Department of
Environment and Conservation
Our environment, our future

Decision Document

Environmental Protection Act 1986, Part V

Proponent: Doral Mineral Sands Pty Ltd

Works Approval: W5412/2013/1

Registered office:	1 Alumina Road EAST ROCKINGHAM WA 6168
ACN:	096 342 451
Premises address:	Picton Dry Separation Plant Harris Road PICTON WA 6229 Being Lot 6 on Diagram 61381, Lot 500 on Diagram 75572 and Lot 501 on Diagram 75572
Issue Date:	Friday 28/06/2013
Commencement Date:	Monday 01/07/2013
Expiry Date:	Thursday 30/06/2013

Decision

Based on the assessment detailed in this document, the Department of Environment and Conservation (DEC), has decided to issue a works approval. DEC 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: .Amine Callegari.....
Regional Environmental Officer

Decision Document Authorised By: .Neville Welsh.....
Regional Leader

Contents

1 Purpose of this Document

This decision document explains how DEC has assessed and determined the application for a works approval or licence, and provides a record of DEC's decision-making process and how relevant factors have been taken into account. Stakeholders should note that this document is limited to DEC'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.

Works approval and licence conditions
DEC has three types of conditions that may be imposed on works approvals and licences. They are as follows;

Standard conditions (SC)

DEC has standard conditions that are imposed on all works approvals and licences regardless of the activities undertaken on the Premises and the information provided in the application. These are included as the following conditions on works approvals and licences:

Works approval conditions: 1.1.1-1.1.3, 1.2.1, 1.2.2, 5.1.1 and 5.1.2.

Licence conditions: 1.1.1-1.1.3, 1.2.1-1.2.4, 5.1.1-5.1.4 and 5.2.1.

For such conditions, justification within the Decision Document is not provided.

Optional standard conditions (OSC)

In the interests of regulatory consistency DEC has a set of optional standard conditions that can be imposed on works approvals and licences. DEC will include optional standard conditions as necessary, and are likely to constitute the majority of conditions in any licence. The inclusion of any optional standard conditions are justified in Section 4 of this document.

Non standard conditions (NSC)

Where the proposed activities require conditions outside the standard conditions suite DEC will impose one or more non-standard conditions. These include both premises and sector specific conditions, and are likely to occur within few licences. Where used, justification for the application of these conditions will be included in Section 4.

2 Administrative Summary

Administrative Details		
Application Type	Works Approval ☒ New Licence ☐ Licence Amendment ☐ Works Approval Amendment ☐	
Activities that cause the premises to become prescribed premises	**Category Number(s)** 08	**Design Capacity** 350,000 tonnes
Application Verified Application Fee Paid	Date: 21/03/2013 Date: 26/04/2013	
Works Approval has been complied with Compliance Certificate received	Yes ☐ No ☐ N/A ☒ Yes ☐ No ☐ N/A ☒	
Commercial-in-confidence claim	Yes ☐ No ☒	
Commercial-in-confidence claim outcome		
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: Ass No. 624 &1138 Managed under Part V ☐ Assessed under Part IV ☒
Is the proposal subject to Ministerial Conditions?	Yes ☒ No ☐	Ministerial Statement No: 239 & 484 EPA Report No: Bulletin 605 & 898
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 ☐ Bunbury Groundwater Area Department of Water consulted Yes ☐ No ☒	
Is the Premises within an Environmental Protection Policy (EPP) Area Yes ☐ No ☒		
Is the Premises subject to any EPP requirements? Yes ☐ No ☒		

3 Executive summary of proposal

Doral Mineral Sands Pty Ltd (Doral) operates the Picton Dry Plant. The plant is located in an industrial area approximately 5km east of Bunbury and 200km south of Perth. The plant was originally built in the late 1980's with a design throughput of 50,000 tonnes per annum. It was upgraded to increase the design throughput and the modified plant was commissioned in 2002. The plant currently processes heavy mineral concentrate (HMC) from the Doral Dardanup Mine, approximately 20km east of Bunbury. Up to 250,000 tonnes of HMC is processed per annum to separate Zircon, Ilmenite and Leucoxene concentrates via magnetic, electrostatic, gravity and wet separation.

The Dry Separation Plant is housed within an enclosed building and consists of a gas fired dryer, magnetic separators, high tension separators, wet separation spirals, cyclones and bag house. Other infrastructure on the premises includes diesel storage, product storage shed, HMC stockpile, intermediate zircon stockpiles, three process water ponds, water treatment plant, tailings storage area, workshop/store, laboratory and weighbridge.

Doral are proposing to toll treat approximately 110,000 tonne per annum of HMC from the MZI Resources (MZI) Keysbrook Mining Operation, located approximately 60km south of Perth, and 30km east of Mandurah. HMC will be trucked to the Picton Dry Plant from the mining operation. Processing of the Dardanup and Keysbrook HMC feeds will be undertaken on a monthly alternating schedule.

Heavy mineral concentrate from the Keysbrook Mining Operation has a higher concentration of Zircon and Leucoxene, and a lower concentration of Ilmenite than HMC from the Dardanup mine. To enable efficient batch processing of the two different HMC feeds, new equipment and modifications to the premises are required. Throughput will be increased to up to 350,000 tonnes of HMC per annum and an additional 26,700 tonnes of tailings will be produced from the Keysbrook HMC feed. Tailings from the Keysbrook HMC will be managed in the same way as the Dardanup tailings. Dardanup tailings are temporarily stored on site to dry before being trucked back to the mine for disposal. Keysbrook tailings will be returned to the Keysbrook mine via truck for disposal.

Works proposed as part of this works approval application include installation of a second bag house and reconfiguration of part of the dust extraction system. The baghouse will be supplied by Mideco Dust Control Pty Ltd, model TAPC PJ2-144-3-2PP with a fan capable of 14500 normal cubic metres per hour air flow. Dust extracted from the fluid bed dryer and cooler will be directed to the new bag house and dust from the remaining dry plant equipment and new separation machines will be directed to the existing bag house. An enclosed annexe will be established on the northern side of the existing dry plant building to include an extended Leucoxene circuit. A new concentrate pump and stacking cyclone will also be installed near the HMC stockpile to establish a zircon concentrate stockpile. All works will be undertaken within existing cleared areas so no additional clearing is proposed. The most significant emissions are fugitive and point source dust from stockpiles and the dry plant as well as fugitive emissions to groundwater and land from the tailings stockpile.

