Government of Western Australia
Department of Water and Environmental Regulation

Amendment Notice 2

Licence Number	L4504/1981/17
Licence Holder	South32 Worsley Alumina Pty Ltd
ACN	008 905 155
File Number	DER2015/002689
Premises	Worsley Alumina Refinery Gestaldo Road COLLIE WA 6225 Lease No 3116/7574
Date of Amendment	28 July 2017

Amendment

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

Paul Byrnes

Manager Licensing (Process Industries)

Regulatory Services (Environment)

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

Amendment Notice

This notice is issued under section 59B9 of the *Environmental Protection Act* 1986 (EP Act) amending Licence L4504/1981/17.

The amendment relates to Category 46 activities (Bauxite refining) that are occurring on the premises. This amendment also consolidates reporting requirements for existing monitoring conditions and removes improvement conditions that have been completed.

Amendment description

South32 Worsley Alumina Pty Ltd (South32) lodged an application to amend Licence L4504/1981/17 for the Worsley Refinery on 23 February 2017. Appendix 1 contains a list of the documents that form the application.

South32 seeks approval to construct and operate an additional process water storage dam. The proposed works involve converting an existing excavated area adjacent to the Refinery Catchment Lake (RCL) into a process water holding dam.

The dam (identified as Water Body 1) (WB1) has been designed to incorporate an in-situ compacted base, a geosynthetic liner and an under drainage system. It is proposed to be used as a balancing pond for return liquor from the Bauxite Residue Disposal Areas (BRDAs) and also for the storage of process water providing about 1.1GL of additional storage capacity. The proposed infrastructure is set out in Appendix 2 and illustrated in Figures 1 and 2 below.

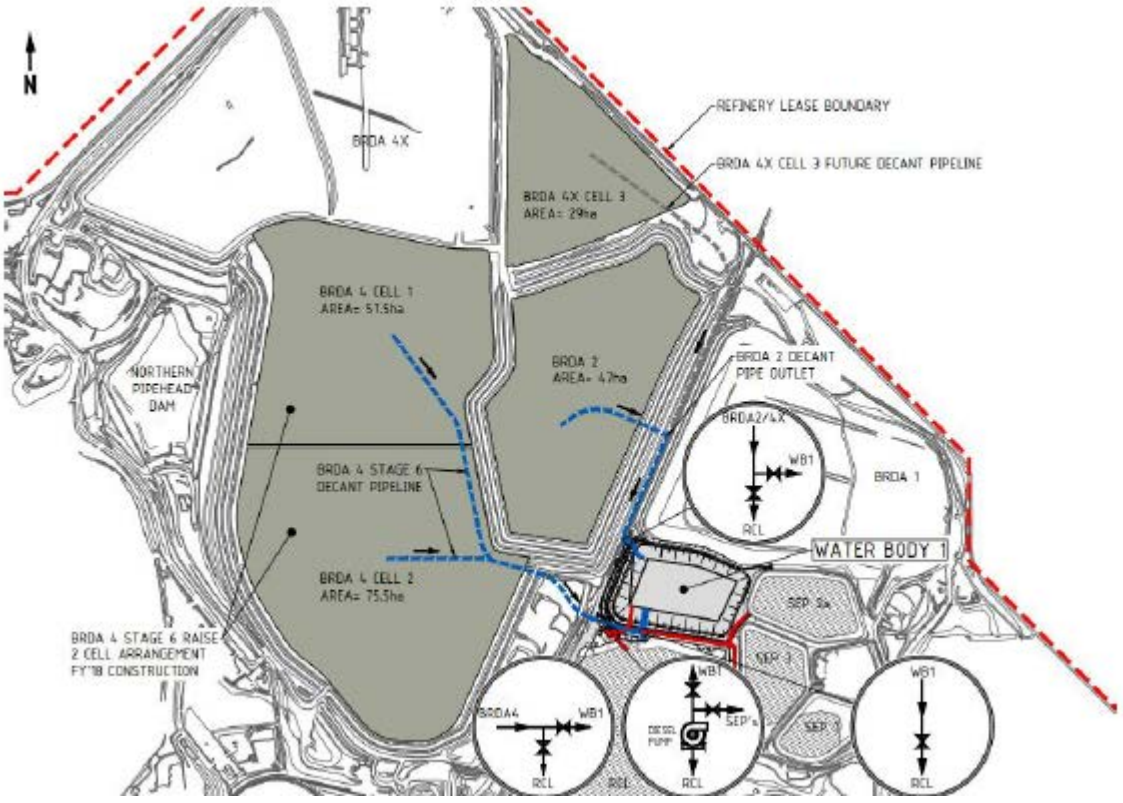


Figure 1: General arrangement of process water inputs and the outlet of WB1
(source Figure 23 from Design Report – Water Body 1, AECOM, 2017a)

