Government of Western Australia
Department of Environment Regulation

# Works Approval

## *Environmental Protection Act 1986,* Part V

## Works Approval Holder: Kin Mining N.L.

## Works Approval Number: W5856/2015/1

**Registered office:** 342 Scarborough Beach Road
OSBORNE PARK WA 6017

**ACN:** 150 597 541

**Premises address:** Leonora Gold Project
Mining tenements M37/86, M37/277, M37/227, M37/300 and M37/428
LEONORA WA 6438

**Issue date:** Thursday, 27 August 2015

**Commencement date:** Monday, 31 August 2015

**Expiry date:** Thursday, 30 August 2018

The following category/s from the *Environmental Protection Regulations 1987* cause this Premises to be a prescribed premises for the purposes of the *Environmental Protection Act 1986*:

| Category number | Category description | Category production or design capacity | Approved premises production or design capacity |
|---|---|---|---|
| 5 | Processing or beneficiation of metallic or non-metallic ore. | 50 000 tonnes ore more per year | 150 000 tonnes per year |
| 7 | Vat or in situ leaching of metal: premises on which metal is extracted from ore with a chemical solution. | 5 000 tonnes or more per year | 150 000 tonnes per year |

**Conditions**
This Works Approval is subject to the conditions set out in the attached pages.

.....
Danielle Eyre
Officer delegated under section 20
of the *Environmental Protection Act 1986*

# Works Approval Conditions

# 1 General

### 1.1 Interpretation

1.1.1 In the Works Approval, definitions from the *Environmental Protection Act 1986* apply unless the contrary intention appears.

1.1.2 In the Works Approval, unless the contrary intention appears:

**'Act'** means the *Environmental Protection Act 1986;*

**'averaging period**' means the time over which a limit or target is measured or a monitoring result is obtained;

**'CEO'** means Chief Executive Officer of the Department of Environment Regulation;

**'CEO'** for the purpose of correspondence means;
Manager Licensing, Resources (South)

At the following address:
Department of Environment Regulation
Locked Bag 33
Cloisters Square
PERTH WA 6850
Telephone: (08) 6467 5000
Facsimile: (08) 6467 5562
Email: industry.regulation@der.wa.gov.au;

**'code of practice for the storage and handling of dangerous goods'** means document titled "Storage and handling of dangerous goods: Code of Practice" published by the Department of Mines and Petroleum, as amended from time to time;

**'Commissioning'** means the process of operation and testing that verifies the works and all relevant systems, plant, machinery and equipment have been installed and are performing in accordance with the design specification set out in the works approval application;

**'dangerous goods'** has the meaning defined in the *Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007*;

**'environmentally hazardous material'** means material (either solid or liquid raw materials, materials in the process of manufacture, manufactured products, products used in the manufacturing process, by-products and waste) which if discharged into the environment from or within the premises may cause pollution or environmental harm. Note: Environmentally hazardous materials include dangerous goods where they are stored in quantities below placard quantities. The storage of dangerous goods above placard quantities is regulated by the Department of Mines and Petroleum;

**'Premises'** means the area defined in the Premises Map in Schedule 1 and listed as the Premises address on page 1 of the Works Approval;

**'Schedule 1'** means Schedule 1 of this Works Approval unless otherwise stated;

**'Stage 1'** means construction of the first vat and the installation of the crushing and screening plant;

**'Stage 2'** means the construction of the second vat;

**'Stage 3'** means the construction of the third vat;

**'Stage 4'** means the construction of the fourth vat;

**'Stage 5'** means the construction of the fifth vat;

**'Stage 6'** means the construction of the sixth vat;

**'Stage 7'** means the construction of the seventh vat;

**'Stage 8'** means the construction of the eighth vat;

**'Works Approval'** means this Works Approval numbered W5856/2015/1 and issued under the Act;

**'Works Approval Holder'** means the person or organisation named as the Works Approval Holder on page 1 of the Works Approval;

1.1.3 Any reference to an Australian or other standard in the Works Approval means the relevant parts of the standard in force from time to time during the term of this Works Approval.

