



Application for Licence Amendment

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

Licence Number	L8739/2013/1
Licence Holder	Cable Sands (WA) Pty Ltd
ACN	009 137 142
File Number	DER2014/000656-1
Premises	Wonnerup Mineral Sands Mine 109 Sues Rd YALYALUP WA 6280 Being Lot 100 on Deposited Plan 65306, Mining Lease M70/360 and M70/569 and part of Miscellaneous Licences L70/159 and L70/161, as depicted in Schedule 1 of the revised licence
Date of Report	05/03/2021
Decision	Revised licence granted

**A/MANAGER, RESOURCE INDUSTRIES
REGULATORY SERVICES**

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

Table of Contents

1. Decision summary	3
2. Scope of assessment	3
2.1 Regulatory framework	3
2.2 Application summary	3
2.2.1 Expansion of mining area – Wonnerup North Stage 2	3
2.2.2 Upgrade of discharge point W2	5
2.2.3 Additional changes	6
2.3 Other Approvals	7
2.3.1 Part IV of the EP Act	7
2.3.2 Part V, Division 2 of the EP Act	7
2.3.3 Environment Protection Biodiversity Conservation Act 1999 (Commonwealth)	7
3. Prevailing wind data	8
4. Risk assessment	8
4.1 Source-pathways and receptors	8
4.1.1 Emissions and controls	8
4.1.2 Receptors	10
4.2 Risk ratings	12
4.3 Detailed risk assessment for dust impact to residential receptors (both construction and mining)	16
4.4 Detailed risk assessment for noise amenity impact to residential receptors (construction and operation)	17
4.5 Detailed risk assessment for increased discharge of surplus water to the Abba River resulting in significant alteration of flow volumes or water quality	18
5. Consultation	23
6. Conclusion	23
6.1 Summary of amendments	23
References	24
Appendix 1: Summary of Licence Holder’s comments on risk assessment and draft conditions	25
Appendix 2: Application validation summary	26
Table 1: Proposed changes associated with the Wonnerup North Stage 2 expansion	4
Table 2: Additional changes requested by the Licence Holder	6
Table 3: Additional changes initiated by DWER	7
Table 4: Licence Holder controls	8
Table 5: Sensitive human and environmental receptors and distance from prescribed activity	

.....	10
Table 6. Risk assessment of potential emissions and discharges from the Premises during construction and operation	13
Table 7: Consultation	23
Table 8: Summary of licence amendments	23
Figure 1: Location of expansions for Wonnerup North Stage 2; Phases A (this amendment) and B (future proposed)	5
Figure 2: Upgrades to discharge point W2	5
Figure 3: Annual wind rose for Busselton Aerodrome (site no 009603), approximately 7km from Wonnerup at (A) 9am and (B) 3pm	8
Figure 4: Distance to residential receptors	11
Figure 5: Diagram showing the progressive construction of topsoil (external) and ore (internal) noise bunds	18
Figure 6: Proposed Upgrades to Discharge Point W2	19
Figure 7: Mean Daily flow rates at the North Western corner of M70/360	20
Figure 8: Predicted groundwater inflow rates over the life of Wonnerup North (Stages 1 and 2)	20
Figure 9: Condition 2.2.3 of the existing licence, which stipulates chemical parameters for emissions to surface water	21
Figure 10: Constriction of Abba River between flood bunds	22

1. Decision summary

Licence L8739/2013/1 is held by Cable Sands (WA) Pty Ltd (Licence Holder) for the Wonnerup Mineral Sands Mine (the Premises), located at Lot 100 on Plan 65306, Mining Leases M70/360 and M70/569 (added this amendment), and part of Miscellaneous Licence L70/161 (transport corridor), as depicted in Schedule 1 of the Revised Licence. The Licence Holder is a wholly owned subsidiary of Tronox.

This Amendment Report documents the assessment of potential risks to the environment and public health from proposed changes to the emissions and discharges during the construction and operation of the Premises. As a result of this assessment, Revised L8739/2013/1 has been granted.

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

2. Scope of assessment

2.1 Regulatory framework

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

2.2 Application summary

On 4 November 2020, the Licence Holder applied to the department to amend Licence L8739/2013/1 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act). The amendment is sought primarily to expand the active mining area. There is no change in throughput proposed, as previous mining areas are progressively being completed and rehabilitated. The Licence Holder has also taken the opportunity to apply for several amendments they consider to be administrative.

2.2.1 Expansion of mining area – Wonnerup North Stage 2

Mining is currently being undertaken on Wonnerup North Stage 1, and post-mining rehabilitation activities on the Wonnerup site (Lot 100). The Licence Holder proposes to expand active mining to the east onto Mining Tenement M70/569, south of the Abba River as shown in Figure 1 (Wonnerup North stage 2 Phase A). The original application included a second area to the north (Wonnerup North stage 2 Phase B), but on 17 February 2021 the licence holder requested to remove this area from the amendment application to expedite approval. Approval for expansion to Wonnerup North stage 2 Phase B will be sought at a later date.

Mined ore will be piped in slurry form to the existing processing plant, as per the existing mining operations.

Construction and operation activities are outlined below.

Construction

- Initial vegetation clearing and topsoil stripping and stockpiling, up to 3 months ahead of mining;
- formation of topsoil stockpiles into boundary noise walls;
- upgrade of Abba River Discharge W2 to improve erosion control, to cater for an increased flow capacity. Design details provided by email (DWER Document A1977665)
- Initial internal noise walls/ barriers installed within 100m mining unit (primary screening plant)

Operations

- extraction of mineral sands ore using conventional dry mining equipment (dozers and loaders);
- backfilling of sand residues (i.e. clay fines, sand tailings, coarse rejects (oversize), and tailings returned from off-site secondary processing) following mineral processing to either the active mining area (behind the advancing ore extraction area) or solar evaporation ponds;
- subsequent clearing and topsoil stockpiling as mining progresses through the initially cleared area;
- each time the mining unit is moved, the internal ore and external topsoil bunds are extended to 100m beyond the mining unit; and
- progressive rehabilitation behind the advancing mining operation.

Clearing and topsoil stripping will be undertaken progressively. This is both due to conditions of clearing permit CPS 8046/1 and to minimise the amount of farming land out of action at any given time. Clearing will be ongoing during operations, approximately 6-8 weeks (100m) ahead of the mining front. It is therefore considered for the current assessment that although initial works are considered part of the construction phase for this approval, ongoing clearing, stripping, and construction of noise bunds are considered to be operational phase activities.

Processing of mined ore will occur at the existing Wonnerup Plant. Dewatering is expected to be required at some time during mining of Wonnerup North, and will be added to the existing site process water circuit. Where water generated on site exceeds usage requirements for processing and dust control, excess water is currently discharged at W1, on the Sabina River. As the current and proposed mining areas are closer to the Abba River and in the Abba River catchment, the Licence Holder proposes to upgrade existing discharge point W2 on the Abba River, and commission this for regular use.

There are a number of proposed licence changes associated with this mining area expansion, as outlined in Table 1.

Table 1: Proposed changes associated with the Wonnerup North Stage 2 expansion

Operational aspect	Licence amendment requested
Prescribed Premises boundary	Include Mining Lease M70/569
Abba river discharge point (W2)	Amend discharge point from <i>emergency only</i> to <i>general use</i> .
Construction of Extension Infrastructure	Amend to allow for construction of new noise walls and new monitoring sites
Dust and Surface water monitoring sites	Amend to include new noise, dust and surface water monitoring sites commensurate with the risks of the extension area. The Delegated Officer considers that any noise and dust emissions associated with the installation of these monitoring points will be short term and negligible, therefore will not be considered further in this assessment.
Solar evaporation ponds	Amend to include new solar evaporation ponds in the extension area