The Delegated Officer's assessment of the application has had specific regard to:

- groundwater protection and in particular, the dam liner's design and construction methods including third party quality assurance certification and testing;
- surface water protection and in particular, the size, extent and operational capacity of WB1; and

- additional water resource protection measures employed during and post construction including phreatic surface monitoring, seepage monitoring, management and recovery.

South32 considered potential impacts to ground and surface water resources in the application. This included a conceptual site model of localised hydrogeology, a risk assessment of the perceived risks, and recommendations to validate the conceptual model with proposed additional monitoring. The Delegated Officer has considered these in assessing the application.

The amendment involves enabling the construction of WB1 and permits its operation, subject to construction conditions, additional licence conditions and associated updates to existing conditions, attachments and figures.

The Delegated Officer has included administrative changes to reporting requirements on existing monitoring conditions requiring quarterly rather than monthly reporting. Improvement conditions that have been completed have also been deleted from the licence.

Other approvals

The key regulatory control over the Refinery comes from the *Alumina Refinery (Worsley) Agreement Act 1973 (as amended)* (Agreement Act) and Ministerial Statement 719 (as amended) issued under Part IV of the EP Act. The current licence does not include conditions on groundwater as this aspect is regulated via the Agreement Act and Ministerial Statement 719.

The approval to construct the refinery and associated infrastructure was granted under the Agreement Act. No Mining Proposal exists for the Premises.

Consultation

The application was referred to the former Office of the Environmental Protection Authority (OEPA), the former Department of Water and the former Department of Mines and Petroleum for comments. No comments have been provided.

Licence Holder's comments

South32 was provided with the draft Amendment Notice on 18 July 2017. DWER received correspondence from the Licence Holder dated 26 July 2017 advising they wished to waive the consultation period and requested this Amendment Notice to be issued as soon as possible. No further comments were made.

Amendment history

Table 1 provides the amendment history for L4504/1981/17.

Table 1: Licence L4504/1981/17 amendment history

Instrument	Issued	Amendment
L4504/1981/17	24/09/2015	Licence reissued. Changes made as to the occupier (South32 Worsley Alumina Pty Ltd), reporting dates, categories (Cat 61 liquid waste facility) and administrative changes.
L4504/1981/17	29/04/2016	Licence amended to extend duration in accordance with DER's *Guidance Statement on Licence Duration (November 2014)*.
L4504/1981/17	4/08/2016	Amendment Notice 1 Licence amended to include Minister's Appeal Determination and extend the compliance date of Condition 4.1.1, table 4.1.1 (IR2) until the 30 November 2016.

L4504/1981/17	11/11/2016	Licence amended to include Boiler 5 and Boiler 6 and remove of ambient SO_2 monitoring stations Willis and 303.
L4504/1981/17	28 July 2017	Amendment Notice 2 Licence amended to allow construction and operation of Water Body1 and to consolidate reporting conditions.