1.1.4 Any reference to a guideline or code of practice in the Works Approval means the current version of the guideline or code of practice in force from time to time, and shall include any amendments or replacements to that guidelines or code of practice made during the term of this Works Approval.

### 1.2 General conditions

1.2.1 The Works Approval Holder shall construct the works in accordance with the documentation detailed in Table 1.2.1:

**Table 1.2.1: Construction Requirements[1]**

| Document | Parts | Date of Document |
|---|---|---|
| Works Approval North Supporting Document – Leonora Gold Project, Prepared for Kin Mining by MWH. | All, including Drawings and Appendices | April, 2015 |
| Leonora Gold Project – Leach Vat Commissioning Plan, Navigator Mining | All | July, 2015 |

Note 1: Where the details and commitments of the documents listed in condition 1.2.1 are inconsistent with any other condition of this works approval, the conditions of this works approval shall prevail.

1.2.2 The Works Approval Holder, except where storage is prescribed in section 1.3, shall ensure that environmentally hazardous materials are stored in accordance with the Code of Practice for the Storage and handling of dangerous goods.

1.2.3 The Works Approval Holder shall undertake commissioning in accordance with the commissioning plan Leonora Gold Project – Leach Vat Commisioning Plan.

### 1.3 Premises operation

1.3.1 The Works Approvals Holder shall ensure that Installation of liners will be in accordance with:

(a) Quality Protection Guideline No. 3 – Liners for Waste Containment (Water and Rivers Commission, 2000); and

(b) Water Quality Protection Note No. 26 – Liners for containing pollutants, using synthetic membranes (Department of Water, 2013)

# 2 Information

## 2.1 Reporting

2.1.1 The Works Approval Holder shall submit a compliance document to the CEO, following the construction of each of Stages 1 - 8 of the works and prior to commissioning of the same.

2.1.2 The compliance document shall:
(a) certify that the works were constructed in accordance with the conditions of the works approval;
(b) be signed by a person authorised to represent the Works Approval Holder and contain the printed name and position of that person within the company.

## 2.2 Notification

2.2.1 The Works Approval Holder shall ensure that the parameters listed in Table 2.2.1 are notified to the CEO and are in accordance with the notification requirements of the table.

