 (MB4)[2]*** ***Located on Schedule 1: Map 9***	***pH[1]***	***-***	***Spot sample***	***Monthly***
	Electrical conductivity[1]	***µS/cm***		
	Standing water level[1]	***mbgl***		
	Total Dissolved Solids[1]	***mg/L***		
	pH	***-***	***Spot sample***	***Six monthly***
	Electrical Conductivity (EC)	***µS/cm***		
	Total Dissolved Solids, turbidity, Hydroxide OH- as CaCO3, Total Alkalinity, and Fluoride ***Perchlorate (ClO_4)$^-$*** ***Major ions*** ***Calcium, Magnesium, Sodium, Potassium, Chloride, Sulphate, Carbonate, Bicarbonate HCO3,*** ***Nutrients - Nitrate, Nitrite, Ammonia,*** ***Reactive Phosphorus, Total Phosphorus and Total Nitrogen*** ***Heavy metals (Dissolved and total)*** ***Arsenic, Aluminium, Beryllium, Boron, Cadmium, Cobalt, Chromium, Copper, Iron,*** ***Lead, Manganese, Mercury, Nickel, Selenium, Thallium, Vanadium, Zinc***			

Note 1: In-field non-NATA accredited analysis.
Note 2: Sampling and analysis of MB4 to commence immediately following installation.

7. Condition 4.2.1 of the Licence is amended by the deletion of the text shown in strikethrough below and the insertion of the bold italic text shown in underline below.

4.2.1 The Licensee shall submit to the CEO an Annual Environmental Report within 28 calendar days after the end of the annual period. The report shall contain the information listed in Table 4.2.1 in the format or form specified in that table.

Table 4.2.1: Annual Environmental Report		
Condition or table (if relevant)	**Parameter**	**Format or form[1]**
-	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
-	Comparison of the approved production and design capacities and actual production/throughputs for the Annual Period	
Table 3.2.1	Monitoring of emissions to land	
Table 3.3.1	Monitoring of inputs and outputs	
Table 3.4.1	***Groundwater monitoring***	***To include graphical and historical representation in addition to raw data***
4.1.3	Annual Audit Compliance Report (AACR)	~~None specified~~ ***Downloadable form at www.dwer.wa.gov.au***
4.1.4	Complaints summary	None specified
-	An assessment of monitoring results collected within the Annual period against previous monitoring results and any limits specified in this Licence.	

8. Condition 4.3.2 of the Licence is amended by the insertion of the bold italic text in underline and deletion of text in strike-through as shown below:

4.3.2 The Licensee shall submit compliance documents to the CEO within one month following construction of ***TSF 2A Phase 1 and separate construction documents for TSF 2A Phase 2 within one month of the completion of Phase 2,***

9. The Licence is amended by the insertion of the following conditions 4.3.3, 4.3.4, 4.3.5 4.3.6 and 4.3.7, as shown in bold italic text in underline below.

4.3.3 ***The Licensee must ensure that each set of construction compliance documents:***

(i) ***is certified by a suitably qualified professional engineer stating that each item of infrastructure specified in Table 1.3.6 has been constructed or completed in accordance with the conditions of the Licence;***

(ii) ***include the record of all construction quality control testing, the basis of any method specification adopted, and any significant modifications to the original design together with the reasons why the modifications were necessary;***

(iii) ***include copies of the as-built drawings for the embankment earthworks, decant and pipework; and***

(iv) ***be signed by a person authorised to represent the Licensee and contain the printed name and position of that person within the company.***

4.3.4 ***The Licensee may deposit tailings into TSF2A Cell 1 following submission of the construction compliance documents for Cell 1, required by Condition 4.3.2***

4.3.5 ***The Licensee may deposit tailings into TSF2A Cell 2 following submission of the construction compliance documents for Cell 2, required by Condition 4.3.2.***

4.3.6. The Licensee must maintain a Total Freeboard for TSF 2A Cell 1 of 500 mm as measured from the top of the internal embankment. Once Cell 2 is completed and the total perimeter embankments are constructed, freeboard is to be measured from the top of the perimeter embankments.