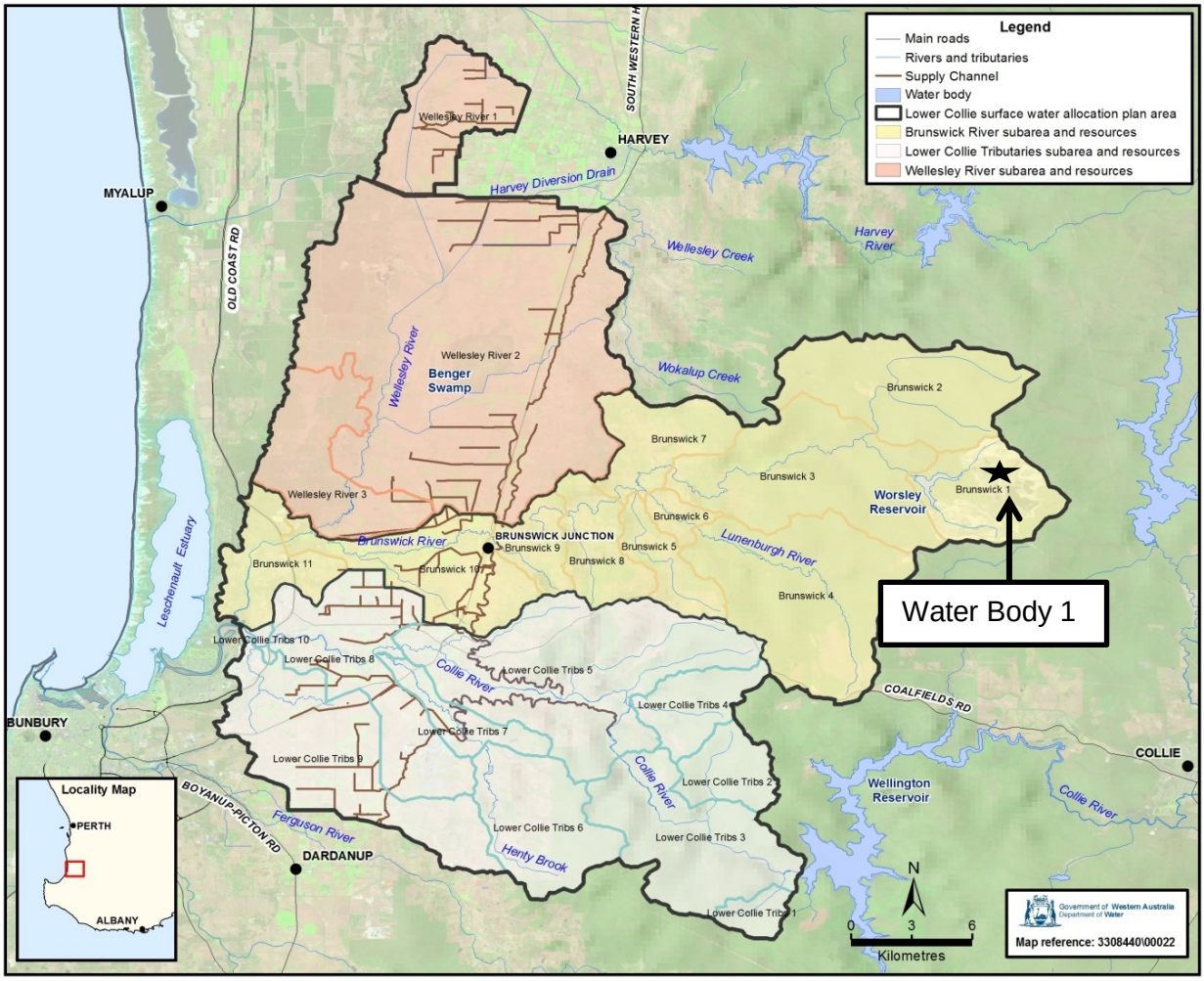
Location and receptors

The location proposed for WB1 is shown in Figure 2 within the Refinery and Figure 3 within the local area. The Refinery is approximately 15km northwest of Collie on the Darling Plateau within the Augustus (minor) and Brunswick (major) river catchments.

Figure 2: Location of Water Body 1 in relation to the premises and lease boundary.

Source: Worsley Alumina RCL Extension application letter (S32 WAPL, 2017a)

Figure 3: Location of Water Body 1 in relation to the Brunswick and Collie Rivers



Source (as modified): http://www.water.wa.gov.au/planning-for-the-future/allocation-plans/south-west-region/lower-collie-surface-water-allocation-plan

The broader Refinery Premises are situated on a topographic divide between two valleys (southern and northern) that contain the wet areas of the refinery (SEP's BDRA's, Northern Valley Catchment Head Dam, Southern Valley catchment Head Dam and the Freshwater Lake) within the upper reaches of the Augustus River catchment.

The distances to residential and sensitive receptors are detailed in Table 2 and the distances to specified ecosystems are detailed in Table 3.