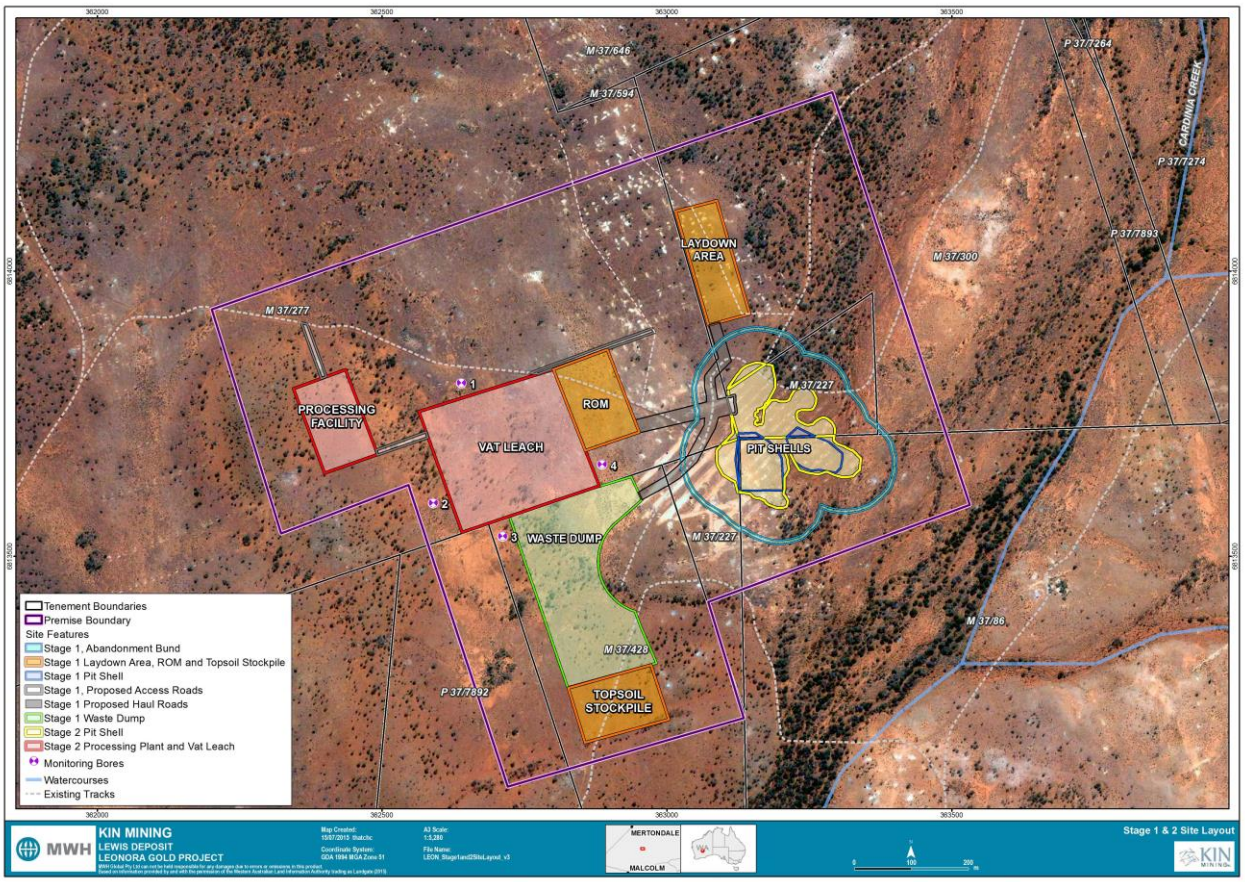
**Table 2.2.1: Notification requirements**

| Condition or table (if relevant) | Parameter | Notification requirement | Format or form |
|---|---|---|---|
| 1.2.4 | Commencement of commissioning | 7 days prior to start | None specified |
| | Completion of commissioning | 7 days after completion | |

# Schedule 1: Maps

## Premises map

The Premises is shown in the map below. The pink line depicts the Premises boundary.



Government of Western Australia
Department of Environment Regulation

# Decision Document

## *Environmental Protection Act 1986,* Part V

## Proponent: Kin Mining N.L.

## Works Approval: W5856/2015/1

| | |
|---|---|
| **Registered office:** | 342 Scarborough Beach Road<br>OSBORNE PARK WA 6017 |
| **ACN:** | 150 597 541 |
| **Premises address:** | Leonora Gold Project<br>Mining tenements M37/86, M37/277, M37/227, M37/300 and M37/428<br>LEONORA WA 6438 |
| **Issue date:** | Thursday, 27 August 2015 |
| **Commencement date:** | Monday, 31 August 2015 |
| **Expiry date:** | Thursday, 30 August 2018 |

**Decision**

Based on the assessment detailed in this document the Department of Environment Regulation (DER), has decided to issue a works approval. DER considers that in reaching this decision, it has taken into account all relevant considerations and legal requirements and that the Works Approval and its conditions will ensure that an appropriate level of environmental protection is provided.

| | |
|---|---|
| Decision Document prepared by: | Fiona Sharpe<br>Licensing Officer |
| Decision Document authorised by: | Danielle Eyre<br>Delegated Officer |

# Contents



# 1 Purpose of this Document

This decision document explains how DER has assessed and determined the application and provides a record of DER's decision-making process and how relevant factors have been taken into account. Stakeholders should note that this document is limited to DER's assessment and decision making under Part V of the *Environmental Protection Act 1986.* Other approvals may be required for the proposal, and it is the proponent's responsibility to ensure they have all relevant approvals for their Premises.