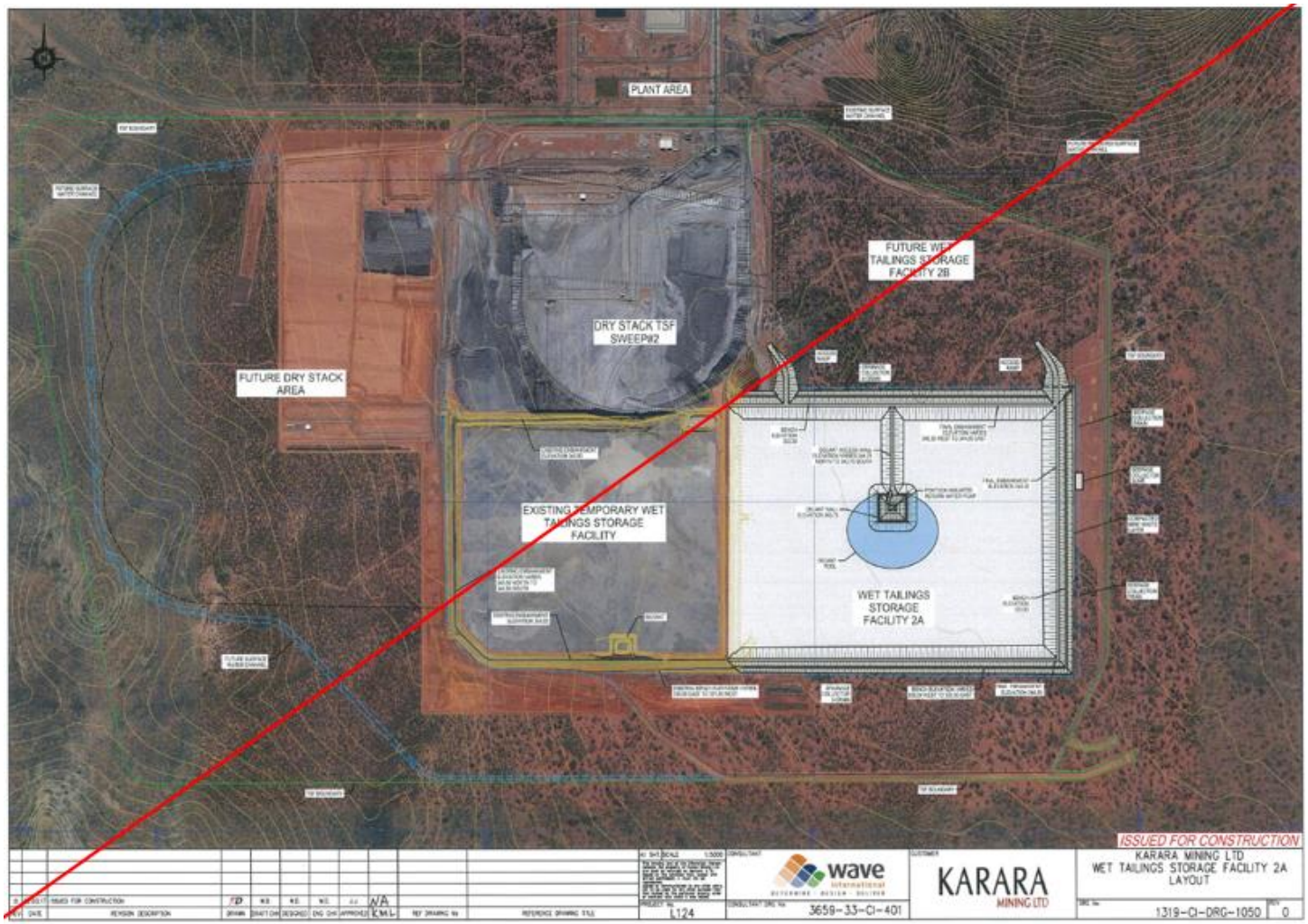
4.3.7 The Licensee must undertake daily, visual inspections of TSF 2A Cell 1 and TSF 2A Cell 2 storage embankments to confirm there are no unusual changes to embankments. A record must be kept of all inspections, to be made available on request of the CEO.