The Picton Dry Plant is surrounded by other industries including a power substation, asphalt plant, earthmoving business and an oil recycling facility. The closest residential premise to

the operation is a property approximately 1.5km to the south east. The only ecological receptor of significance within proximity of the premises is the Ferguson River approximately 90m south of the premises boundary.

Doral's activities at the Picton Dry Plant are conducted in accordance with a Department of Mines and Petroleum (DMP) approved Radiation Management Plan and a Radiological Council of Western Australia Registration (RS 72/2001 12866).The Radiation Management Plan will be updated to include the upgrades to the Dry Plant.

4 Decision Table

All applications are assessed under the *Environmental Protection Act 1986*, the Environmental Protection Regulations 1987, DEC's Policy Statement - Limits and targets for prescribed premises 2006, the risk matrix attached to this decision document in Appendix A and DEC's Industry Regulation Emissions and Discharges Assessment Framework. Where other references have been used in making the decision they are detailed in the decision table.

DECISION TABLE				
Works Approval / Licence Section	**Condition Number W = Works Approval L= Licence**	**OSC or NSC**	**Justification (including risk description & decision methodology where relevant)**	**Reference Documents**
General Conditions	W1.2.3 W1.2.4	OSC	**Construction** Doral require the works to be commissioned under the works approval. OSC's 1.2.3 and 1.2.4 have been included on the works approval to authorise commissioning under the works approval. Doral were unable to provide a commissioning plan at the time of the works approval application due to contractual arrangements not being finalised with the construction contractor. Improvement condition IR1 has been included to enable Doral to prepare a commissioning plan for approval prior to commencing commissioning works. OSC 1.2.3 therefore refers to IR1. Standard general conditions have also been applied to the works approval.	Application supporting documentation.

	L1.2.5 L1.2.6	NSC	**Operation** *Emission Significance* - 3 *Socio-political context* - No concern or interest. *Risk Assessment* - D – licence conditions The premises has a dedicated underground and open channel stormwater drainage and collection system which collects runoff from sealed plant/workshop/laboratory areas, process water ponds, the HMC stockpile and tailings storage areas. Stormwater is directed via the drainage system to a settling sump (set up as a biofilter containing a variety of sedge species) before release to a neighbouring stormwater drain (Road Reserve Drain) which originates in north east Picton and discharges into the Ferguson River. A small section of the premises is undisturbed and vegetated. Runoff from this area is unlikely to be contaminated and discharges directly to the adjacent drain. There is minimal chemical and hydrocarbon use on the premises therefore the main contaminant in stormwater is suspended solids collected from stockpiles and a build up of material around the premises. Annual vacuum cleaning of the underground drainage system is scheduled to remove built up materials which could impede flow through the drainage network. The requirement for annual cleaning of the drainage system was introduced following an incident in September 2012 where stormwater overflowed from the drainage system due to a build up of sediments. A compliance inspection undertaken at the premises in March 2013 identified that stormwater is not diverted away from stockpiles as required by current conditions of licence resulting in stormwater collecting large quantities of sediment from the stockpiles and carrying them into the drainage system. Section W4 addresses this issue. NSCs 1.2.5 and 1.2.6 will be included in the licence to ensure contaminated and potentially contaminated stormwater is collected and treated to prevent discharging contaminants to the Ferguson River. Standard general conditions will also be included on the licence.	Application supporting documentation Doral Mineral Sands Pty Ltd Annual Environmental Report 2012 Site inspection report March 2013

Premises Operation	L1.3.1 L1.3.2	OSC	**Operation** *Emission Significance* - 3 *Socio-political context* - No concern or interest. *Risk Assessment* - D – licence conditions The Picton Dry Plant process is a closed water circuit. Process water is collected and settled through a series of three process water dams for reuse. Recycled process water includes water recovered from the wet separation circuit, dewater removed from the tailings stream via cyclone, and seepage from the HMC stockpile. HMC is stockpiled at approximately 7-8% moisture content. Any moisture seeping from the stockpile is collected via a subsoil drainage system beneath the HMC stockpile, which drains to a collection sump, from which it is pumped to the process water ponds. Minimal chemical treatment of process water occurs. Only biocides, flocculent and sodium hydroxide are added as required to maintain water quality and aid settling. The main contaminant in the process water is sediment although it may also contain elevated metals and radioactivity due to extended contact with HMC. The three process water ponds are lined with HDPE liner and were being progressively cleared of sediment in early 2013. The ponds had minimal freeboard and vegetative growth was observed around the top embankment of one of the ponds potentially providing a seepage pathway. OSC 1.3.1 will be included in the amended licence to ensure the ponds and process water pipelines are regularly inspected to identify potential integrity issues (such as vegetative growth and insufficient freeboard) before the infrastructure is compromised. OSC 1.3.2 will also be included to ensure the ponds are managed in a manner which minimises the risk of the ponds overtopping, seeping or failing.	Application supporting documentation Doral Mineral Sands Pty Ltd Annual Environmental Report 2012 Site inspection report March 2013
Emissions General	W2	N/A	**Construction** There are no specific conditions relating to emissions during construction or commissioning of the Picton Dry Plant.	N/A

	L2.1.1	OSC	**Operation** Descriptive limits will be set through condition 2.6.2 of the licence and limits and targets will be included for both point source and ambient emissions therefore OSC 2.1.1 requiring recording and investigation of limits and target exceedances will be included in the licence.	Application supporting documentation
Point source emissions to air including monitoring	W2 and W3	OSC	**Construction** *Emission Significance* - 1 *Socio-political context* - No concern or interest. *Risk Assessment* - E – no regulation No significant point source air emissions are expected during the construction works therefore there are no specific point source air emissions monitoring requirements included on the works approval. Doral have provided detail on the bags being used in the new baghouse which includes the maximum particulate emissions expected for the bags (20mg/m^3). Baghouse emissions levels are not solely influenced by the characteristics of the bags used. Emissions levels are influenced by a number of other factors such as airflow, dust properties, operational conditions and the dust loading on the bag. As a result of other influencing factors, emissions are typically lower than the advertised emission limit for the bag. It is therefore anticipated that actual emissions from the baghouse will be lower than 20mg/m^3. In order to verify that the baghouse is able to achieve the proposed emission target of 20mg/m^3 OSC 4.1.1 (IR1) has been included in the works approval which requires a commissioning plan with monitoring requirements is submitted. OSC 5.1.3 has also been included which requires that a commissioning report is submitted following completion of commissioning. The report is to include a summary of the environmental performance of the plant which will include the results of monitoring undertaken in accordance with the commissioning plan.	Application supporting documentation NSW Protection of the Environment Operations (Clean Air) Regulation 2010 Doral Mineral Sands Pty Ltd Annual Environmental Reports 2008-2012