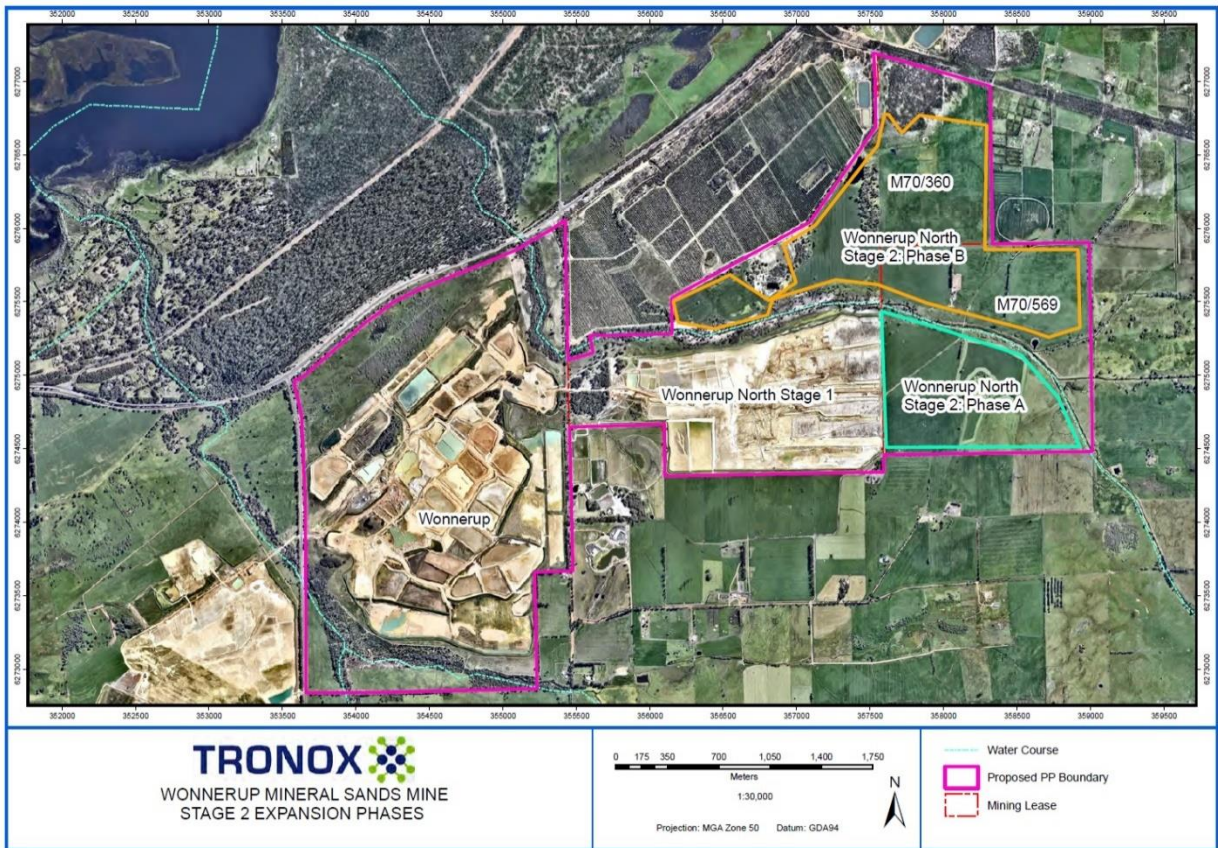


Figure 1: Location of expansions for Wonnerup North Stage 2; Phases A (this amendment) and B (future proposed)

2.2.2 Upgrade of discharge point W2

The discharge point W2 will be upgraded as shown in Figure 2. The existing poly pipe over the road will be replaced with a steel pipe through a culvert to minimize the risk of damage and subsequent failure, and the 20m long artificial drainage path between the pipe and the rehabilitated paddocks (not mined) is lined with rock armour to minimize erosion. Beyond the planned rock armour is a natural drainage line that existed pre-mining, that is expected to manage the proposed discharge with no significant erosion.



Figure 2: Upgrades to discharge point W2

2.2.3 Additional changes

Table 2: Additional changes requested by the Licence Holder

Operational aspect	Licence amendment requested	DWER response
Current licence boundary includes L70/159 which is a Wonnerup South tenement.	Amend the Licence to remove L70/159.	Noted, removed.
Allow for activation of noise monitoring sites closest to active mining fronts and deactivation of noise monitoring sites in areas under rehabilitation	Update Table 3.4.1 to accommodate active mining areas. eg Amend AN2 and AN3 to AN5 and AN6	Clarified with Licence Holder that this request relates only to directional monitoring (bottom row of table 3.4.1). Condition 1.2.4 required the establishment of AN5 and AN6 prior to mining at Wonnerup North Stage 1. As Lot 100 remains on the licence and there is possibility of future mining in this area, AN2-3 will be retained on the licence. AN5-6 will be added, consistent with assessment for Amendment Notice 2. Table notes will be applied to this line so monitoring is only required when mining is occurring in the relevant area.
Wonnerup North Stage 1 has been constructed and decommissioning will commence in 2021.	Remove the conditions relating to construction of Wonnerup North Stage 1 infrastructure. Replace with conditions for construction of Wonnerup North Stage 2 Phase A and B infrastructure.	Compliance report received on 12 July 2019 (A1975311). This has been reviewed and the Delegated Officer is satisfied that conditions 1.2.2 – 1.2.5 have been complied with. Reference to Stage 1 to be removed or replaced with Stage 2, as required.
Amend Table 3.2.1 (monitoring point source emissions to surface water) Link table note 2 to Total Titratable Acidity and Total Alkalinity, to allow for field testing	As standard practice to meet holding times, Licence Holder undertakes field titrations for Total Titratable Acidity (TTA) and Total Alkalinity (TA), as approved in the Groundwater Operating Strategy for the Groundwater Licence.	Discussions with water licencing officer revealed that field analysis was authorised as this is stated as preferred in AS/NZS 5667.1:1998 (Table 1). The Delegated Officer is satisfied that this meets current best practice, therefore authorises this change. Review of the previous two AERs shows that neither TTA nor TA are close to specified limits. It is therefore considered that no overlap of lab and field samples to provide comparability is justified.
Table 3.4.2 Footnotes	Table notes 1 and 2 in the 'parameter' column appear to be an error.	These were removed in Amendment Notice 2, considered redundant. Were reintroduced in error during the consolidation of amendment notices. Removed this amendment.

		Existing note 2 also removed – now redundant.
Table 4.3.1. references Table 2.3.4 and Table 3.4.1	The licence does not contain a Table 2.3.4 or Table 3.1.4. Appears to be an error.	The reference to Table 2.3.4 relates to discharge to the Abba River at point W2, as specified in Condition 2.2.1, Table 2.2.1. However this table and reference will both be removed as part of this amendment as W2 is now authorised as a regular discharge point (previously for emergency discharge only). The Reference to condition (not table) 3.1.4 is correct. The word 'Condition' is added for clarity.

Table 3: Additional changes initiated by DWER

Condition	Change made and reason
2.2.2	Removed. Redundant due to changes made to surface water discharge in Amendment Notice 2 (Addition of W2 to condition 2.2.1 and removal of previous condition 2.2.4)
2.2.3 and 2.2.4	Renumbered to 2.2.2 and 2.2.3, due to deletion above. No cross references affected.
2.5.1	Deleted. DWER's current preference is not to reference external documents within conditions. The Delegated Officer considers that the controls listed in the former table 2.5.2, condition 2.5.2 (renumbered table 2.2.1, condition 2.5.1) in their updated form provide sufficient regulatory control of the risk.

2.3 Other Approvals

2.3.1 Part IV of the EP Act

The Wonnerup North extension was referred to the EPA for assessment. The decision made was Not Assessed - Public Advice Given (EPA 2014).

2.3.2 Part V, Division 2 of the EP Act

Clearing permit CPS 8046/1 has been issued for the Wonnerup North Stage 2 area.

2.3.3 Environment Protection Biodiversity Conservation Act 1999 (Commonwealth)

The Wonnerup North Project was assessed under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC 2014/7205). The relevant Controlling Provisions are wetlands of international importance (Vasse Wonnerup system) and listed threatened species and communities (Black cockatoos and Western Ring-tail Possum). The approval includes conditions relating to the construction of service corridors across the Abba River, vegetation retention areas buffering the Abba River, management plans for water and acid sulphate soils, biodiversity offset areas, dieback management

3. Prevailing wind data

Figure 3 shows the prevailing wind direction at the Busselton Aerodrome (site no 009603), approximately 7km from the premises. Winds are mostly easterly at 9am (Figure 3A), which means that nearby residences are predominantly upwind of the proposed operations. At 3pm (Figure 3B), wind direction varies more throughout the year and tends to be more southerly to north-westerly.