10. Schedule 1: Map 6 of the Licence is amended by the deletion of the map crossed by red line below and the insertion of the map titled Map 6 in red underline as denoted as Map 6 below.

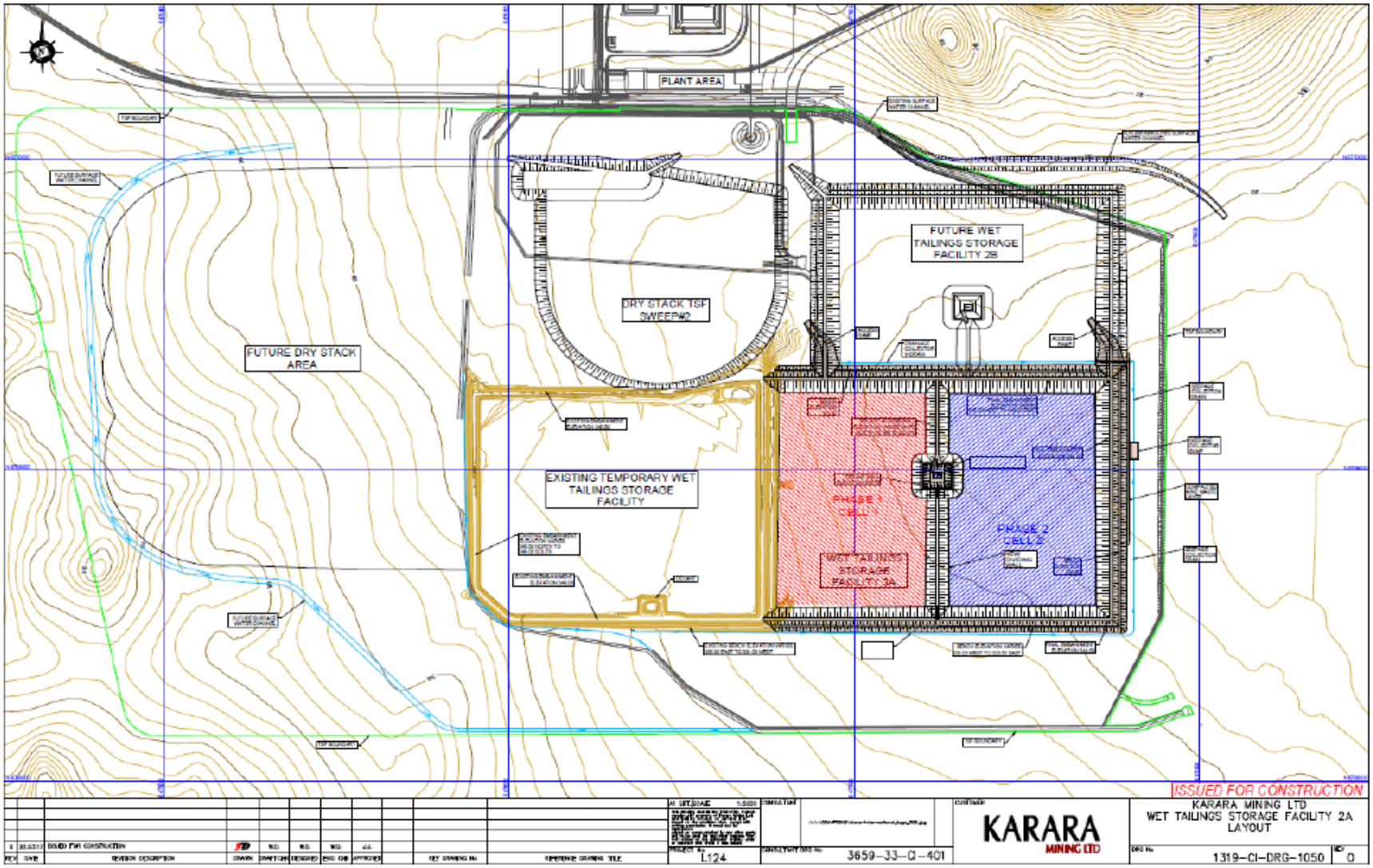
11. Schedule 1: Map 8 of the Licence is amended by the deletion of the map crossed by red line below and the insertion of the map titled Map 8 in red underline as denoted following.