Table 2: Receptors and distance from prescribed premises

Residential and sensitive premises	Distance from the Boundary of the Premises
Single Rural Dwellings:	No rural dwelling within 5 km of the boundary of the premises.
Township of Allanson	Allanson is approximately 11km south of the boundary of the premises.

Table 3: Specified ecosystems

Specified ecosystems	Distance from the Proposed Works
Priority 1 Public Drinking Water Source Area (PDWSA)	WB1 is approximately 850m from a PDWSA, being the Harris River Dam Catchment Area (HRDCA).
Native vegetation	700m to the west

A description of groundwater resources is provided in Table 4

Table 4: Groundwater and surface waters

Groundwater and water sources	Distance from the Proposed Works	Environmental Value
Groundwater	Within the vicinity of WB1 the shallow aquifer is 0-8mbgl and groundwater ponding was observed within the excavation area prior to the works authorised by this amendment. The Zersatz and fractured rock aquifer are 15-60mbgl and it is separated from the shallow aquifer by a continuous confining layer. The predevelopment baseline level of groundwater is 15mbgl (between 270 and 275mAHD). Groundwater levels within the vicinity of WB1 are elevated due to pond seepage causing localised water mounding and are currently between 280-285AHD.	The shallow aquifer originally fed into the upper Reaches of the Augustus River. Shallow Groundwater within the WB1 area feeds directly into the RCL which is used for site operations. In the vicinity of WB1 water from the fractured rock and Zersatz aquifers feed into the RCL and at times of high water level in the RCL is at risk of feeding into the Freshwater Lake. The Freshwater Lake is a source for the Augustus River.
Rights in Water and Irrigation Act 1914	The refinery operational area, including the location of WB1, is within two surface water catchments and the irrigation districts associated with these catchments in accordance with the Department of Water's Geographic Information System's viewer. These areas are proclaimed under the *Rights in Water and Irrigation Act 1914 as*: •The Brunswick River and Tributaries •Collie River Irrigation District	The water within the premises boundary has no environmental value for irrigation purposes. However, impacted water from within the premises boundary should it reach the Augustus River has the ability to decrease the beneficial uses associate of surface water within the irrigation districts for horticulture, stock watering, recreational and domestic purposes.
Watercourses	The Premises are within the upper reaches of the Augustus River Catchment and the Freshwater Lake within the premises boundary and discharges directly into the Augustus River. The Augustus River flows into the Brunswick River approximately 2.5km north of the Premises boundary. The upper reaches of the Hamilton River run approximately 500m south of the Premises boundary. Ground and surface water flow from the proposed development area is towards the west of the Premises, away from this receptor.	The Augustus River is a freshwater system with a slightly acid pH. The upper reaches of the Brunswick River is dominated by the refinery and state forest and down-stream uses include horticulture, stock watering, recreational and domestic purposes. The Hamilton River flows south into the Wellington Dam and the Collie River.

A description of other environmental values associated with the premises is provided in Table 5 below

Table 5: Other environmental values

Environmental value	Distance from the Proposed Works
Aboriginal Sites of Significance	Site 5317 covers the area of WB1 and relates to a record of a former site. No artefacts are currently identified in the construction area.

Risk assessment

Water Body 1 design considerations

South32 has advised that Water Body 1 has been designed in accordance with the standards listed in Table 6 below.

Table 6: Risk assessment of the proposed design

Design Requirement	Risk	Reasoning
Tailings Storage Facilities in Western Australia – Code of Practice (DMP 2013)	Acceptable	Low strength wastewater holding pond in a fully lined structure with under drainage and monitoring..
Safe Design and Operating Standards for Tailings Storage (DMP 1999)		
Guidelines on Tailings Dams (ANCOLD 2012)		

The Delegated Officer considers that Water Body 1 is designed to an acceptable standard.

General risks associated with Water Body 1

Tables 7 and 8 describe the environmental risks associated with the proposed works at the construction and operational stages, consistent with the *Guidance Statement: Risk Assessments*. Both tables identify the risk to human health or the environment, requiring regulatory controls.

The risks at the construction stage are identified in Table 7. In summary, the works involve excavating an existing area on the refinery and constructing WB1. The construction area is well separated from residential dwellings and other sensitive premises and is unlikely to cause any adverse amenity or environmental impacts.