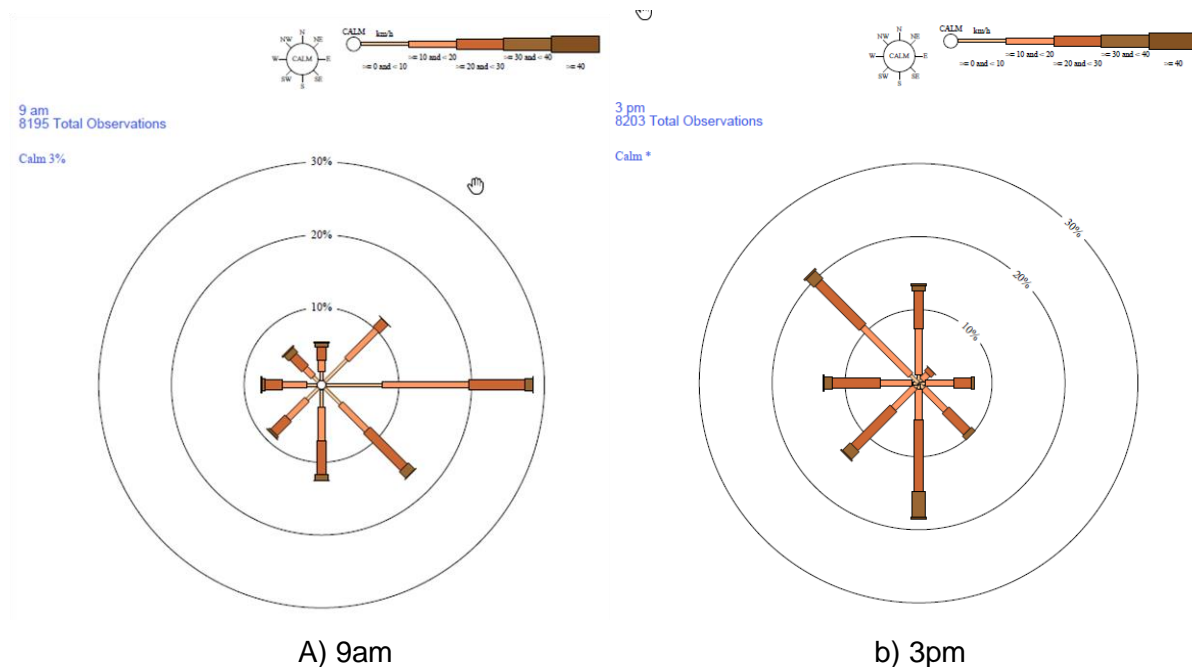


Figure 3: Annual wind rose for Busselton Aerodrome (site no 009603), approximately 7km from Wonnerup at (A) 9am and (B) 3pm

4. Risk assessment

The department assesses the risks of emissions from prescribed premises and identifies the potential source, pathway and impact to receptors in accordance with the *Guidance Statement: Risk Assessments* (DER 2017).

To establish a Risk Event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission.

4.1 Source-pathways and receptors

4.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during premises construction and operation which have been considered in this Amendment Report are detailed in Table 4 below. Table 4 also details the proposed control measures the Licence Holder has proposed to assist in controlling these emissions, where necessary.

Table 4: Licence Holder controls

Emission	Sources	Potential pathways	Proposed controls
Dust	Earthmoving, vehicle	Air/windborne	As per existing licence

Emission	Sources	Potential pathways	Proposed controls
	movements	pathway	
Noise	Mining	Air/windborne pathway	As per existing licence Mufflers/noise screens, limited operations after hours, shutdown in response to real time monitoring Installation of noise attenuation walls/bunds constructed out of ore (internal) and stripped topsoil (boundary)
Contaminated runoff	Contaminated stormwater from operational areas	Surface runoff to Abba River	Allocation of new ambient (upstream) surface water quality monitoring sites to provide comparison with upstream sites No mining activities in Abba River, and approval 2014/7205 under the EPBC Act stipulates a vegetation retention zone providing a buffer around the Abba River. Runoff on site contained and retained as process water. Discharge of excess regulated under existing licence conditions
Increased sediment	Mining	Abba River	The above approval prohibits mining within 50 m of the river banks.
Seepage	Sand tailings disposed in mine voids	Seepage through floor of voids	Sand tailings (consisting principally of silica sand) to be returned to the mine void will have undergone wet separation only and are unlikely to contain contaminants. Seepage is unlikely to cause significant mounding, as it will be offset by mine dewatering where groundwater is shallow. Monitoring is conducted in accordance with the Wonnerup Groundwater Operating Strategy
Seepage	Disposal of clay slimes (solar drying ponds)	Seepage from ponds to groundwater	The volume of seepage is expected to be low as the initial clay layer will create a natural lining of the pond floor
Process water	Overflow of solar drying ponds	Overflow to surface water	Solar drying ponds are designed with weir boxes to capture supernatant water for recycling within the mine water circuit, so as to not allow overtopping
Mine water	Mine dewatering to access ore	Discharged to Abba River	Preferentially used on site as process water and for dust suppression. Discharge only occurs when process water circuit is at capacity. Water quality criteria as per existing licence

4.1.2 Receptors

In accordance with the *Guidance Statement: Risk Assessment* (DER 2017), the Delegated Officer has excluded employees, visitors and contractors of the Licence Holder's from its assessment. Protection of these parties often involves different exposure risks and prevention strategies, and is provided for under other state legislation.

Table 5 below provides a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed premises (*Guidance Statement: Environmental Siting* (DER 2016)).

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

Human receptors	Distance from prescribed activity
Residential Premises (farm houses)	Shown in Figure 4. The closest of which is 700m south of Phase A mining area.
Environmental receptors	Distance from prescribed activity
Underlying groundwater (potable)	Underlying the premises
Threatened or Priority Fauna	Black Cockatoo, Western Ringtail Possum
Abba River	Within boundary. However EPBC 2014/7205 prohibits mining within 50 m of the river banks. Premises is located within the Abba River surface water catchment, with the river flowing from south east to north west along the top of phases A. The river is ephemeral in nature, with flow predominantly taking place in winter.
Vasse-Wonnerup wetlands	Approximately 2km downstream of the Premises. Listed under the RAMSAR convention as a wetland of international importance (as migratory bird habitat).
Potential acid sulphate soils	Within boundary

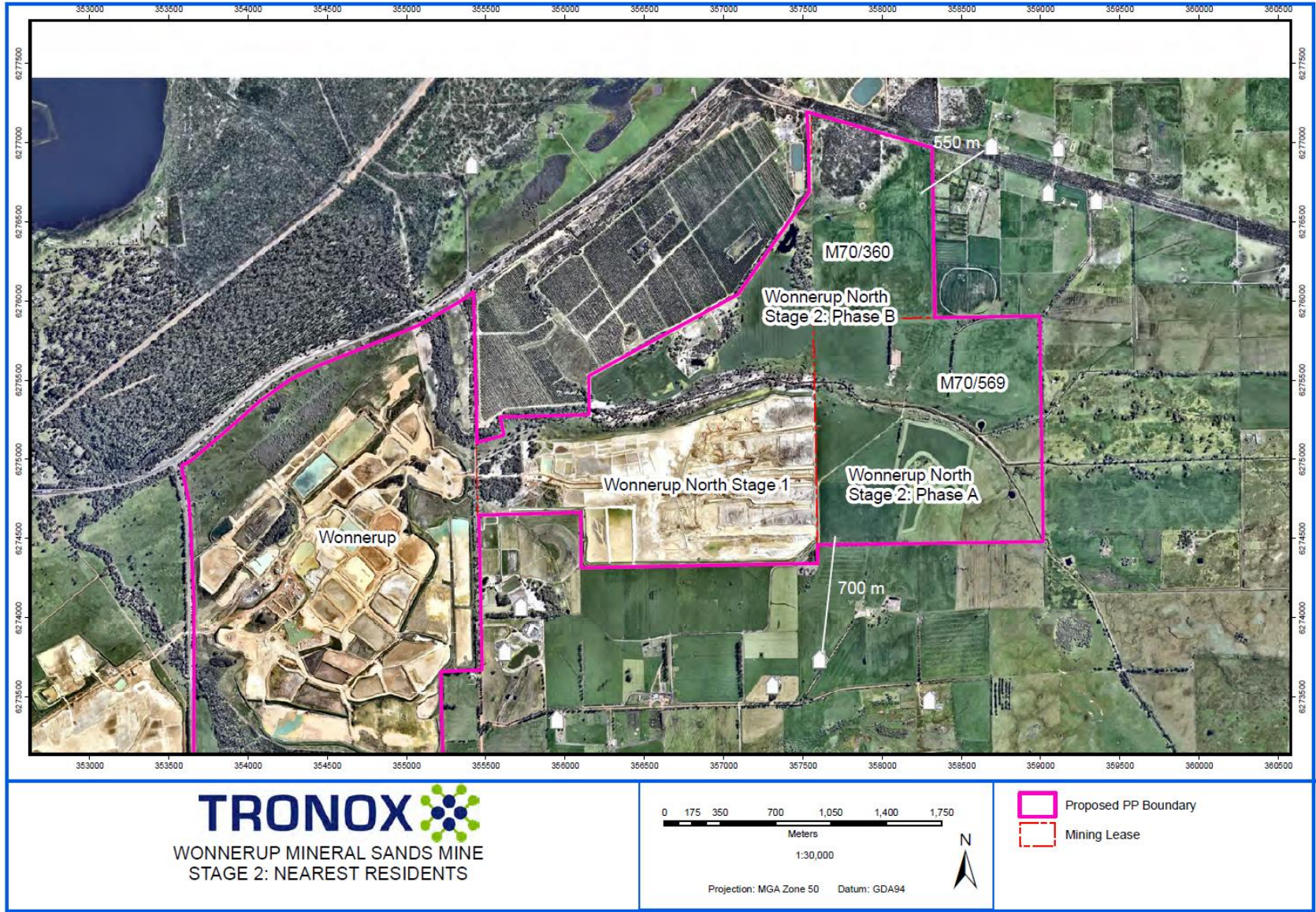


Figure 4: Distance to residential receptors

Licence: L8739/2013/1

4.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guidance Statement: Risk Assessments* (DER 2017) for those emission sources which are proposed to change and takes into account potential source-pathway and receptor linkages as identified in Section 4.1. Where linkages are in-complete they have not been considered further in the risk assessment.