# 2 Administrative summary

| **Administrative details** | | |
|---|---|---|
| Application type | Works Approval ☒<br>New Licence ☐<br>Licence amendment ☐<br>Works Approval amendment ☐ | |
| Activities that cause the premises to become prescribed premises | **Category number(s)** | **Assessed design capacity** |
| | 7 | 150 000 tonnes per year |
| | 5 | 150 000 tonnes per year |
| Application verified<br>Application fee paid | Date: 17/06/2015<br>Date: 25/06/2015 | |
| Works Approval has been complied with<br>Compliance Certificate received | Yes☐ No☐ N/A☒<br>Yes☐ No☐ N/A☒ | |
| Commercial-in-confidence claim | Yes☐ No☒ | |
| Commercial-in-confidence claim outcome | N/A | |
| Is the proposal a Major Resource Project? | Yes☒ No☐ | |
| Was the proposal referred to the Environmental Protection Authority (EPA) under Part IV of the *Environmental Protection Act 1986*? | Yes☐ No☒ | Referral decision No:<br>Managed under Part V ☐<br>Assessed under Part IV ☐ |
| Is the proposal subject to Ministerial Conditions? | Yes☐ No☒ | Ministerial statement No: |

| | | |
|---|---|---|
| | | EPA Report No: |
| Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the *Environmental Protection Act 1986*)? | Yes☐ No☒<br>Department of Water consulted Yes ☐ No X | |
| Is the Premises within an Environmental Protection Policy (EPP) Area Yes☐ No☒<br>If Yes include details of which EPP(s) here. | | |
| Is the Premises subject to any EPP requirements? Yes☐ No☒<br>If Yes, include details here, eg Site is subject to $SO_2$ requirements of Kwinana EPP. | | |

# 3 Executive summary of proposal and assessment

Kin Mining purchased Navigator Mining Pty Ltd in November 2014. This included the Leonora Gold Project and all associated tenements. The Leonora Gold Project comprises the Mertondale, Cardinia, Gambier Lass and Raeside project areas. It is located approximately 35 km northeast of Leonora and 700 km northeast of Perth. Kin Mining are seeking to develop the Lewis deposit (the Project) which consists of a small pit in the Cardinia area of the Leonora Gold Project. The Project spans mining tenements M37/86, M37/277, M37/227, M37/300 and M37/428.

Mining of the Lewis deposit consist of several components including:

- A 4.7 ha open pit;
- A waste rock landform;
- A processing facility including leach vats and associated infrastructure;
- A run of mine (RoM) pad, laydown area and topsoil stockpile; and
- A total area of disturbance of 24.1 ha across five tenements

It is proposed the Lewis open cut pit will be mined to a depth of 25 m. It is proposed to extract a total of 854,775 tonnes of material, comprising 721,800 tonnes of waste and 132,975 tonnes of ore.

A screening plant will be positioned on the RoM to provide initial separation of ore based on size. There will be three sizes of ore expected, with processing dependent on the ore size (+25 mm ore – stockpiled for offsite processing; -25 mm/+ 10 mm ore – direct to vat leach; and -10 mm ore – agglomeration before vat leaching). Offsite processing and agglomeration will be reviewed as options based on ongoing investigations into the processing requirements of these ores. They will remain stockpiled on the RoM until this is defined.

The screening plant has a 500 tonne per hour capacity. It is expected that the screening plant will be able to process the 132,975 tonnes of ore within one year.

The 5.6 ha leach vat area will initially be stripped of topsoil and then wheel compacted to form and suitable base for the construction of eight vats. The outer vat leach wall will be constructed using compacted waste rock. Waste rock will be truck dumped in 0.5 m raises then track rolled with a bulldozer until the required compaction is reached. For track compaction, one coverage shall consist of one pass of the dozer. An overlap of 150 mm shall be maintained between the surfaces traversed by adjacent passes of the dozer. During the initial construction of the embankment, compaction trials will be conducted to establish the optimum compaction characteristics of the materials. The vat leach walls will be a total of 3.5 m tall.