Table 7: Risk assessment for proposed amendments during construction

Risk Event						Consequence rating	Likelihood rating	Risk	Reasoning
Source/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**				
Cat 46 *Bauxite refining*	Civil and construction works *WB1*	**Dust:** from civil and construction activities	Single rural dwelling, closest being 8.1km north-west of WB1	**Air:** transport and dispersion of particulates (fugitive dust)	Amenity impacts	Slight	Rare	Low	Large separation distance (8 km) for there to be minimal to no amenity impacts.
			Nearby native vegetation.	**Air:** transport and dispersion of particulates (fugitive dust)	Deposition on vegetation which may harm plants	Slight	Rare	Low	There is a separation distance of 700m between the Water Body 1 and the nearest vegetation. No impacts evident on native vegetation from existing activities, some, as close as 10m to native vegetation.
		Noise: from civil and construction activities	Single rural dwelling, closest being 8.1km north-west of WB1	**Air:** transport and dispersion	Amenity impacts	Slight	Rare	Low	Large separation distance (8 km) for there to be minimal to no amenity impacts. The Environmental Protection (Noise) Regulations 1997apply.
		Sediments: mobilised by stormwater	Augustus River	No pathway— Stormwater runoff surrounding the WB1 development area reports to a network of diversion channels and v-drains before being re-used in site operations.					No pathway.

Table 8: Risk assessment for proposed works during operation

Risk Event						Consequence rating	Likelihood rating	Risk	Reasoning
Source/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**				
Cat 46 *Bauxite refining*	Contamination of groundwater from seepage	**Process water**: containing Al_2O_3; Na_2, CO_3, Na_2 SO_4.	Groundwater	Through dam liner and soil to groundwater	Groundwater harm.	Moderate	Likely	High	Refer to detailed risk assessment in the decision section below. Base of the dam is close to the water table (1 to 3m). Good quality groundwater below the dam (<1000mg/L TDS)
	Groundwater mounding from seepage	**Process water**: containing Al_2O_3; Na_2 CO_3, Na_2 SO_4.	Groundwater & vegetation	Through dam liner and soil to groundwater	Groundwater and environmental harm.	Moderate	Likely	High	
	Overtopping of WB1 and impacting surface waters. due to	**Process water**: containing Al_2O_3; Na_2 CO_3, Na_2 SO_4	Augustus River	No pathway— Stormwater and process water runoff from WB1 operational and surrounding areas report to a network of diversion channels and v-drains before being re-used in site operations.					No pathway. Managed via the conditions of the existing licence. No further assessment.
	Pipeline failures associated with WB1	**Process water**: containing Al_2O_3; Na_2 CO_3, Na_2 SO_4	Augustus River						
	Sediments and process wastes: mobilised by stormwater	Dilute process water containing Al_2O_3; Na_2 CO_3, Na_2 SO_4 and sediments	Augustus River						
	Odour related issues	Odours	Sensitive premises	Air dispersion	None expected	Slight	Rare	Low	Large separation distance (8 km) resulting in minimal to no amenity impacts. No further assessment.
	Risk to wildlife and stock	**Contact:** Stock and wildlife exposed to WB1	Stock and wildlife	**Animal:** direct contact	Harm to wildlife	Slight	Rare	Low	Site has a security fence. There is no wildlife contact issue with the current operations. No further assessment

Risk of groundwater contamination and mounding

Groundwater is a possible receptor of seepage from WB1. Groundwater and local surface waters may be chemically altered by seepage from WB1. If seepage is significant, it may cause groundwater mounding in a localised area around WB1 leading to environmental harm or vegetation damage.

Soils underlying WB1

South32 has advised that the soils at depth within the proposed WB1 area consist of a weathered mantle of clay overlying some laterite and the dolerite dyke bedrock with very low hydraulic conductivity and which favours lateral groundwater movement. Pockets of permeable strata are known to occur across the site more generally within the profile from tree roots and veins as quartz and quartz-mica residues which can facilitate groundwater flow along fractured pathways.

The Delegated Officer considers that given the characteristics of the underlying soils, it is expected to allow any seepage through the soil profile.

Depth to groundwater beneath WB1

South32 has advised that the groundwater level beneath WB1 has been influenced by existing developments surrounding the area and has risen to be 10 to 15m above baseline values. The current groundwater level is higher than the base of the proposed liner of WB1.