Where the Licence Holder has proposed mitigation measures/controls (as detailed in Section 4.1), these have been considered when determining the final risk rating. Where the Delegated Officer considers the Licence Holder's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the licence as regulatory controls.

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

The Revised Licence L8739/2013/1 that accompanies this Amendment Report authorises emissions associated with the operation of the Premises i.e. mineral sands mining. There is no change to mineral sands processing in this amendment.

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

Table 6. Risk assessment of potential emissions and discharges from the Premises during construction and operation

Risk Event					Risk rating ¹ C = consequence L = likelihood	Licence Holder's controls sufficient?	Conditions ² of licence	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Licence Holder's controls				
Construction								
Topsoil and overburden stripping and stockpiling, including construction of initial noise bunds	Dust	Air/windborne pathway causing impacts to health and amenity	Closest residences 700m south. Residences to north and east >1.5km away.	Refer to Section 4.1.1	C = Minor L = Possible Medium Risk	Y	Existing conditions <ul style="list-style-type: none"> 2.4.3 –dust management plan (updated) 3.4.1 – dust monitoring and limits/targets 1.2.5 – construction requirements of new dust monitoring site AQ8 AQ8 added to 3.4.1 and Maps	See section 4.3
	Noise	Air/windborne pathway causing impacts to amenity			C = Minor L = Possible Medium Risk	Y	Existing conditions (expanded to apply to Wonnerup North Stage 2) <ul style="list-style-type: none"> 1.2.5 - works, infrastructure and equipment requirements 1.2.6 - hours of operation 2.5.1 - operational noise controls 	Proponent controls conditioned
Operation								
Increased frequency and volume of discharge to Abba River	Sediment	Increased sediment load to Abba River, in discharged water and through erosion, causing ecological impact	Abba River; Wonnerup Wetlands	Refer to Section 4.1.1	C = Moderate L = Possible Medium Risk	Y	<ul style="list-style-type: none"> Existing condition 2.2.1 (point source emissions to surface water) updated to remove reference to W2 being a secondary discharge Condition 2.2.2 (previously 2.2.3) specifies water quality parameters required for discharge. Edited to remove volume limit Condition 2.2.3 (previously 2.2.4) amended such that discharge volume at W2 is only restricted prior to the upgrade of erosion control at W2. WQ8-10 added to maps, and Table 3.4.3. 	Restriction on use of W2 removed after upgrade, as erosion risk is then low
Mining and in-pit screening of ore	Dust	Air/windborne pathway causing impacts to health and amenity	Residences 800m south and 550m east	Refer to Section 4.1.1	C = Minor L = Possible Medium Risk	Y – but additional monitoring required	Existing conditions <ul style="list-style-type: none"> 2.4.3 –dust management plan (updated) 3.4.1 – dust monitoring and limits/targets 1.2.5 – construction requirements of new dust monitoring site AQ8	See section 4.3

Risk Event					Risk rating ¹ C = consequence L = likelihood	Licence Holder's controls sufficient?	Conditions ² of licence	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Licence Holder's controls				
							AQ8 added to 3.4.1 and Maps	
	Noise	Airborne pathway causing impacts to amenity	Residences 800m south and 550m east	Refer to Section 4.1.1	C = Moderate L = Possible Medium Risk	Y	Existing conditions (expanded to apply to Wonnerup North Stage 2) <ul style="list-style-type: none"> 1.2.5 - works, infrastructure and equipment requirements 1.2.6 - hours of operation 2.5.1 - operational noise controls 	See section 4.4
	Contaminated stormwater runoff	Runoff to Abba River; Wonnerup Wetlands	Abba River; Wonnerup Wetlands	Refer to Section 4.1.1	C = Minor L = Unlikely Medium Risk	Y	EPBC 2014/7205 prohibits mining within 50 m of the river banks.	NA
	Oxidation of Acid Sulphate Soils from physical disturbance of ASS material	Leachate to groundwater; discharge of acidic water to Abba or Sabina Rivers	Groundwater, groundwater dependent vegetation, Abba and Sabina Rivers	As per existing Licence	C = Moderate L = Possible Medium Risk	Y	<ul style="list-style-type: none"> Existing condition 1.3.4 - Acid sulphate soils management plan Previous condition 2.2.3 (now 2.2.2) - criteria for point source emissions to surface water 	NA
Transport of slurried ore to the WCP via pipeline; or tailings from the WCP to disposal points	Rupture of pipeline causing slurry discharge to land or water	Direct discharge leading to smothering or contamination	Abba River, Remnant vegetation	As per existing Licence	C = Moderate L = Possible Medium Risk	Y	<ul style="list-style-type: none"> Existing condition 1.3.2 - inspections Existing condition 1.2.5 - initial pipeline construction 1.3.5 - ongoing pipeline construction during operations 	Conditions added on pipeline construction, consistent with previous amendments but with provision for ongoing construction/modification during operations.
Disposal of sand tailings (mine void)	Seepage of water entrained within sand tailings to groundwater	Seepage to groundwater, causing contamination or mounding		Refer to Section 4.1.1	C = Minor L = Unlikely Medium Risk	Y	Existing condition 2.3.1. – approved location	NA
Disposal of clay slimes (solar drying ponds)	Seepage of Water entrained within clay slimes to groundwater	Seepage to groundwater, causing contamination or mounding	Groundwater, groundwater dependent vegetation	Refer to Section 4.1.1	C = Minor L = Unlikely Medium Risk	Y	Existing condition 1.3.1 – pond construction	NA
	Overtopping/breach of containment causing discharge to	Direct discharge to vegetation, runoff to surface waters	Vegetation, Abba River	Refer to Section 4.1.1	C = Minor L = Rare Low Risk	Y	Existing conditions <ul style="list-style-type: none"> 1.3.1 – minimum freeboard, overflow to process water pond 1.3.2 – inspections for freeboard 	NA

Licence: L8739/2013/1

Risk Event					Risk rating ¹ C = consequence L = likelihood	Licence Holder's controls sufficient?	Conditions ² of licence	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Licence Holder's controls				
	land or waters							
Dewatering	Disposal of excess water (mine dewater plus rain water)	Direct discharge to Abba River resulting in significant alteration of flow volumes or water quality	Abba River, Wonnerup Wetlands	As per existing Licence	C = Minor L = Possible Medium Risk	Y	<ul style="list-style-type: none"> Condition 1.2.5 - upgrade of discharge point Existing table 3.4.3 – surface water monitoring – amended to add monitoring points on 3 feeder tributaries upstream of W2. 	See section 4.5

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

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

4.3 Detailed risk assessment for dust impact to residential receptors (both construction and mining)

Construction and mining activities are likely to result in increased ambient dust within and around the mining areas. Dust exposure of personnel on site is an occupational health matter, and outside the scope of this assessment. Impacts of dust deposition on native vegetation are likely to be minor. The proposed mining area is further from the neighbouring avocado orchard than existing mining areas. The key receptors for dust emissions are nearby residences. These could be impacted by reduced amenity (visible dust, deposition on domestic surfaces) or respiratory health impacts.

The Licence Holder has a mature Air Quality Management Plan, which has recently been updated. DWER has no record of previous dust complaints associated with the Wonnerup mineral sands mine.

The locations of the closest residences are shown in Figure 4. The Licence Holder proposes no new dust monitoring for the phase A mining area, stating that residences to the south are adequately covered by existing AQ6.