A layer of -10 mm selected screened waste material will be placed on the vat leach embankment batters at 100 mm thickness and on the leach vat floor at 50 mm thickness to provide protection for the HDPE liner that will be laid on top. A Damtuff 40 HDPE liner will be used to line the leach vats. The liner will be anchored into the top of the leach vat embankments and will remain in place at closure. To collect pregnant liquor, 65 mm Draincoil piping will be placed across the base of the vat at 2 m intervals.

Ore will be placed in the leach vat with a front end loader progressing at 2 m intervals until completion of loading the leach vats with ore. After the leach vat construction and loadings have been completed, the leach vat will be flooded with water and a cyanide-caustic soda solution. Each 15,000 tonne leach vat will require approximately 5,000 kL of water.

Gold will leach out of the ore and form a gold pregnant solution which will then be pumped through pipe work to the Processing Facility.

The eight leach vats will be constructed and operated sequentially from one to eight, with construction taking around four weeks followed by a processing period of approximately eight weeks. At the end of the eight week cycle, the process liquor will be moved forward to the next vat, and the processed vat will be flushed with water until the cyanide is dissipated. The leach vats once constructed will be flooded with the gold extraction solution initially pumped from the reagent mixing area and then circulated through the carbon adsorption circuit.

# 4 Decision table

All applications are assessed in line with the *Environmental Protection Act 1986*, the *Environmental Protection Regulations 1987*, DEC's Policy Statement - Limits and targets for prescribed premises (2006), and DER's Operational Procedure on Assessing Emissions and Discharges from Prescribed Premises. Where other references have been used in making the decision they are detailed in the decision document.

| **DECISION TABLE** | | | |
|---|---|---|---|
| **Works Approval / Licence section** | **Condition number W = Works Approval L= Licence** | **Justification (including risk description & decision methodology where relevant)** | **Reference documents** |
| **General conditions** | L – 1.2.1 – 1.2.3 | DER's assessment and decision making are detailed in Appendix A. | Application supporting documentation |
| **Premises operation** | W – 1.3.1 | DER's assessment and decision making are detailed in Appendix A. | Application supporting documentation |
| | L – 1.3.1 – 1.3.4 | DER's assessment and decision making are detailed in Appendix A. | Application supporting documentation<br><br>*Environmental Protection Act 1986* |
| **Emissions general** | W – no conditions<br>L – no conditions | There are no emission conditions in the Works Approval or Licence, therefore no general emissions conditions. | N/A |
| **Point source emissions to air including monitoring** | W – no conditions<br>L – no conditions | **Construction and Operation**<br>No point source air emissions to air will occur during construction or operation. No conditions relating to air emissions are required for the Works Approval or Licence. | Application supporting documentation |
| **Point source emissions to surface water including monitoring** | W – no conditions<br>L – no conditions | **Construction and Operation**<br>No point source emissions to surface water will occur during construction or operation. No conditions relating to emissions to surface water are required for the Works Approval or Licence. | Application supporting documentation |