	L2.2 and L3.2	OSC	**Operation** *Emission Significance* – 2 *Socio-political context* – Low *Risk Assessment* – D Licence conditions, targets set Details of DEC's assessment and decision making are included in Appendix 1 - Point source emissions to air including monitoring.	Application supporting documentation Doral Mineral Sands Pty Ltd Annual Environmental Reports 2008-2012 NSW Protection of the Environment Operations (Clean Air) Regulation 2010
Point source emissions to surface water including monitoring	W2 and W3	N/A	**Construction** *Emission Significance* - 1 *Socio-political context* - No concern or interest. *Risk Assessment* - E –no regulation No significant point source emissions to surface water are expected during the construction works. No specific conditions relating to point source emissions to surface water or the monitoring of these emissions are required to be added to the works approval	Application supporting documentation
	L2.3.1 and L3.3.1	OSC	**Operation** *Emission Significance* – 3 *Socio-political context* – No concern or interest. *Risk Assessment* – D Licence conditions, targets set Details of DEC's assessment and decision making are included in Appendix 1 - Stormwater Control and Point Source Emissions to Surface Water.	Application supporting documentation Doral Mineral Sands Pty Ltd Annual Environmental Report 2012 Site inspection report March 2013 Department of Water Water Resources Data ANZECC Guidelines 2000

Point source emissions to groundwater including monitoring	W2 and W3 L2.5 and L3.5	N/A	**Construction and Operation** *Emission Significance* - 1 *Socio-political context* - No concern or interest. *Risk Assessment* - E –no regulation No significant point source emissions to groundwater are expected during the construction works or operation of the premises. No specific conditions relating to point source emissions to groundwater or the monitoring of these emissions are required to be added to the works approval or licence.	Application supporting documentation
Emissions to land including monitoring	W2 and W3 L2.4 and L3.4	N/A	**Construction and Operation** *Emission Significance* - 1 *Socio-political context* - No concern or interest. *Risk Assessment* - E –no regulation No significant emissions to land are expected during the construction works or operation of this premises. HMC from Dardanup and Keysbrook has low risk of acid sulphate soils so is not considered to be a significant risk. There is minimal storage of environmentally hazardous substances on the premises. Stockpiling of HMC, tailings and intermediate product is undertaken on unsealed areas of the premises. There is potential for fugitive emissions to land or groundwater from these activities. Details of DEC's assessment and decision making in relation to these emissions are included in Appendix 1 - Fugitive Emissions to Land and Groundwater.	Application supporting documentation
Fugitive Emissions	W2	N/A	**Construction** *Emission Significance* - 1 *Socio-political context* - No concern or interest. *Risk Assessment* - E –no regulation No significant fugitive dust emissions are expected to occur as a result of the construction works. No specific conditions relating to dust emissions or the monitoring of them are required to be added to the works approval.	Application supporting documentation

	L2.6.1 L2.6.2	OSC	**Operations** *Emission Significance* - 3 *Socio-political context* - No concern or interest. *Risk Assessment* - D –Licence conditions Details of DEC's assessment and decision making are included in Appendix 1 – Fugitive Emissions to Air and Ambient Air Quality Monitoring.	Application supporting documentation Doral Mineral Sands Pty Ltd Annual Environmental Reports 2008-2012 Site inspection report March 2013
Odour	W2 L2.7	N/A	**Operation and Construction** *Emission Significance* – 1 *Socio-political context* –No concern or interest *Risk Assessment* – E –no regulation No odour emissions are expected during construction works or as a result of operation of the Picton Dry Plant. No specific conditions relating to odour emissions or the monitoring of these emissions are required to be added to the works approval or licence.	Application supporting documentation
Noise	W2	NA	**Construction** *Emission Significance* – 1 *Socio-political context* –No concern or interest *Risk Assessment* – E –no regulation The Picton Plant is located in the Picton Industrial area adjacent to other noise producing operations including an Asphalt plant and earthmoving business. The nearest sensitive receptors are approximately 1.5km south east of the plant. Construction work will be undertaken between the hours of 7am-5pm Monday to Friday. No significant increases to current noise emissions are anticipated during the construction phase therefore no specific conditions relating to noise emission are required to be added to the works approval however noise monitoring in accordance with the current licence for the premises will continue.	Application supporting documentation

<table>
<tr>
<td></td>
<td>L2.8.1</td>
<td>NSC</td>
<td>
Operation
Emission Significance – 4
Socio-political context –No concern or interest
Risk Assessment – C –licence conditions
The Picton Dry Plant is located in the Picton Industrial area adjacent to other noise producing operations including an Asphalt plant and earthmoving business. The nearest sensitive receptors are approximately 1.5km south east of the plant.