The Delegated Officer considers that given the existing licence conditions, it is **Possible** that **Minor** impacts to receptors could occur, as a result of mining associated dust. This gives a risk rating of **Medium**.

The Delegated Officer considers that existing controls on the licence are adequate to control the risk of amenity impacts associated with dust, although condition 2.4.2 requires updating to reference the relevant section of the updated Air Quality Management Plan. However due to the moderate risk, the existing monitoring program has been reviewed to ensure it is appropriate to measure dust levels.

The Delegated Officer has considered the location of receptors with respect to the mining area, in conjunction with the wind data in section 3. Residences to the north and east are more than 1.5km from the proposed mining area, so the Delegated Officer is satisfied that no monitoring in these directions is justified. The Delegated Officer considers that in many situations AQ6 may significantly underestimate the dust load to the residence to the south east of AQ6. To improve the accuracy of monitoring, an additional dust monitoring point AQ8 will be required in the south east corner of M70/569. As the receptor is about 1km away, it is considered that PM₁₀ and dust deposition monitoring is sufficient. Recent DWER internal technical advice states that deposited dust is appropriate for the assessment of amenity impacts. PM₁₀ is an appropriate parameter for monitoring impacts to human health.

The only existing licence limit in the monitoring conditions is for TSP. To trigger investigation should the PM₁₀ at any monitoring point exceed the *National Environmental Protection (Ambient Air Quality) Measure* (Ambient air NEPM), a target to not exceed 50 µg/m³, averaged over 24-hours, is introduced in Table 3.4.2.

For dust deposition, a trigger of 4g/m³/month is introduced, as per *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (2016)*. As there is no existing background data and difficulties in collecting any data at this stage of the mine life, the limit of 2g/m³/month above background is not considered a useful value. The Delegated Officer notes that dust deposition data has not previously been collected on this site, and surrounding activities such as farming can generate significant dust. This monitoring is intended to gain an understanding of dust levels and inform future monitoring programs. It is not intended as a regulatory limit.

4.4 Detailed risk assessment for noise amenity impact to residential receptors (construction and operation)

The Licence Holder commissioned noise modelling and submitted separate noise impact assessments based on this, for Wonnerup North Stage 2 Phase A and Phase B (Wood 2020a; Wood 2020b). These assessments concluded that there is potential for exceedances at some nearby receptors under worst-case day and night time conditions, but with specified controls it is expected that mining can occur in compliance with the *Environmental Protection (Noise) Regulations 1997* (Noise Regulations).

The controls proposed are in line with those currently conditioned for the Wonnerup North (Stage 1) operations. This includes existing condition 1.2.5 for works, infrastructure and equipment requirements; existing condition 1.2.6 for hours of operation and existing conditions 2.5.1 for operational noise controls. These conditions will be updated to apply to all of the Wonnerup North site, including Stage 2.

The Licence Holder has a mature noise management plan, and DWER has no record to date of noise complaints from neighbours of the Wonnerup mineral sands site.

Existing monitoring conditions provide a framework to assess impacts to receptors, and trigger equipment relocation or cessation of mining if required. The only residences within 1.5km of the Wonnerup North Stage 2 Phase A are to the south. Existing monitoring point AN6 is sufficient to monitor noise at these receptors. There are also receptors within 2km to the north and east.

In previous mining areas, the Licence Holder has constructed noise bunds around the perimeter of the mining area before the commencement of mining operations. Due to land access limitations (farming continuing on as much land as possible that is not being actively mined), this is not possible for Wonnerup North stage 2 phase B. The Licence Holder proposes to progressively construct and deconstruct noise bunds throughout the mining timeline as required.

The original noise modelling assumed the placement of an external noise bund along the southern perimeter of M70/569 and along the southern bank of the Abba River, the northern boundary of the mining area. DWER requested a sensitivity analysis to show the impact of this bund being incomplete or not present. This was provided (Wood 2021) and shows that in a worst-case scenario (no external topsoil bund, only internal ore bunds within 100m of the mining unit), the Noise Regulations can still be met. The noise bunds close to the mining unit provide the greatest noise mitigation, with the external bunds providing some additional protection from noise as well as dust and visual screening. The Delegated Officer therefore considers the proposal to allow construction of noise bunding progressively (at least 100m in advance of the mining unit) to be reasonable.

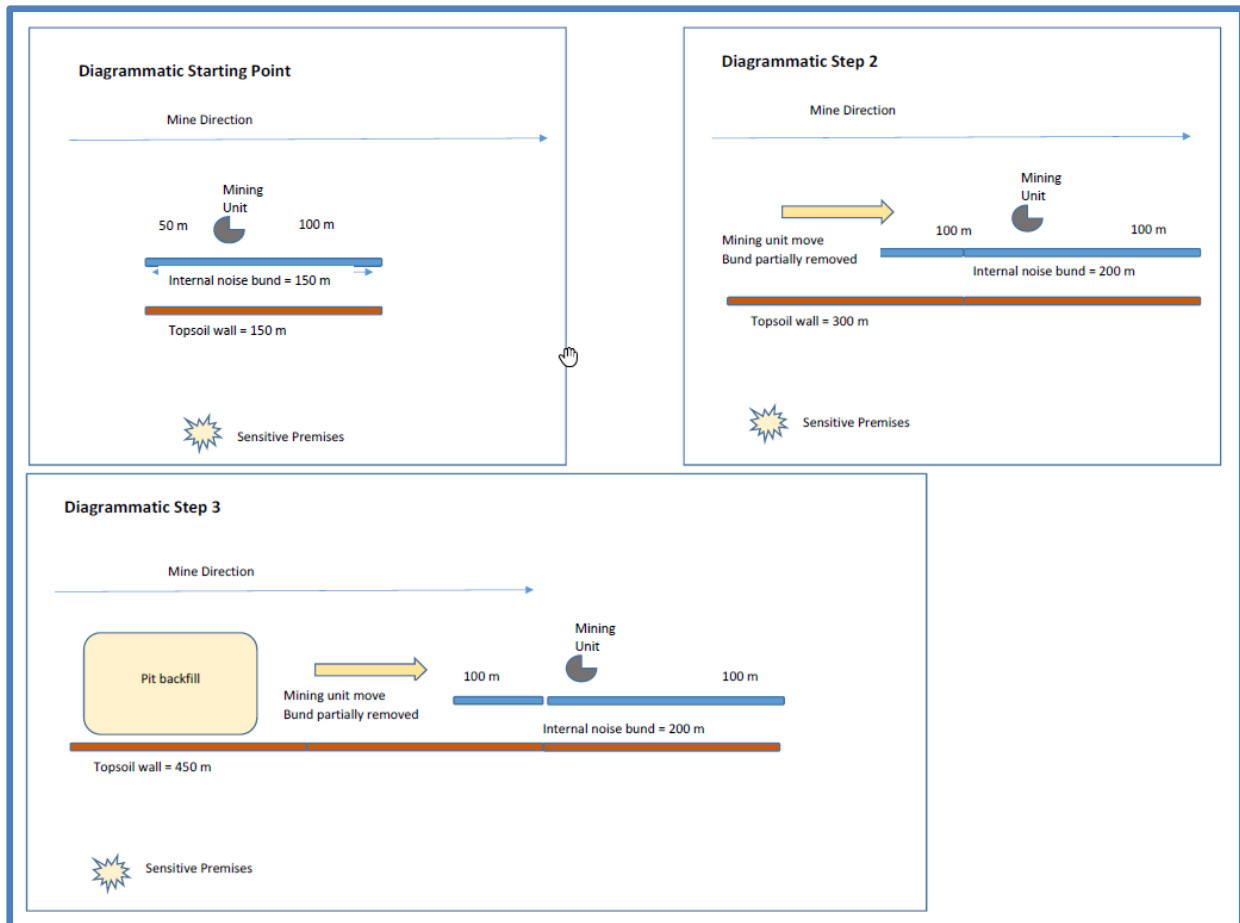


Figure 5: Diagram showing the progressive construction of topsoil (external) and ore (internal) noise bunds

The Delegated Officer considers that with the above conditions in place, there may be a low level impact to amenity at off site residential receptors, giving a consequence rating of **Moderate**. It is **Possible** that this impact could occur at some time, giving a risk rating of **Medium**.

4.5 Detailed risk assessment for increased discharge of surplus water to the Abba River resulting in significant alteration of flow volumes or water quality

Mine dewater and stormwater from the existing Wonnerup operations is fed into the Wonnerup mine water circuit. There is also a component of previously used process water that has seeped from sand tailings. The water in this circuit is referred to collectively in this assessment as process water. This is used on site for ore processing and dust suppression. Historically throughout the drier summer months, site water requirements exceed the volume into the mine water circuit.