| DECISION TABLE | | | |
|---|---|---|---|
| **Works Approval / Licence section** | **Condition number W = Works Approval L= Licence** | **Justification (including risk description & decision methodology where relevant)** | **Reference documents** |
| **Point source emissions to groundwater including monitoring** | W – no conditions<br>L – no conditions | **Construction and Operation**<br>No point source emissions to groundwater will occur during construction or operation. No conditions relating to emissions to groundwater are required for the Works Approval or Licence. | Application supporting documentation |
| **Emissions to land including monitoring** | W – no conditions<br>L – no conditions | **Construction and Operation**<br>No emissions to land will occur during construction or operation. No conditions relating to emissions to land are required for the Works Approval or Licence. | Application supporting documentation |
| **Fugitive emissions** | W – no conditions<br>L – no conditions | **Construction and Normal Operation**<br><u>Emission Description</u><br>*Emission:* Fugitive dust emissions generated from movement of mobile plant, crushing and stockpiling of ore, loading ore into the vats, dusting from spent vats during construction and operation.<br><br>*Impact*: Dust emissions can be harmful to human health and the environment. Elevated particulate concentrations in ambient air can impact on native vegetation by smothering leaves. Small particle sized dust (less than 10 microns in diameter – known as PM10) in particular has the potential to impact on human health as it able to be drawn far into the lungs. The chemical and physical properties of the particles, the size of the particles and the duration of exposure are all factors which may affect human health impacts from dust.<br><br>*Controls*: Dust emissions will be minimised by spraying ore with water as required. There will be haul road water and dust suppression on stockpiles and open areas. PPE will be supplied to site personnel.<br><br>The site is remote from any township or communities. The nearest sensitive receptor is approximately 30 km away, including the Nambi Homestead and town of Leonora. | Application supporting documentation<br><br>General provisions of the *Environmental Protection Act 1986* |

| DECISION TABLE | | | |
|---|---|---|---|
| **Works Approval / Licence section** | **Condition number W = Works Approval L= Licence** | **Justification (including risk description & decision methodology where relevant)** | **Reference documents** |
| | | Risk Assessment<br>*Consequence:* Insignificant<br>*Likelihood*: Possible<br>*Risk Rating*: Low<br><br>Regulatory Controls<br>No specific conditions are required for fugitive dust emissions.<br><br>Residual Risk<br>*Consequence*: Insignificant<br>*Likelihood*: Unlikely<br>*Risk Rating*: Low | |
| **Odour** | W – no conditions<br>L – no conditions | **Construction and Operation**<br>No significant odour emissions are expected during the construction and operation. No conditions relating to odour are required for the Works Approval or Licence. | N/A |
| **Noise** | W – no conditions<br>L – no conditions | **Construction and Operation**<br>No significant noise emissions are expected during the construction and operation. No conditions relating to noise are required for the Works Approval or Licence. | N/A |
| **Monitoring general** | W – no conditions<br>L – 3.1.1 – 3.1.5 | General monitoring conditions will be included on the Licence to support the monitoring. No conditions are required for the Works Approval. | General provisions of the *Environmental Protection Act 1986* |
| **Monitoring of inputs and outputs** | W – no conditions<br>L – no conditions | **Construction and Operation**<br>No monitoring of inputs or outputs is required. | N/A |
| **Process monitoring** | W – no conditions | **Construction**<br>No process monitoring is required for the Works Approval. | Application supporting |

| DECISION TABLE | | | |
|---|---|---|---|
| **Works Approval / Licence section** | **Condition number W = Works Approval L= Licence** | **Justification (including risk description & decision methodology where relevant)** | **Reference documents** |
| | L – 2.2.1 | **Operation**<br>Condition 2.2.1 will be added to the Licence to ensure volumes of ore deposited into the vats are monitored. | documentation |
| **Ambient quality monitoring** | W – no conditions<br><br>L – 2.3.1 | **Construction**<br>No ambient environmental quality monitoring is required in the Works Approval. Dust and noise are the only potential emissions to the environment from construction work. As these emissions are anticipated to be low, no specific conditions relating to environmental quality monitoring are required to be added to the Works Approval.<br><br>**Normal Operation**<br>Ambient quality monitoring conditions will be included in the Licence to support the monitoring relating to ambient groundwater quality. Refer to DER's assessment for Premises Operation included as Appendix A. | Application supporting documentation<br><br>General provisions of the *Environmental Protection Act 1986* |
| **Meteorological monitoring** | W – no conditions<br>L – no conditions | **Construction and Operation**<br>Meteorological monitoring is not required for the Works Approval or Licence. | N/A |
| **Improvements** | W – no conditions<br>L – no conditions | No improvements are required for the Works Approval or Licence. | N/A |
| **Information** | W – 2.1.1 – 2.2.1<br><br>L3.1.1 – L3.3.1 | Standard conditions are listed on the Works Approval for the submission of a compliance document at the end of each construction phase.<br><br>Standard conditions will be included on the Licence relating to the management of records and complaints, notification requirements and the submission of an annual audit compliance report and annual environmental report are included on the Licence. | |
| **Licence Duration** | N/A | The Works Approval will be issued for a duration of three years in accordance with Guidance Statement on Licence Duration. | Guidance Statement on Licence Duration |