Noise monitoring is undertaken biannually at the premises' Eastern boundary and between the dry plant and administration building. Approximately 40% of recorded noise is derived from background sources such as traffic, adjacent industry, birds and wind. A summary of annually reported noise monitoring is included below. Measurements are collected using a B&K 2250 sound level meter mounted on a tripod over a minimum 15 minute period.
<table>
<tr><th>Monitoring Date</th><th>Boundary Monitoring (L_{A10} dBA)</th><th>Plant Monitoring (L_{A10} dBA)</th></tr>
<tr><td>April 2007</td><td>62.1</td><td>70.6</td></tr>
<tr><td>January 2008</td><td>56</td><td>71</td></tr>
<tr><td>June 2008</td><td>68</td><td>57</td></tr>
<tr><td>December 2009</td><td>65.5</td><td>56.8</td></tr>
<tr><td>November 2010</td><td>60.74</td><td>64.42</td></tr>
<tr><td>September 2011</td><td>57.75</td><td>63.79</td></tr>
<tr><td>February 2012</td><td>57.14</td><td>66.11</td></tr>
<tr><td>September 2012</td><td>59.59</td><td>63.9</td></tr>
</table>
Assigned L_{A10} noise level at noise sensitive premises>15m from a building directly associated with a noise sensitive use – 60dBA
Assigned L_{A10} noise level at Industrial and utility premises – 65dBA

Doral predict noise emission will not change as new equipment is in an enclosed building, and some equipment is being removed. Continued monitoring of noise emissions from the premises is warranted to verify that noise levels do not significantly increase following modification of the plant, and that they remain within assigned levels. NSC 2.8.1 will be included on the licence requiring continued noise monitoring at the same frequency and location as previous licences.
</td>
<td>Application supporting documentation

Environmental Protection (Noise) Regulations 1997</td>
</tr>
</table>

Monitoring General	L3.1.1 – 3.1.5	OSC	**Operation** Monitoring of point source emissions to air, surface water and ambient air and water quality are conditions of the licence therefore OSC's relating to the collection of samples, frequency of sampling, and monitoring equipment calibration have been included to ensure monitoring results are reliable and accurate.	Application supporting documentation
Monitoring of inputs, outputs and process monitoring	W3 L3.6-3.7	N/A	**Operation and Construction** Monitoring of inputs, outputs and process parameters are not required to adequately manage emissions from this premises during construction or operation. OSCs relating to monitoring of these aspects will therefore not be included in the works approval or licence.	Application supporting documentation
Ambient Quality Monitoring	W3	N/A	**Construction** Construction operations are unlikely to have any significant impact on current ambient air or water quality therefore OSCs relating to ambient quality monitoring have not been included in the works approval.	Application supporting documentation
	L3.8.1	OSC	**Operation - Air** *Emission Significance* – 3 *Socio-political context* –No concern or interest *Risk Assessment* – D –licence conditions Details of DEC's assessment and decision making are included in Appendix 1 – Fugitive Emissions to Air and Ambient Air Quality Monitoring.	Application supporting documentation Doral Mineral Sands Pty Ltd Annual Environmental Reports 2008-2012 *Environmental Protection (Kwinana) (Atmospheric Wastes) Regulations 1992* Site inspection report March 2013
	L3.8.2	OSC	**Operation – Groundwater/Land** *Emission Significance* – 3 *Socio-political context* –No concern or interest *Risk Assessment* – D –licence conditions Details of DEC's assessment and decision making are included in Appendix 1 – Fugitive Emissions to Land and Groundwater.	Application supporting documentation Doral Mineral Sands Pty Ltd Annual Environmental Report 2012 Site inspection report March 2013

Meteorological monitoring	W3 L3.9	N/A	Monitoring of meteorological conditions is not required to adequately manage emissions from this premises therefore OSCs relating to meteorological monitoring will not be included in the works approval or licence.	NA
Improvements	W4 L4	OSC N/A	Two improvement requirements have been included on the works approval. Doral were unable to provide a commissioning plan at the time of the works approval application due to contractual arrangements not being finalised with the construction contractor. Commissioning will however need to be undertaken under the works approval to ensure the plant is ready for operation at the appropriate time therefore improvement condition IR1 has been included on the works approval requiring submission of a commissioning plan. A compliance inspection was undertaken at the premises on 12 March 2013. The inspection identified that stormwater management requires improvement. Of particular concern was the potential for contamination of stormwater with sediments from stockpiles as the premises has no stormwater diversion established around stockpiles. Improvement condition IR2 has been included in the works approval to develop a Stormwater Management Plan which incorporates a review of current stormwater management practices, identification of stormwater management issues and development of an implementation schedule for improvements. A review of management plans submitted with the works approval application was undertaken as part of this assessment. This identified that the plans are heavily reliant on licence conditions rather than specific management methods. It is recommended that the Groundwater, Surface Water and Dust management plans are reviewed. Consideration will be given to including review of these plans as an improvement condition in the licence amendment.	Application supporting documentation Doral Mineral Sands Pty Ltd Annual Environmental Report 2012 Site inspection report March 2013 Department of Water Stormwater Management Manual for Western Australia (Chapter 5)
Information	W5.1 W5.2.1	SC OSC	Standard conditions requiring submission of a compliance document upon completion of the works have been included in the works approval. OSC 5.2.1 has also been included to ensure DEC is informed when commissioning is commencing and completed.	Application supporting documentation

	L5.1	SC	Standard conditions relating to records will be included on the licence.	NA
	L5.2.1 L5.2.2	SC OSC	SC 5.2.1 relating to submission and content of the Annual Environmental Report will be included on the licence and modified to suit the premises and conditions of the licence. OSC 5.2.2 will also be included on the licence to ensure production data relevant to emission monitoring at the bag houses is included in the AER and that a regular review of monitoring data in comparison with historic results, limits and targets is undertaken to assist in identification of potential environmental impacts at an early stage.	NA
	L5.3.1	OSC	The OSC relating to DEC notification will be included on the licence to ensure DEC is made aware of all relevant limit and target exceedances, and the failure or malfunction of any pollution control equipment, within a suitable timeframe.	NA

5 Advertisement and Consultation Table

Date	Event	Comments received/Notes	How comments were taken into consideration
06/05/2013	Application advertised in West Australian (or other relevant newspaper)	No comments received	
03/05/2013	Application referred to interested parties listed: City of Bunbury	No comments received	
05/06/2013	Proponent sent a copy of draft instrument	Comments received 18 June 2013	Commissioning plan date extended. Registered address of occupier amended to new address.

6. Appendix 1

Point source emissions to air including monitoring

Separation of HMC at the Picton Dry Plant is undertaken within an enclosed building. The building has a single discharge stack (Baghouse Exhaust Stack 1) through which all exhaust and ventilation gases from the plant are currently discharged. Exhaust and ventilation gases are directed through a baghouse fitted with a Teflon coated filter (manufactured by Albany Filtration Technologies) to remove particulates before discharge through the exhaust stack.