Groundwater from the Yaragadee aquifer is used to make up the difference and no discharge to surface water occurs. During wetter winter months, increased stormwater results in an excess of water in the mine water circuit. Discharge occurs typically from late autumn to late spring. This has so far principally been discharged at point W1 on the Sabina River, with an emergency discharge point W2 authorised on the Abba River, where required to prevent backing up at W1. In 2019, discharge to the Sabina River occurred from April to December. In 2020, discharge occurred to the Sabina River from June to December.

Mine dewater from the Wonnerup North Stage 2 mining area will feed into the existing mine water circuit. The Licence Holder is seeking authorisation in this amendment to use the Abba River as the primary receiver for surplus process water. Two discharge points are proposed over the life of the mining area, existing secondary discharge point W2 and new W3. However W3 is not needed for about 18 months and designs are not yet available, so the licence holder has requested it be excluded in this amendment.

W2 will be upgraded to reduce the risk of erosion at the discharge point, as per Figure 6. The surface water impact assessment (RPS 2014) identified the narrowest constriction of the Abba River, between proposed flood bunds, to be on tenement M70/569. Discharge point W2 is downstream of this constriction, which reduces any flooding risk associated with the discharge.

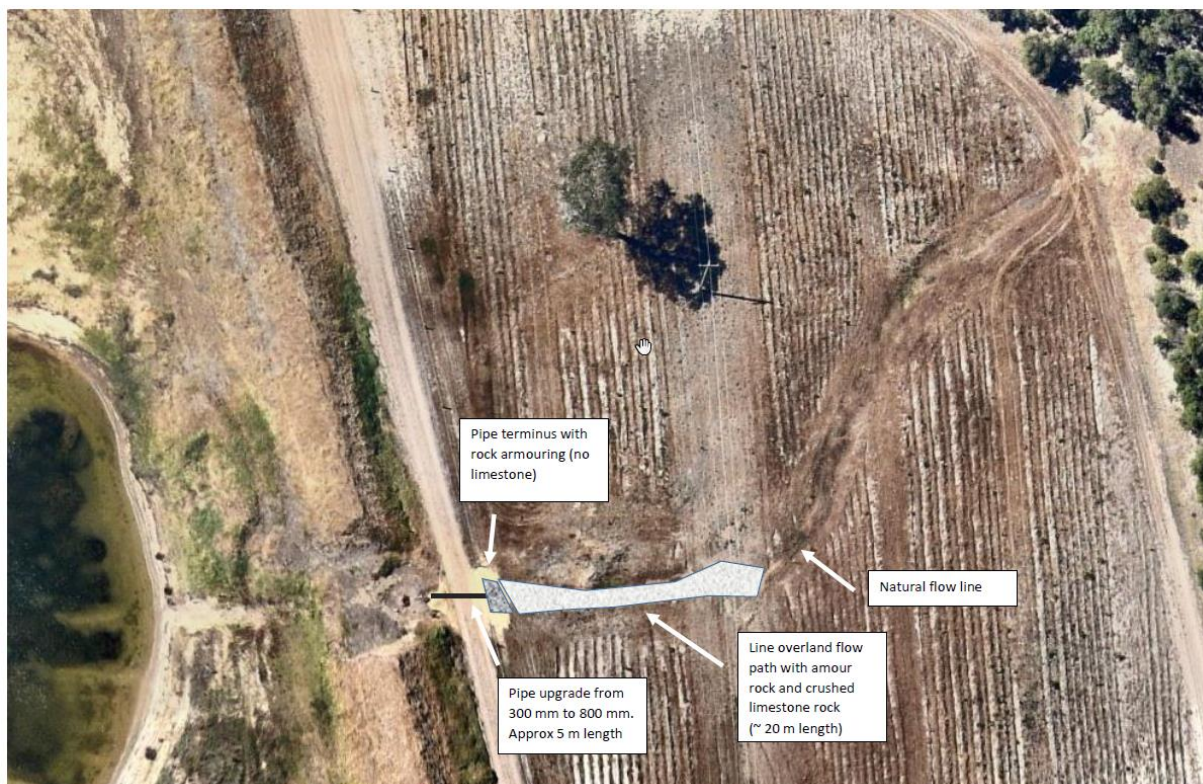


Figure 6: Proposed Upgrades to Discharge Point W2

The water to be discharged is a combination of stormwater collected across the active mining areas, and mine dewater. The rainfall component is calculated based on recorded rainfall, and the disturbed area over which stormwater is directed to mine pits. The remainder is assumed to be groundwater inflow. There is expected to be no further dewatering of the Wonnerup mining area, as all pits have been backfilled to above the water table. The Wonnerup North Stage 2 mining area is within the catchment of the Abba River. It is therefore considered reasonable that discharging the stormwater portion to the Abba River (rather than Sabina River as currently approved) will minimise the impact of the mine on the flow rates of both rivers.

The mine dewater component will likely result in an increase in flow rate of the Abba River. Figure 7 shows the mean daily flow rates since 2015 on the Abba River, at DWER's site 610062 which is located at the North Western corner of M70/360. There is typically no flow in Summer (only pools), then flow during the winter months which correlate strongly with rainfall.

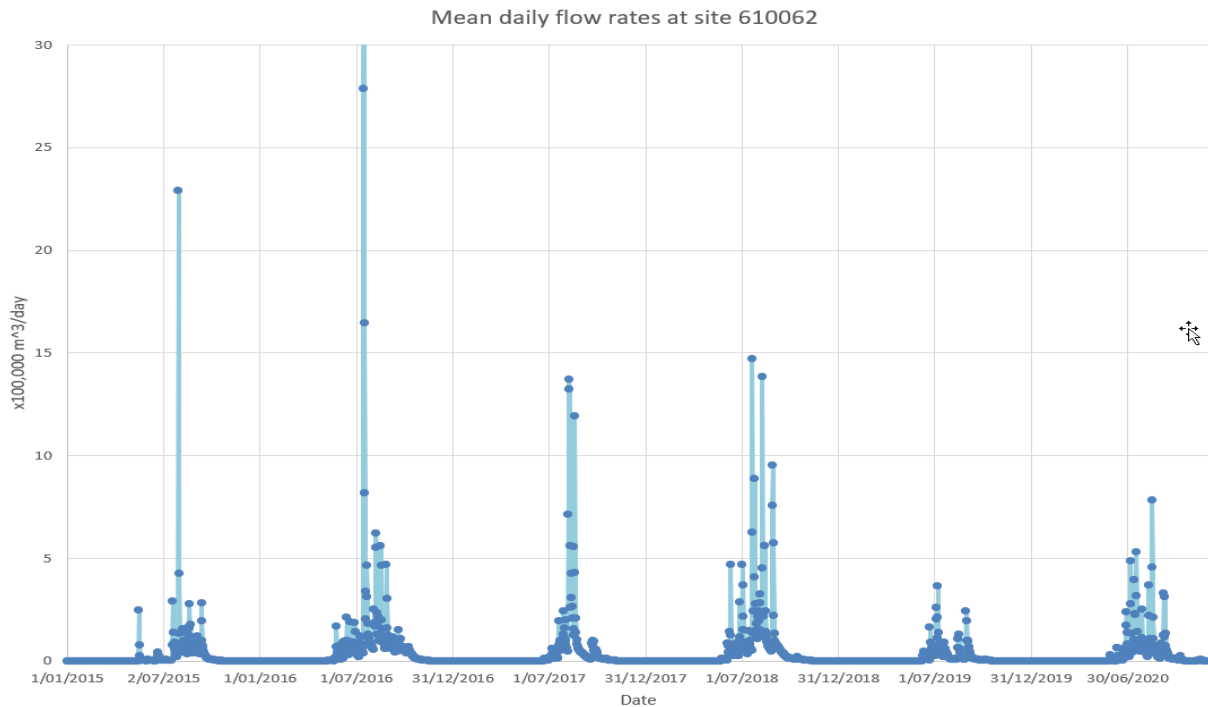
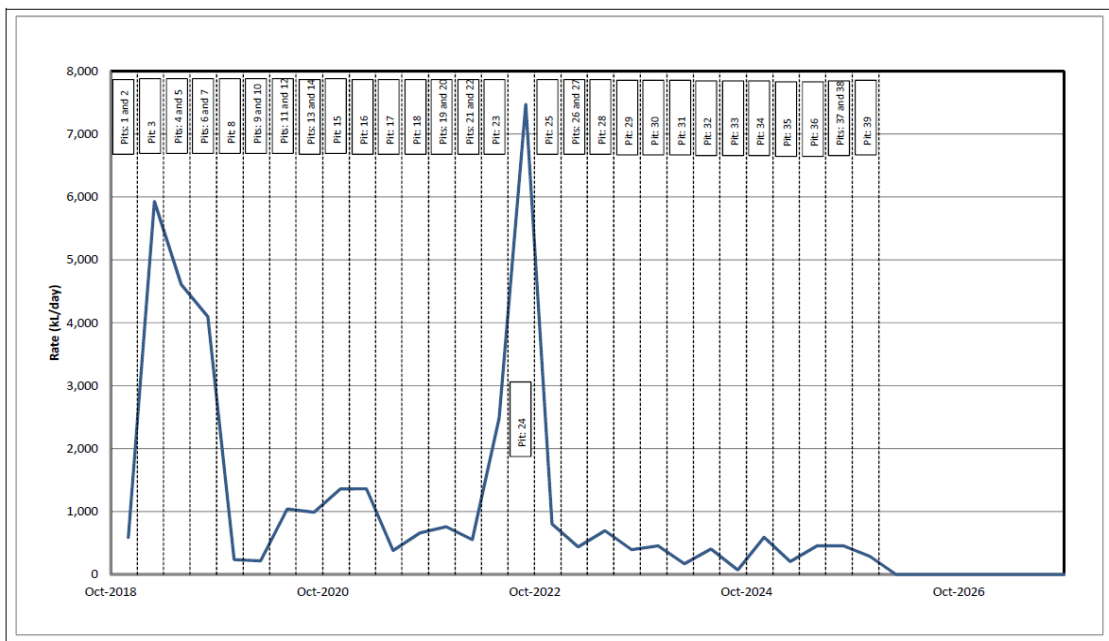