12. The Schedule of the Licence is amended by the insertion of Map 9 titled ‘Groundwater monitoring bore locations’ as denoted in red underline following.

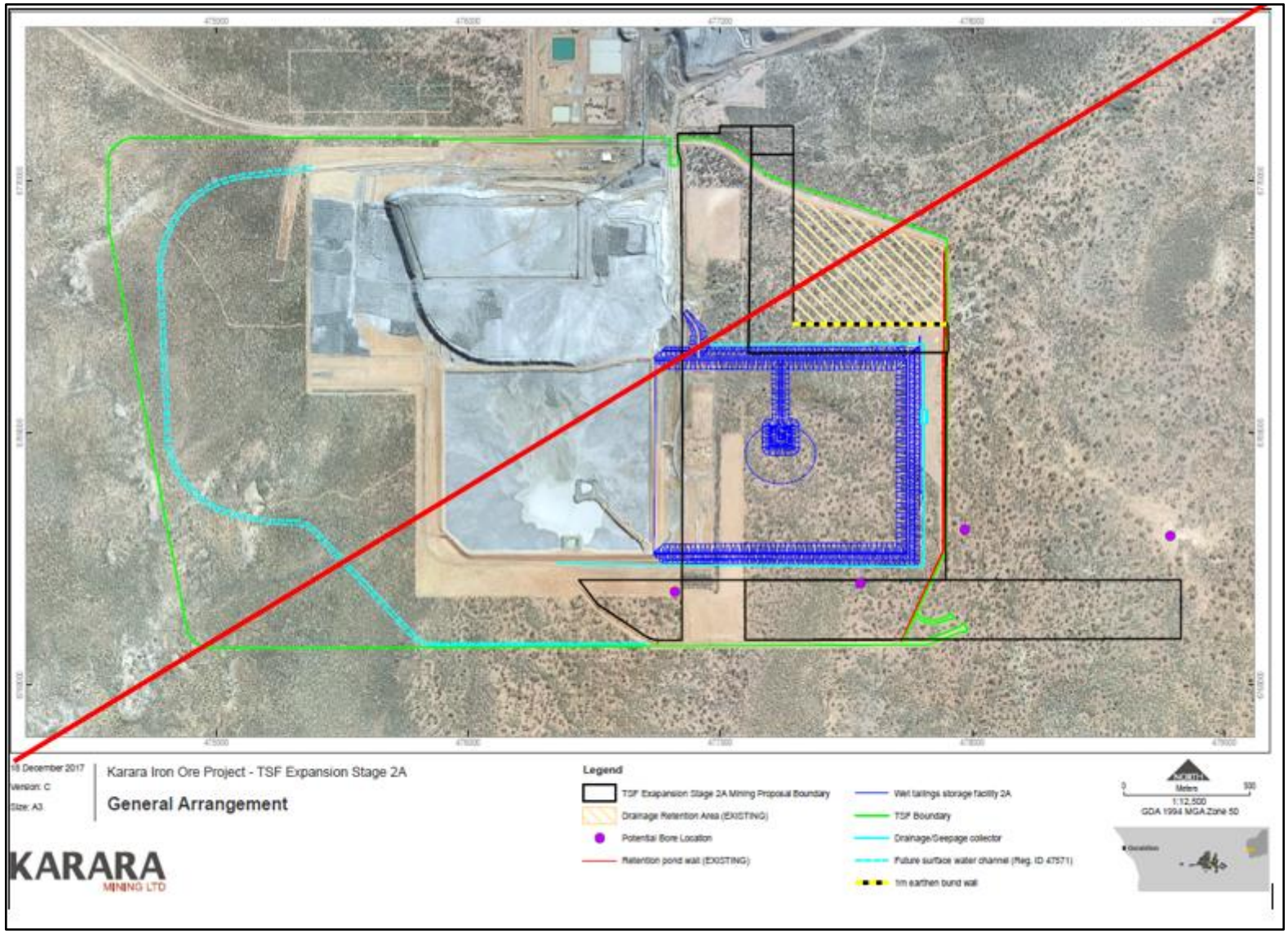
~~Map 6: TSF 2A layout~~



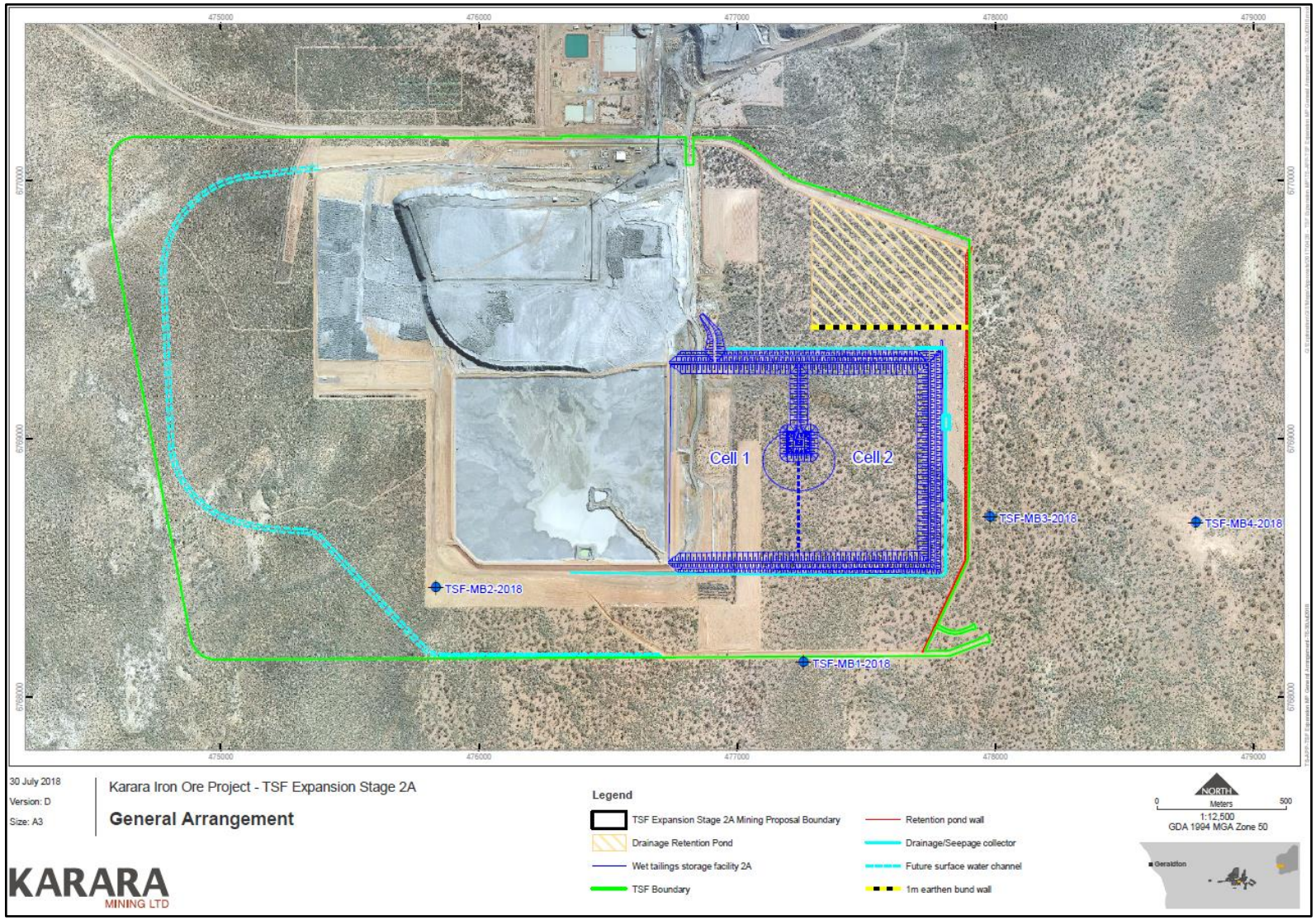
Map 6: Layout of TSF 2A (Cell 1 and Cell2)