The proposed modifications, for which this works approval has been sought, include a second baghouse and exhaust stack (Baghouse Exhaust Stack 2) for the separation plant and modification of the ventilation system. The modifications will direct exhaust and ventilation gases from the existing dry separation circuit and new leucoxene separation circuit to the existing Baghouse Exhaust Stack 1. Particulate and exhaust gas emissions from the primary fluid bed drier will be directed to the new Baghouse Exhaust Stack 2. The new baghouse will be fitted with a Mideco filter which has an advertised emission capability of 20 mg/Nm^3 on start up, reducing to 10 mg/Nm^3 during operation. Actual emissions can be higher or lower than the advertised capability however depending on the design and performance of the bag house. OSC 2.2.1 will be included in the licence to define the two emission points.

Sampling and analysis of exhaust gases from Baghouse Exhaust Stack 1 are undertaken on an annual basis in accordance with current licence condition. Results from the past five annual environmental reports are included in Table 1. The most significant emission from the baghouse is particulates therefore the existing licence includes a limit of 150g/m^3 TSP however results are well within this limit (Table 1). Sulfur dioxide (SO_2) and Oxides of Nitrogen (NOx) are not expected to vary significantly from current levels as the source of these emissions is from incomplete combustion of fuel in the gas fired drier, which is not being altered as part of this proposal. There is little reference documentation for comparison of SO_2 and NOx emissions from HMC dry separation plants to determine the significance of the emissions. Comparison was however made with emission benchmarks in the UK Environment Agency Sector Guidance Note for Non-Ferrous Metals and the Production of Carbon and Graphite (2.03), and the New South Wales *Protection of the Environment Operations (Clean Air) Regulations 2010* Standards of Concentration for non-ferrous metals primary production. Based on the comparison, emissions were found to be well within the benchmarks and standards listed (<26%) so were not considered significant. Commissioning monitoring of the Picton Dry Plant will verify emission levels from the existing and new baghouse exhaust stacks.

The emission monitoring results in Table 1 also indicate that particulate emissions from the stack have significantly reduced over the past two years. This is likely to be related to the change to use of Teflon coated filters in the baghouse which are recognised as being more efficient and less prone to damage than non-Teflon coated filters which had previously been used.

Table 1: Annual Baghouse Exhaust Stack Monitoring Results for the Picton Dry Plant

Monitoring Date	Total Particulates (mg/m^3)	Sulfur dioxide (mg/m^3)	Oxides of Nitrogen (mg/m^3)
4 December 2008	24	13	11
9 December 2009	15	NA	4.5
28 October 2010	36	NA	23
06 October 2011	4.7	<5.7	23
31 October 2012	2	<5.7	14

NB – Two readings are taken at each monitoring event, the higher readings are listed in the table.

Modelling of emissions from the baghouses has not been undertaken and was not requested due to the low levels of emissions predicted from the plant in comparison with the UK Environment Agency Sector Guidance Note and NSW Clean Air Regulations discussed earlier, the location of the plant within an industrial precinct and the distance from sensitive receptors. DEC is satisfied that the proposed emission control of a baghouse is appropriate for the level of point source emissions to air from the existing and new exhaust stacks at the plant.

Limits/Targets

The current licence limit of 150mg/m^3 TSP from the bag house exhaust stack is considered too high and outdated in comparison with recent standards. Therefore a new target has also been defined for inclusion in the amended licence. The New South Wales *Protection of the Environment Operations (Clean Air) Regulations 2010* was referred to, to determine an appropriate target for point source particulate emissions to air. The Regulations specify emission standards based on the age of plant and pollution control equipment. The existing bag house would be classified into Group 4 as it was constructed between 1 July 1986 and 31 July 1997 and the new bag house would be classified as Group 6 as is it being constructed after 1 September 2005. Schedule 3 of the Regulations (Standards of concentration for scheduled premises: activities and plant used for specific purposes), specifies a standard of 20mg/m^3 of total particulate emissions from any crushing, grinding, separating or materials handling activity at a Group 6 premises, where primary production of Non-ferrous metals (excluding aluminium) is undertaken. The proposed baghouse meets these requirements therefore a new emission target, consistent with the standard of 20mg/m^3 specified in the Regulations, will be imposed through the licence on point source emissions to air through OSC 2.2.2. Although the existing baghouse would be classified as Group 4, monitoring data indicates that facility is also able to meet the proposed target therefore the target will also be applied to the existing baghouse. Actual emissions are expected to be below the emission target. Once the facility is operational and emission monitoring data is available, DEC will consider applying lower targets on particulates. The existing licence limit of 150mg/m^3 TSP may also be amended based on results of monitoring undertaken during commissioning of the plant.

There are no other emissions of significance from the baghouses which require targets.

Emissions Monitoring

The main point source emissions to air from the Picton Dry Plant are total particulates, sulfur dioxide, and oxides of nitrogen. Doral have provided detail on the bags being used in the new baghouse which includes the maximum particulate emissions expected for the bags (20mg/m^3). Baghouse emissions levels are not solely influenced by the characteristics of the bags used. Emissions levels are influenced by a number of other factors such as airflow, dust properties, operational conditions and the dust loading on the bag. As a result of other influencing factors, emissions are typically lower than the advertised emission limit for the bag. It is therefore anticipated that actual emissions from the baghouses will be lower than 20mg/m^3. In order to verify the particulate emission level achievable by the baghouses OSC 4.1.1 (IR1) has been included in the works approval which requires a commissioning plan with monitoring requirements is submitted to DEC. It is expected that the commissioning plan will include monitoring of both baghouses for potential emissions including particulates, SO_2 and NOx. OSC 5.1.3 has also been included which requires that a commissioning report is submitted following completion of commissioning. The report is to include a summary of the environmental performance of the plant which will include the results of monitoring undertaken in accordance with the commissioning plan. This information will verify the achievable emission levels for the plant. It is anticipated that the monitoring results for SO_2 and NOx emissions will be similar to existing levels as no changes are proposed for the gas fired dryer which is the source of these emissions.

Monitoring requirements for point source emissions to air will be included in the amended licence as condition 3.2.1. The methods for monitoring are consistent with current standards. OSC's 3.2.2 and 3.2.3 will be included in the licence to ensure sampling and analysis is undertaken at an appropriate

location by a holder of NATA accreditation. These conditions are required to ensure the monitoring data is reliable and accurate.