Figure 7: Mean Daily flow rates at the North Western corner of M70/360

The licenced dewatering volume for Wonnerup North is 2,000,000 tonnes per year. If it were assumed that this is spread across the year, it would be around 5,500m³ per day. However dewatering volumes are not consistent, varying due to the depth and location of mining. Modelling carried out by RPS (2014) predicted inflow rates less than 1,500kL/d until end 2022, with the exception of two spikes of up to 6,000kL/day in Q1 2019 and 7,500kL/d in Q3 2022. Predicted inflow rates thereafter are less than 500kL/d until the end of mine life. Figure 8 shows the predicted groundwater inflows.



PREDICTED GROUNDWATER INFLOW RATES FIGURE 30
 F:\Jobel\1604B\Modelling\Model Results\prediction_P_T05_1604B\P_T05_Predicted dewatering rates (revised).xlsx\Chart

Figure 8: Predicted groundwater inflow rates over the life of Wonnerup North (Stages 1 and 2)

If all mine water was discharged during the peak predicted dewatering period of 7,500kL/d in Q3 2022, the Delegated Officer considers that given the magnitude and variability of winter flow rates for the Abba River presented in Figure 7, 7,500m³/day for a few months is unlikely to make a noticeable change to the flow volume in the Abba River. If pit 24 is mined at a dryer time of year, discharge is likely to be low as more of the dewater will be used on site. The lower dewatering rate at other times may slightly extend the flow period of the river, but it is unlikely to be outside of natural variability.

Water chemistry of mine dewater could also alter the chemistry of the Abba River. The superficial aquifer that is being dewatered is in places slightly brackish; and there is a risk of acidification due to the exposure of potential acid sulphate soils during mining. The Delegated Officer notes however that mine dewater will be mixed with stormwater which is likely to reduce the salinity, and the Licence Holder has a well established Acid Sulphate Soils Management Plan. Existing condition 2.2.3 sets limits on the chemistry of water discharged at W1 and W2, as shown in Figure 9.

2.2.3 The License Holder must not cause or allow point source emissions to surface water that do not meet the limits listed in Table 2.2.2.

Table 2.2.2: Point source emission limits to surface water			
Emission point reference	Parameter	Limit (including units)	Averaging period
W1 - W2	pH	5.5 (lower) 8.5 (upper)	Spot sample
	Electrical conductivity @ 25°C	2,500 µS/cm	
	Total dissolved solids	1,500 mg/L (upper)	
	Total suspended solids	80 mg/L (upper)	
	Total titratable acidity	65 mg/L (upper)	
	Total alkalinity	10 mg/L (lower)	
W2	Volumetric flow rate	5,000 kL/d (upper)	N/A

Figure 9: Condition 2.2.3 of the existing licence, which stipulates chemical parameters for emissions to surface water

Most of the surface water collected on the Wonnerup site is now from the Abba River catchment, as active mining is now occurring only in the Wonnerup North mining area. It is therefore anticipated that discharging this water to the Abba River rather than the Sabina River will minimise impact that the mine has on changing flow volumes in both rivers.

Existing condition 2.2.1 specifies approved discharge points. Existing Condition 2.2.2 specifies limits for key parameters in water allowed to be discharged. Those listed for W1 and W2 are also relevant for W3, and recent Wonnerup Annual Environmental Reports show readings well within these limits. The daily volume limit is removed as this assessment finds that the Abba River is the most appropriate discharge location for surplus process water from the Wonnerup North Mining area, so there is no justification to limit the daily flow.

Existing condition 3.2.1 specifies discharge monitoring requirements at discharge points W1 and W2. Existing condition 3.4.1 (Table 3.4.3) specifies ambient surface water quality monitoring. Points WQ8 – WQ10 proposed by the Licence Holder are added to provide upstream water quality data. WQ7 is also added – this is shown in Schedule 1 of the existing licence, and by administrative error was not added to Table 3.4.3 in Amendment Notice 2.

Design components critical to erosion control at discharge point W2 are specified in condition 1.2.5.

The Delegated Officer considers that with the above conditions in place, it is **Possible** that impacts could be felt downstream due to water contamination or alterations in flow volume, but these impacts are likely to be **Minor**. The overall risk rating is therefore **Medium**.