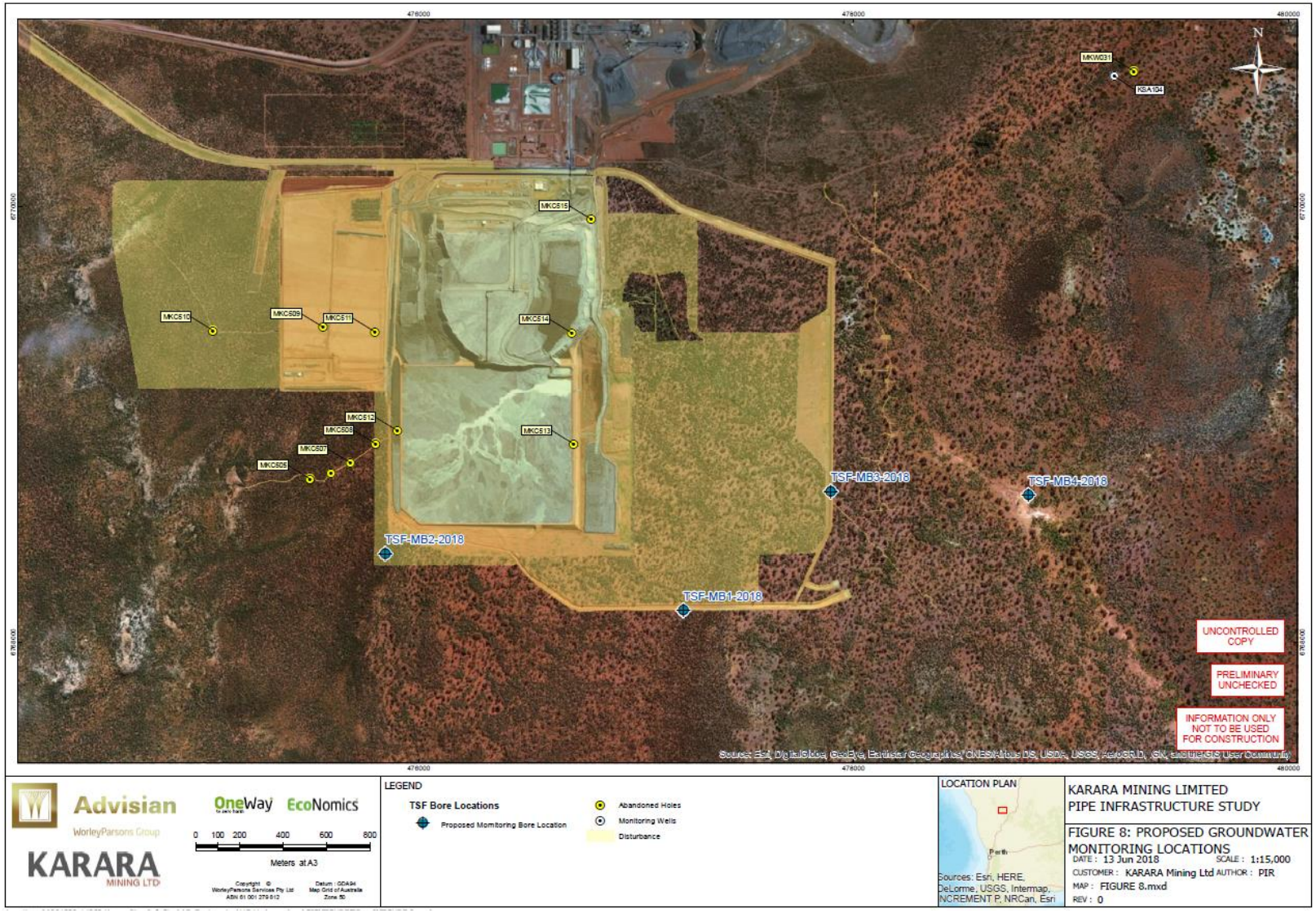
~~Map 8: TSF drainage and seepage plan and indicative monitoring locations~~