# 5 Advertisement and consultation table

| Date | Event | Comments received/Notes | How comments were taken into consideration |
|---|---|---|---|
| 06/07/2015 | Application advertised in West Australian (or other relevant newspaper) | No comments received | |
| 06/07/2015 | Application referred to interested parties listed<br>Department of Mines and Petroleum<br>Shire of Leonora | No comments received | |
| 10/08/2015 | Proponent sent a copy of draft instrument | One comment received to amend the annual reporting date. | Date amended. |

# 6 Risk Assessment

*Note: This matrix is taken from the DER Corporate Policy Statement No. 07 - Operational Risk Management*

## Table 1: Emissions Risk Matrix

| Likelihood | Consequence | | | | |
|---|---|---|---|---|---|
| | Insignificant | Minor | Moderate | Major | Severe |
| Almost Certain | Moderate | High | High | Extreme | Extreme |
| Likely | Moderate | Moderate | High | High | Extreme |
| Possible | Low | Moderate | Moderate | High | Extreme |
| Unlikely | Low | Moderate | Moderate | Moderate | High |
| Rare | Low | Low | Moderate | Moderate | High |

# Appendix A

## Premises Operation, including ambient groundwater quality monitoring

### Emergency Operation

Emission Description
*Emission*: Overtopping of vat cells, due to poor management or storm inundation, spilling saline alkaline process liquor containing trace metals and cyanide to land.

*Impact:* Soil contamination and impact to native vegetation, including vegetation death from contact with saline, alkaline liquor with metals and cyanide.

No surface water bodies of significant watercourses are located within the project area.

*Controls*: Vats will be constructed and managed such that a minimum top of embankment freeboard of 350-500mm is maintained such that a 1 in 100 year, 72 hour storm event will not cause overtopping of the vat cells.

Liquor levels in the vats will be monitored during heavy rainfall and if necessary liquor will be pumped to other completed vats to prevent overtopping of the active vat.

Six hourly inspections will be carried out of processing facilities.

Risk Assessment
*Consequence*: Moderate
*Likelihood:* Possible
*Risk Rating:* Moderate

Regulatory Controls
Conditions 1.3.2 – 1.3.4 will be added to the Licence to ensure that the vats' freeboard is maintained and that the vats are regularly inspected.

Condition 1.2.3 will be included in the Licence to ensure that uncontaminated stormwater is kept separate from contaminated or potentially contaminated stormwater.

Residual Risk
*Consequence*: Moderate
*Likelihood:* Rare
*Risk Rating:* Moderate

### Emergency Operation

Emission Description
*Emission*: Leakage from the vats, discharging saline, alkaline process liquor containing trace metals and cyanide to land.

*Impact:* Soil contamination and impact to native vegetation, including vegetation death from contact with saline, alkaline liquor with metals and cyanide.

No surface water bodies of significant watercourses are located within the project area.

*Controls*: The vats have been lined with a high quality Damtuff HDPE liner, which will be installed as per manufacturer recommendations to prevent any seepage or leakage.

A layer of -10 mm selected screened waste material will be placed on the vat leach embankment batters at 100 mm thickness and on the leach vat floor at 50 mm thickness to provide protection for the HDPE liner that will be laid on top, so as to minimise the risk of damage to the liner. The liner will be anchored into the top of the leach vat embankments and will remain in place at closure.