Fugitive Emissions to Air and Ambient Air Quality Monitoring

The Picton Dry Plant was originally constructed in the late 1980's with modifications made in 2001 to increase the design throughput of the plant. Due to the age of the premises, facilities are not established in line with current best practice. This means there is an increased likelihood of dust emissions from the premises. Potential sources of dust identified include:

- Unloading of HMC in the open to an open stockpile.
- Stockpiling of HMC in the open.
- Extensive stockpiles of intermediate material (awaiting sale) in the open.
- Spillage from the conveyor feeding HMC to the dry plant. Although the conveyor is covered an accumulation of material was observed around the conveyor during the March 2013 compliance inspection indicating this area is not regularly cleared.
- Loading of concentrates into trucks in unconfined areas.
- Accumulated HMC in unsealed areas of the premises.

Dust management measures implemented at the premises are described in the Doral Dust Management Plan (Picton Dry Plant). Dust management measures in the plan include:

- Keeping the moisture content of HMC at approximately 5-9%. This is managed by transporting the HMC damp and sampling HMC feed into the plant.
- Storage of mineral concentrates either in product bins, sheds or damp.
- Installation of shade cloth barriers when required. At the March 2013 inspection it was observed that shade cloth barriers had been installed along parts of the boundary fenceline to reduce dust emissions from the premises.
- Weekly street sweeping of the premises. The sweeper is however only able to access sealed areas resulting in a build up of material in unsealed areas of the premises.
- Commitment to implement 24 hour dust monitoring at the location of any dust complaint

In accordance with current licence conditions, sampling and analysis of fugitive dust emissions is undertaken at four locations around the premises boundary once every 8 weeks from September to May each year. Results from the past six annual environmental reports are included in Table 2. Only one emission above the current licence target of 260µg/m^3 has been recorded in this time and this was attributed to activities at a neighbouring premises. The results do not illustrate any clear patterns although this is expected given the infrequent nature of sampling.

Table 2: Annual Fugitive Dust Monitoring Results for the Picton Dry Plant

Monitoring Year	North Monitoring Site TSP µg/m^3		South Monitoring Site TSP µg/m^3		East Monitoring Site TSP µg/m^3		West Monitoring Site TSP µg/m^3	
	Range	Average	Range	Average	Range	Average	Range	Average
2007	28-70.2	46.74	27.5-65.5	50.46	41.3-112.2	72.88	41.1-126.8	78.14
2008	29.2-113.1	68.6	36.5-105.6	64.6	35.7-119	59.7	20.8-110.4	62.4
2009	49.85-133.64	95.05	48.63-75.60	60.68	27.32-147.80	83.57	32.57-63.10	47.75
2010	83.06-139.88	118.59	30.28-102.24	64.17	45.08-458.93	73.44*	54.95-178.42	97.67
2011	17.45-112.50	70.28	26.79-73.81	56.73	14.13-69.87	43.3	9.45-110.12	68.0
2012	29.76-98.63	62.81	30.36-91.09	57.78	51.13-74.10	60.62	5.36-184.52	84.68

** Average excludes highest value due to it being significantly higher than any other result. Detail in report noted that neighbouring Asphalt manufacturer has loader activities ongoing during the sampling event and predominant wind direction was from the East/ North East therefore neighbouring activities contributed to the high recorded dust.*

With the increased throughput which is proposed through this works approval, it is anticipated that fugitive dust emissions from the premises will increase, unless dust management measures are improved, as there will be increased stockpiling and unloading/loading activities in open areas. It is recommended that the Doral Dust Management Plan Picton Dry Separation Plant is reviewed and updated, prior to completion of works under the works approval, taking into consideration all reasonable and practical dust management measures implemented at similar industrial premises. Fugitive dust emissions are likely to be one of the more significant emissions from the premises therefore OSCs 2.6.1 and 2.6.2 will be included on the licence to ensure emissions do not interfere with surrounding land users and dust management is prioritised.

Limits/Targets

The existing licence for the Picton Dry Plant includes an ambient air quality target of 260µg/m^3 TSP. This target has been based on the *Environmental Protection (Kwinana) (Atmospheric Wastes) Regulations 1992*. The target is considered appropriate for inclusion in the amended licence and will be imposed through OSC 3.7.1, Table 3.7.1.

Emissions Monitoring

Mineralogical studies of the Keysbrook deposit indicate a size distribution from 50 to 200 microns while the Doral HMC has a D50 05 between 150-180 microns. Finer particles are typically lost to tails during primary concentration of the mineral sands at the mine site. Due to the larger particle size of HMC being treated at the Picton Dry Plant PM_{10} emissions have been screened out as being insignificant therefore ambient PM10 monitoring, and related targets, will not be included in the licence.

TSP monitoring is however required due to the reasonable likelihood of dust emissions occurring from the premises, and to assess compliance with the ambient air quality target. The current ambient air quality monitoring regime for TSP requires one 24 hour sample to be collected at each of the four monitoring locations around the premises boundary every 8 weeks from September to May.

A review of climate data for the Bunbury region for the period 01/09/2011 to 31/05/ 2012 found that winds are predominantly from the southern sectors during September to May (Figure 1). Monitoring locations should be established downwind of these sectors. The existing monitoring locations on the north, east and western boundaries of the premises are suitable monitoring locations. The monitoring site on the eastern boundary is located approximately south east of the main plant and stockpiles so is suitable for monitoring dust emissions which may affect the nearest residence located approximately 1.5km to the south east. This will reduce the number of monitoring locations from four (in the current licence) to three.