Map 8: TSF 2A stormwater infrastructure



Map 9: Groundwater monitoring bore locations



Appendix 1: Key documents

	Document title	In text ref	Availability
1	Application to amend licence L8721/2013/1, and attached documents including a groundwater monitoring plan, received by email 25 June 2018.	Application	DWER Records (A1705911)
2	Email: Subject: *FW: Karara Iron Ore Project - TSF Stage 2a Wet tails - Geotechnical Matters*, send by Peter Burton, Karara Mining Ltd, 26/07/2018: 3:31PM		DWER Records (A706189
3	Email: Subject: *SF2A Monitoring Bores - bore logs and baseline data*, send by Trevor Ennis-John, Karara Mining Ltd, 25/07/2018: 4:46PM	-	DWER Records (A1708545)
4	Advisian, 13 June 2018. *Karara Tailings Storage Facility – Groundwater Monitoring Plan.*	Advisian, June 2018	DWER Records (1705910)
5	Licence L8721/2013/1	L8721/2013/1	accessed at www.dwer.wa.gov.au
6	*Guidance Statement: Regulatory principles.* Department of Environment Regulation, July 2015.	Not applicable	accessed at www.dwer.wa.gov.au
7	*Guidance Statement: Setting conditions.* Department of Environment Regulation, October 2015.		
8	*Guidance Statement: Risk Assessments*. Department of Environment Regulation, February 2017.		
9	*Guidance Statement: Decision Making*. Department of Environment Regulation, February 2017.		
10	*Guidance Statement: Environmental Siting* Department of Environment Regulation, *November 2016.*		
11	*Mine Proposal Karara Iron Ore Project Tailings Storage Facility Expansion: Stage 2A Minor Amendments CORP-EN-REP-1128*, Karara Mining Limited, 25 July 2018	Mining Proposal	DWER Records (A1706186)
12	Wave International, 3 April 2017. *KML Mine Site Wet Tailings Storage Facility 2A and 2B Design Report*.	Wave, 2017	DWER Records (A1688266)
13	Wave International, 24 May 2018*. Re: Wet TSF 2A Construction - Design Review*	Wave, 2018	DWER Records (1705910)

Appendix 2: Summary of Licence Holder comments

The Licence Holder was provided with the draft Amendment Notice on 2 August 2018 for review and comment. The Licence Holder responded on 2 August 2018 waiving the remaining comment period. The following comments were received on the draft Amendment Notice.

Condition	Summary of Licence Holder comment	DWER response
N/A	Typographic errors noted in background information and risk assessment	Errors corrected
N/A	Reg. Id 70406 Amendment to Mine Approval received	Information included in Other Approvals section.