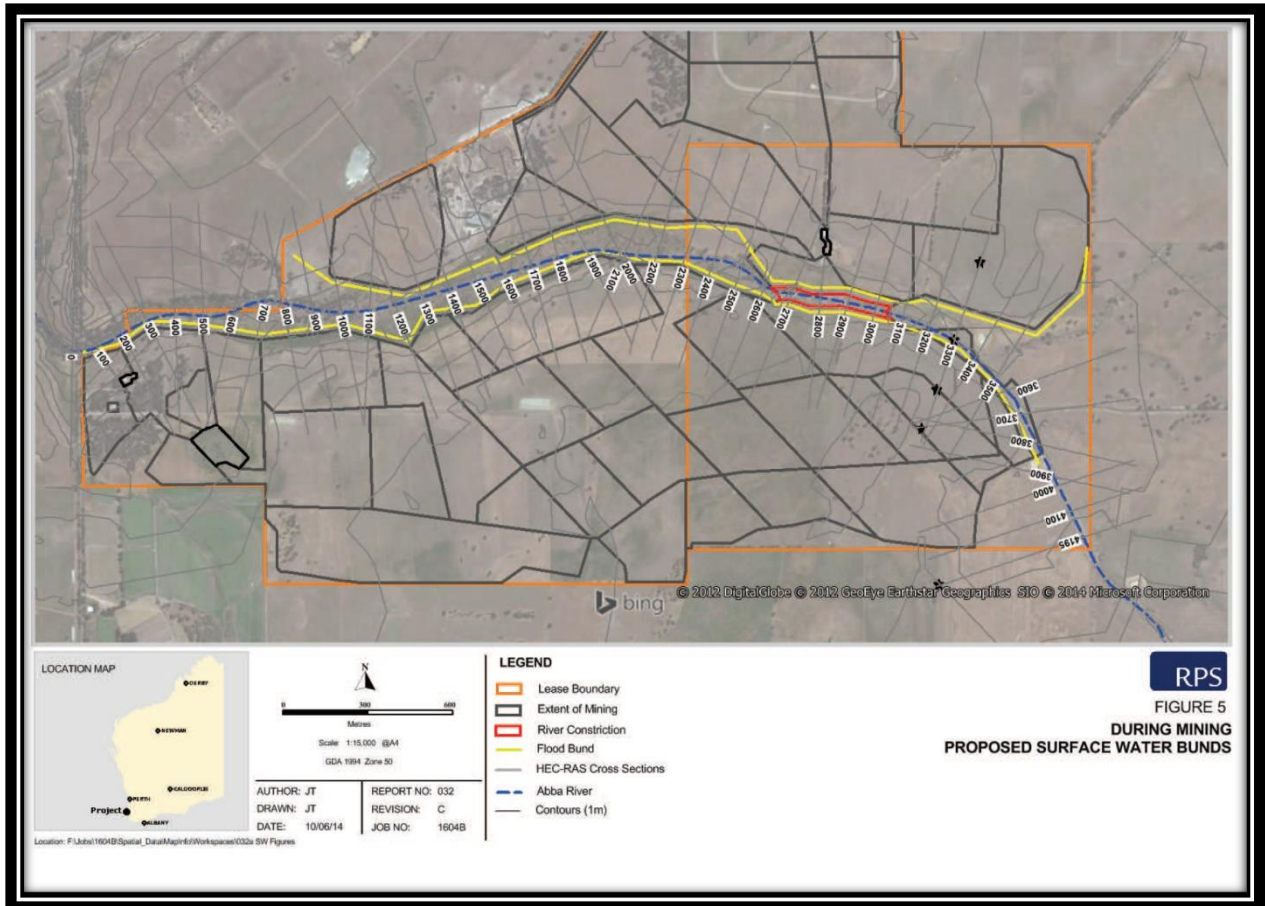


Figure 10: Constriction of Abba River between flood bunds

5. Consultation

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

Table 7: Consultation

Consultation method	Comments received	Department response
Application advertised on the department's website (03/12/2020)	None received	N/A
Local Government Authority advised of proposal (27/11/2020)	None received	N/A
Department of Mines, Industry Regulation and Safety (DMIRS) advised of proposal (27/11/2020)	None received	N/A
Licence Holder was provided with draft amendment on 24 February 2021	Refer to Appendix 1	Refer to Appendix 1

6. Conclusion

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

6.1 Summary of amendments

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

Table 8: Summary of licence amendments

Condition no.	Proposed amendments
1.2.5	Wonnerup North Stage 1 conditions removed; stage 2 phase A added.
1.2.1	Redundant condition relating to construction of previous mining area - removed
1.3.5	Condition added for the moving of pipelines within the mining area as part of ongoing construction, with specified conditions
2.2.1 - 2.2.3	W2 reclassified from a secondary to primary discharge point, and measurement of volumetric flow no longer required
2.4.1	Limit introduced for PM ₁₀ , due to proximity of receptors (monitoring already required)
2.4.3	Reference to Dust Management Plan removed; relevant controls from updated Air Quality Management Plan directly conditioned
2.5.1-2.5.2	Removed 2.5.1 (Noise management plan) and ensure key controls are included in 2.5.2 (renumbered as 2.5.1).
3.4	Monitoring locations updated. Dust deposition added to give an indication of dust impact to receptors, and provide indicative (not background) data for future expansions.
Schedule 1	Maps updated

References

1. Department of Environment Regulation (DER) 2016, *Guidance Statement: Environmental Siting*, Perth, Western Australia.
2. DER 2017, *Guidance Statement: Risk Assessments*, Perth, Western Australia.
3. DER 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
4. Environmental Protection Authority 2014, *letter dated 3 June 2020 to Mr Ken Bell regarding Wonnerup North Mineral Sands Project*, available at <https://www.epa.wa.gov.au/proposals/wonnerup-north-mineral-sands-project>.
5. Wood 6 November 2020a. *Tronox Wonnerup North Lease M70-569 Environmental Noise Impact Assessment (Rpt01-1404556.2-Rev1)* (in DWER Document DWERDT363433)
6. Wood 19 February 2021. *Tronox Wonnerup Topsoil sensitivity analysis for M70-569 extension* (in DWER Document A1983790)
7. RPS 2014. *Wonnerup North Mineral Sands Project – Surface Water Assessment*. Prepared by RPS (DWER Document A1733710)

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

Condition	Summary of Licence Holder's comment	Department's response
-	Updated registered address	ASIC extract provided – DWER document A1985018. Updated.
1.1.2	Definition of mining operations – change to punctuation	Discussed with Licence Holder. Concern was addressed by rewording condition 3.4.1 (below). No additional changes required.
1.2.1	Condition redundant. Relates to the original mining area, constructed and mining is now complete.	Condition redundant. Removed. The remainder of conditions in section 1.2 renumbered.
1.2.2	Question the applicability of topsoil stripping row as initial topsoil stripping is not part of the prescribed activity.	Valid. Does not change controls as no construction/design requirements were listed anyway for this activity. Line removed.
1.2.5 - Upgrade of emission point W2	'so it is no longer dire' not relevant.	Editing error. Corrected to 'Pipe placed in culvert so it is no longer directly driven over'
1.2.5 – Noise bunding	<ol style="list-style-type: none"> 1. Within 30m of bund is workable. 2. Minimum 4m rather than 6m bund height to North 	<ol style="list-style-type: none"> 1. Noted. 2. In the absence of a sensitivity analysis on the noise model, showing the effect of mining south of only a 4m bund, the Delegated Officer considers that the 6m minimum is appropriate. The Licence Holder has chosen to retain this limit rather than delay the issue of this licence amendment.
1.2.6	Time limitation applied only to boundary bunds, not in-pit	Accepted. Consistent with intent of condition.
1.3.1	Layout error identified	Corrected
2.5.1	<ol style="list-style-type: none"> 1. Note breaks in bunds due to power lines – new map provided 2. Reference to new maps regarding north-south noise bunds 	<ol style="list-style-type: none"> 1. Noted. These are factored into the original noise model. Authorisation for breaks added to condition 2.5.1. 2. Map updated in Schedule 1; wording for north-south bunds updated in condition 2.5.1.
3.4.1	<ol style="list-style-type: none"> 1. 'mining operations' changed to 'an operating mining unit' in four places 2. East changed to west 	<ol style="list-style-type: none"> 1. Acceptable. No change to intent of condition. 2. Corrected. Error acknowledged.
3.4.1 (Table 3.4.2)	Units confusing.	Acknowledged. Reworded and confirmed proposed wording with Licence Holder. Changed frequency to only be required October-May. Dust risk outside this period is low.
Schedule 1: Maps	New map of emission points provided	Updated.

Appendix 2: Application validation summary

SECTION 1: APPLICATION SUMMARY				
Application type				
Amendment to licence	<input checked="" type="checkbox"/>	Current licence number:	L8739/2013	
		Relevant works approval number:	-	N/A
Date application received		4/11/20		
Applicant and Premises details				
Applicant name/s (full legal name/s)		Cable Sands (WA) Pty Ltd		
Premises name		Wonnerup Mineral Sands Mine		
Premises location		109 Sues Rd YALYALUP WA 6280 Legal description – Lot 100 on Deposited Plan 65306, Mining Lease M70/360 and M70/569 and part of Miscellaneous Licences L70/159 and L70/161		
Local Government Authority		City of Busselton		
Application documents				
HPCM file reference number:		FA253745		
Key application documents (additional to application form):		Proof of occupancy for M70/569, description of proposed amendments, updated Figures.		
Scope of application/assessment				
Summary of proposed activities or changes to existing operations.		Expansion of mining area to the North and East (North withdrawn 17/2/2021). Installation of new noise and dust monitoring stations. Noise attenuation bunds constructed of topsoil. Changes to discharges to water and surface water monitoring.		
Category number/s (activities that cause the premises to become prescribed premises)				
No change. Still category 6 (dewatering) and category 8 (mineral sands mining or processing)				
Legislative context and other approvals				
Has the applicant referred, or do they intend to refer, their proposal to the EPA under Part IV of the EP Act as a significant proposal?		Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Formal assessment not required		Referral decision No: Managed under Part V <input checked="" type="checkbox"/> Assessed under Part IV <input type="checkbox"/>
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?		Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		Ministerial statement No: EPA Report No:

Has the proposal been referred and/or assessed under the EPBC Act?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Reference No: EPBC 2014/7205
Has the applicant demonstrated occupancy (proof of occupier status)?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Proof of M70/569 provided. Other tenure as per existing licence.	Mining lease / tenement <input checked="" type="checkbox"/> Expiry:
Has the applicant obtained all relevant planning approvals?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A <input type="checkbox"/>	If N/A explain why? Mining Tenure
Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	CPS No: CPS8046
Has the applicant applied for, or have an existing CAWS Act clearing licence in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Licence/permit No: GWL202089
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Is the Premises situated in a Public Drinking Water Source Area (PDWSA)?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Is the Premises subject to any other Acts or subsidiary regulations (e.g. <i>Dangerous Goods Safety Act 2004</i> , <i>Environmental Protection (Controlled Waste) Regulations 2004</i> , <i>State Agreement Act xxxx</i>)	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Is the Premises within an Environmental Protection Policy (EPP) Area?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Is the Premises subject to any EPP requirements?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Is the Premises a known or suspected contaminated site under the <i>Contaminated Sites Act 2003</i> ?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	