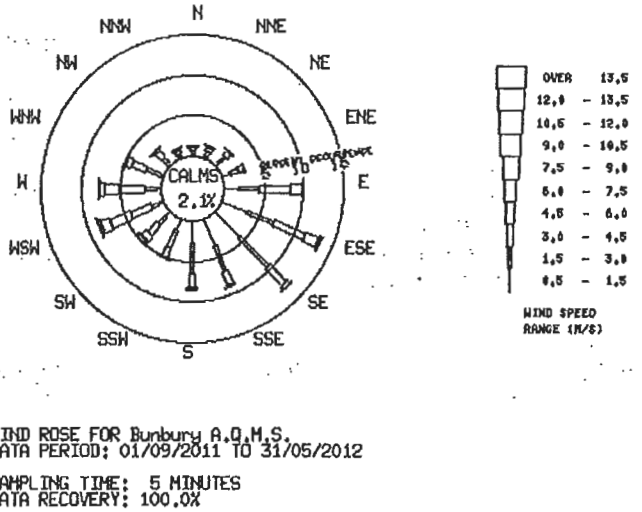

Figure 1: Bunbury region wind rose, September 2011- May 2012

An increased frequency of monitoring will be included in the amended licence as it is anticipated that dust emissions will increase, due to increased stockpiling and unloading/loading activities. Ambient Hi Vol TSP monitoring will be included in the licence as OSC 3.7.1, Table 3.7.1. Doral currently only have one HiVol dust monitor which is also used for compliance monitoring of an additional nine locations at the Burekup minesite (L7789/2001/8). Due to the number of monitoring locations, the frequency of monitoring required at the two premises, and there being only being 16 working days each month when monitoring can be undertaken (taking into account availability of laboratories for analysis) Doral would only be capable of increasing the sampling regime to one 24hour sampling period at each monitoring location per month. If an additional Hi Vol monitor was purchased, the frequency could be increased to two 24hour sampling periods at each monitoring location per month. As there has been no complaints or incidents of significant dust emissions attributed to activities at the Picton Dry Plant reported it is proposed to only increase the monitoring frequency to one 24 hour sampling period per month for each monitoring location.

Stormwater Control and Point Source Emissions to Surface Water

The premises has an established, dedicated underground and open channel stormwater drainage and collection system which collects runoff from the sealed plant/workshop/laboratory area, process water ponds, the HMC stockpile and tailings storage areas, as well as some undisturbed areas of the premises. Collected stormwater is directed via the drainage system to a sedimentation basin. The sedimentation basin has been established as a biofilter, containing a variety of sedge species. Stormwater from the basin is discharged, via an open channel, into a neighbouring stormwater drain (Road Reserve Drain) which originates in north east Picton. This stormwater drain terminates in the nearby Ferguson River. A proportion of the eastern side of the premises is undisturbed and vegetated. Runoff from this area does not come into contact with contaminants from activities on the premises and is therefore not directed into the site stormwater collection system.

NSC 1.2.5 will be included in the licence as a modified version of OSC 1.2.5 relating to Stormwater control. The OSC has been modified to remove the need for uncontaminated stormwater to be separated from contaminated stormwater. Some uncontaminated stormwater from an undisturbed area at the south end of the premises flows naturally into the existing drainage stormwater drainage system and sedimentation pond on the premises. Modification of the site drainage to separate the small volume of uncontaminated stormwater going into this system is not warranted. Permitting this

volume of uncontaminated stormwater into the drainage system will not affect the system's ability to handle contaminated stormwater.

The condition has also been modified to specify that contaminated or potentially contaminated stormwater is to be directed to a sedimentation basin prior to discharge from the premises. This has been specified in the condition because discharge from the sedimentation basin will be included in the licence as an authorised point source discharge to water for the premises. OSC 2.3.1 will be included in the licence to identify the point where water from the sedimentation basin is discharged to the neighbouring road reserve drain as the authorised discharge point for stormwater. The main contaminant in stormwater is likely to be suspended solids collected from stockpiles and build up of material around the premises. Settling of stormwater is therefore necessary prior to discharge from the premises.

Existing licence conditions for the premises require that stormwater runoff is diverted away from process water settling ponds and stockpiles to minimise the loss of stockpiled materials and process water to the environment via the stormwater system. An inspection of the premises in March 2013 identified that stormwater was not being effectively diverted away from stockpiled materials and was likely to accumulate high levels of suspended solids when in contact with stockpiled HMC and intermediate product. In September 2012 an incident also occurred at the premises where stormwater overflowed from the drainage system due to a build up of sediments in the system. This incident suggests that there has been a significant load of sediment in stormwater historically. It was also observed during the premises inspection that there was a build up of material around unsealed areas of the premises, likely as a result of sediment transport via either stormwater movement or wind.

Best practice stormwater management minimises contact between stormwater and contaminants. This is not currently being achieved at the Picton Dry Plant and improvements to the stormwater management system are required to minimise contamination of stormwater as a result of contact with contaminants including HMC and intermediate product. For this reason, improvement condition OSC 4.1.1 (IR2) has been included in the works approval which requires development and submission of a stormwater management plan that includes improvement actions, timeframes for completion and a recommended monitoring strategy for the site stormwater management system. Based on the submission of this plan NSC 1.2.6 will be included on the licence requiring the implementation of actions included in the plan. The monitoring strategy included in the plan will be referred to when developing licence conditions for monitoring point source discharges to surface water.

Limits and Targets

Treated stormwater is discharged from the Road Reserve Drain to the Ferguson River, a slightly to moderately disturbed lowland river (ANZECC 2000 Guidelines). Based on the findings of this assessment, DEC will impose licence targets on point source emissions to surface water through OSC 2.3.2 to ensure water discharged from the site does not impact on the river. The targets reflect parameters most likely to impact water quality and fauna downstream in the Ferguson River. Targets have been set based on the ANZECC 2000 Guidelines and Department of Water (DoW) records for surface water samples collected from a sampling location immediately upstream of where the Road Reserve Drain discharges to the river. Sampling and analysis of stormwater discharged from the premises has not previously been undertaken so could not be taken into account in setting the targets. DoW results from 1996 to 2012 were available for analysis. The results indicated that salinity levels are seasonal with summer levels typically being in excess of 1000mg/L and winter levels typically less than 300mg/L. The average salinity for the period reviewed was approximately 700mg/L. Suspended solids averaged 25mg/L with the majority of results less than 50mg/L. An increasing pH trend was observed however pH is typically in the range 6.5-8.0. Targets may be reviewed in the future if collected monitoring data indicates changes are required. Actual emissions are expected to be below these emission targets

Emission Monitoring

Monitoring requirements will be imposed through OSC 3.2.1 for the parameters emission targets have been set for, to demonstrate compliance with those targets, and other parameters indicative of water quality. Improvement condition IR2 (OSC 4.1.1 of the Works Approval) requires that Doral include a proposed monitoring program in the required Stormwater Management Plan. The proposed monitoring program will be considered when imposing monitoring requirements through OSC 3.2.1 in the licence. OSC 3.1.1 will also be included in the licence to specify the methods for sample collection and preservation and that analysis are to be undertaken by a NATA accredited laboratory. These conditions are required to ensure the monitoring data is reliable and accurate.