The processing pumps will pump approximately 6 litres per second and will be fitted with pressure sensors to shut down in the event of any pipe leakage. The processing facility, leach vats and all associated pipework will be inspected on a 6 hourly basis for leaks or equipment malfunctions.

If any leaks are identified, the processing facility will be shutdown and the situation rectified prior to recommencing processing. As a precaution, safety bund walls will be established around the leach vats to contain any process water in the event of any leakage.

Risk Assessment
*Consequence*: Moderate
*Likelihood:* Possible
*Risk Rating:* Moderate

Regulatory Controls
Premises operation condition 1.3.1 will be added to the Works Approval requiring the Works Approval Holder to install liners as per *WQPG3 – Water Quality Protection Guideline No. 3 – Liners for Waste Containment (Water and Rivers Commission, 2000)* and *WQPN26 – Water Quality Protection Note No. 26 – Liners for containing pollutants, using synthetic membranes*.

Conditions 1.3.2 and 1.3.4 will be added to the Licence to ensure that the vats have the appropriate liner system and that inspections of the vats and leak detection is completed as proposed.

Residual Risk
*Consequence*: Moderate
*Likelihood:* Rare
*Risk Rating:* Moderate

**Emergency Operation**

Emission Description
*Emission*: Leaking vat liners allowing seepage of saline, alkaline process liquors containing trace metals and cyanide, migrating to groundwater.

*Impact*: Contamination of local groundwater with cyanide and trace metals, increasing the pH of groundwater and elevation of groundwater levels. Groundwater in the area varies from 10.2 – 19.3 mbgl.

*Controls*: The vats will be constructed with a Damtuff 40 HDPE liner to prevent any seepage or leakage. The construction of the vat involves selecting a layer of -10mm selected screened waste material which will be placed on the vat leach embankment batters at 100mm thickness and on the leach vat floor at 50mm thickness to provide protection for the liner that will be laid on top. The liner will be anchored into the top of the leach vat embankments and will remain in place at closure.

A series of groundwater monitoring bores will be installed to monitor for any potential groundwater pollution that could result from the operation of the vat leach facility. There are four bores proposed,

three of which will be down gradient from the prevailing groundwater flows and a forth will be up gradient as a control. The proponent is proposing quarterly monitoring.

Risk Assessment
*Consequence*: Moderate
*Likelihood:* Unlikely
*Risk Rating:* Moderate

Regulatory Controls
Conditions 1.3.2 and 1.3.4 will be included in the Licence to ensure that the vats have the appropriate liner system and that inspections of the vats and leak detection is completed as proposed.

Condition 2.3.1 will be included in the Licence to ensure that the groundwater quality in the four groundwater bores is monitored on a quarterly basis.

Residual Risk
*Consequence*: Moderate
*Likelihood:* Unlikely
*Risk Rating:* Moderate

**Emergency Operation**

Emission Description
*Emission*: Failure of process liquor pipelines (either to or from the vats to the carbon recovery facility).

*Impact*: Release of saline, alkaline, cyanide solution containing gold and trace metals.

The liquor has the potential to cause localised soil contamination and impact on native vegetation.

*Controls*: All pipework will be in bunding and pressure sensors and shut-off valves will be installed. 6 hourly inspections will be carried out of processing facilities, including pipelines.

Risk Assessment
*Consequence*: Minor
*Likelihood:* Possible
*Risk Rating:* Moderate

Regulatory Controls
Condition 1.3.1 will be added to the Licence to ensure the proposed controls are placed on the pipelines to mitigate the impact of a spill. Condition 1.3.4 will also be placed on the Licence to ensure that inspections of pipeline infrastructure are conducted on a regular basis.

Residual Risk
*Consequence*: Minor
*Likelihood:* Possible
*Risk Rating:* Moderate