Fugitive Emissions to Land and Groundwater

Tailings, HMC and intermediate zircon product are stockpiled in designated locations within the premises. The stockpiles have all been established on unsealed ground or earthen pads. An additional stockpiling area is proposed to be established on an earthen pad as part of the works approval for storage of MZI Keysbrook zircon concentrate. Due to their location on unsealed ground, with no barriers to seepage in place, any seepage which does occur from the stockpiles could impact on ambient groundwater quality or soils beneath.

There is expected to be limited seepage from the intermediate zircon stockpiles as product in the stockpiles is relatively dry. Seepage would therefore only occur as a result of rain water percolating through the stockpile. The HMC stockpile has a moisture content of up to 9% so is more susceptible to seepage however management measures are in place to collect it. A subsoil drainage system has been established beneath the stockpile to collect and drain seepage to a sump, from which it is pumped to the process water ponds for use. The location and configuration of the drainage system is unknown as it was installed by the previous plant operator when the plant was first commissioned. During a premises inspection in March 2013 DEC officers observed the collection point for seepage collected from beneath the HMC stockpile. Zircon from the MZI HMC is separated and sold as a wet concentrate, at approximately 89% zircon. Due to the moisture content of the concentrate, it cannot be stored within bins so will instead be stored as a wet stockpile on an earthen pad. Doral will install a subsoil drainage system (similar to that beneath the HMC stockpile) beneath the earthen pad which collects seepage in a sump. From the sump the collected water will be pumped back to the process water ponds. Due to the seepage collection systems in place at the HMC stockpile and new zircon wet concentrate stockpile, and low volume of seepage from the intermediate zircon stockpiles, DEC is satisfied that fugitive emissions from these features are unlikely to impact on land or groundwater.

The tailings stockpile is however a potential source of fugitive emissions which could impact on groundwater or land. Tailings are processed through a cyclone to recover the maximum volume of water for reuse in the process circuit. Slurry exiting the cyclone is approximately 30% moisture content and is stockpiled on open ground beneath the cyclone. Seepage from the stockpile is allowed to infiltrate to the ground and no seepage recovery is in place. When tailings have dried to a transportable consistency they are trucked back to the respective mine site for disposal so are not a permanent feature on the premises. Minimal chemical treatment of process water occurs other than the addition of flocculant and NaOH which is added from time to time to maintain water quality. The main contaminants likely to be present in seepage from the tailings stockpile are therefore changed pH, salinity, elevated metals and radioactivity due to extended contact with HMC.

Limits, Targets and Emission Monitoring

Due to the lack of seepage recovery or barriers to seepage at the tailings storage area there is a potential risk of seepage from this feature impacting on groundwater quality. Three bores have been established in the vicinity of the tailings stockpile area (one up and two down hydraulic gradient) to monitor potential groundwater impacts. Monitoring results reported in Doral AERs do not indicate that there has been any impact on groundwater quality to date. pH of the downstream bores appears to be nearer to neutral (~6.5) than the upstream bore which is slightly acidic (~6). Water levels follow the

same seasonal pattern in all bores but there is no distinct difference between the up and down hydraulic gradient water levels. Similarly there are no patterns or trends evident in monitoring results for $Radium_{226}$ and $Radium_{228}$.

It is necessary to continue monitoring of these bores to ensure early identification of potential groundwater impacts. OSC 3.8.1, Table 3.8.2 will be included in the licence requiring continued monitoring of groundwater at the three bores and setting water quality targets. Monitoring parameters and frequency will be the same as in the previous version of the licence with the addition of annual analysis for metals. Annual monitoring results were used to determine appropriate targets for standing water level, pH, electrical conductivity and total petroleum hydrocarbons which could indicate changes in water quality likely to be a result of seepage impacting on groundwater.

7. Appendix 2

EMISSIONS AND DISCHARGES RISK ASSESSMENT MATRIX

Note: These matrix are taken from the current DEC Officer's Guide to Emissions and Discharges Risk Assessment May 2006.

Table 3: Measures of Significance of Emissions

Emissions as a percentage of the relevant emission or ambient standard		Worst Case Operating Conditions (95th Percentile)			
		>100%	50 – 100%	20 – 50%	<20%*
Normal Operating Conditions (50th Percentile)	>100%	5	N/A	N/A	N/A
	50 – 100%	4	3	N/A	N/A
	20 – 50%	4	3	2	N/A
	<20%*	3	3	2	1

*For reliable technology, this figure could increase to 30%

Table 4: Socio-Political Context of Each Regulated Emission

		Relative proximity of the interested party with regards to the emission				
		Immediately Adjacent	Adjacent	Nearby	Distant	Isolated
Level of Community Interest or Concern*	5	High	High	Medium High	Medium	Low
	4	High	High	Medium High	Medium	Low
	3	Medium High	Medium High	Medium	Low	No
	2	Low	Low	Low	Low	No
	1	No	No	No	No	No

Note: These examples are not exclusive and professional judgement is needed to evaluate each specific case

*This is determined by DEC using the DEC "Officer's Guide to Emissions and Discharges Risk Assessment" May 2006.

Table 5: Emissions Risk Reduction Matrix

		Significance of Emissions				
		5	4	3	2	1
Socio-Political Context	High	A	A	B	C	D
	Medium High	A	A	B	C	D
	Medium	A	B	B	D	E
	Low	A	B	C	D	E
	No	B	C	D	E	E

PRIORITY MATRIX ACTION DESCRIPTORS

A = Do not allow (fix)

B = licence condition (setting limits + EMPs - short timeframes)(setting targets optional)

C = licence condition (setting targets + EMPs - longer timeframes)

D= EIPs, other management mechanisms/licence conditions (monitoring/reporting)/other regulatory tools

E = No regulation, other management mechanisms