Ambient groundwater levels will be lowered during construction phase through the use of localised abstraction bores. Post construction ambient groundwater levels will be maintained below the base of WB1 through the water recovery characteristics of the under drainage system. AS such, the base of WB1 is in close proximity to groundwater (<3m).

Seepage pathway to groundwater

The Delegated Officer considers that there is likely to be a pathway for any seepage to enter the groundwater. This is because the underlying soils are porous and the base of WB1 is close to groundwater.

Groundwater beneath WB1

South32 advised that groundwater in the vicinity of WB1 is fresh to brackish with a salinity of between 100-3,000uS/cm, with a TDS of less than 1,000mg/L and a pH averaging 5.6. As such the groundwater may be used for a variety of environmental purposes and is likely to recharge local freshwater resources within the Harris River and Augustus River catchments.

Chemical characteristics of the process water to be stored in WB1

South32 has advised that the electrical conductivity (EC) of the process water to be stored in WB1 is likely to have a conductivity of about 27,000uS/cm with a TDS of about 20,300 mg/L and a pH of about 12.5.

The Delegated Officer considers that any seepage would be saline and it may alter the chemical characteristics of groundwater and surface water.

Consequence of severity of impacts to groundwater

Saline wastewater stored in a process water storage pond in close proximity to high-quality groundwater may cause a moderate impact on groundwater.

Risk of groundwater contamination

The Delegated Officer having considered that a plausible pathway for seepage to enter groundwater exists and that it may have a moderate impact, considers the risk to groundwater and surface water is high.

Decision

The application for the licence amendment should be granted subject to conditions to control the environmental risks to groundwater. The controls and their basis are detailed below together with the reasons for the decision.

Reason for the Decision

In assessing the application, the Delegated Office determined that the proposed works present a high environmental risk to groundwater and surface waters and that there should be controls attached to the licence to mitigate the risks.

High risk process water storage dam should be constructed with a composite liner that has a maximum hydraulic conductivity of 1 x 10^{-9} m/s together with an under drainage system. The proposed works incorporate these features and conditions in this respect have been added to the licence.

Groundwater monitoring conditions would normally also be attached to a licence in respect of a high-risk saline process water storage pond. However, this aspect is managed via other regulatory approvals.

A standard set of conditions have been added to the licence detailing the works to be constructed; quality assurance works certification and their operation. Several existing conditions of the licence also require amendment to enable operation of the works. These are listed in the Details of the Amendment section of this report.

Upon completion of the works and provision of quality assurance certification, the Licensee may operate Water Body 1, because this amendment notice incorporates conditions for its operation.

Other amendments

As part of this amendment the following changes have been made:

- Licence Condition 2.2.3 has been amended to allow for the reporting of investigation and management actions regarding target exceedances on a quarterly rather than monthly basis;
- The change in Condition 2.2.3 is reflected in Condition 5.3.1 which specifies reporting requirements; and
- Improvement requirements that have been completed under Condition 4.1.2 have been removed.

Details of the Amendment

Details of the amendment are set out below:

1. Condition 1.1.2 of the Licence is amended by the insertion of the red underlined text shown below:

   *'**quarter'** means a three-month period of the year from 1 January to 31 March, 1 April to 30 June, 1 July to 30 September or 1 October to 31 December;*

2. Table 1.2.3 of the Licence is amended by the insertion of one additional row as shown below in red underlined text:

Table 1.2.3: Containment infrastructure		
Reference and location on Map of premises and containment infrastructure	***Material***	***Requirements***
BRDA 1, 2, 3, 4, 4X and 5	*Bauxite residue, oxalate and controlled liquid waste*	*Low permeability clay lined with liquor collection system installed (pipework and decant) to transport liquor to PHDs. Groundwater underflow collection pipes to collect groundwater and relieve pressure on liners and allow detection of any residue liquor. Groundwater is transported to the PHDs.*
Fresh Water Lake (FWL)	*Uncontaminated surface water and groundwater from within the refinery lease.*	*None.*
Pipehead Dams (PHDs)	*NVPHD – residue liquor from BRDAs 1,2,3,4 & 4X* *SVPHD – residue liquor from BRDA 5*	*Low permeability clay lined with a chemical grout curtain installed below the earth embankment to prevent downstream migration of high pH residue liquor. Depressurisation bores located upstream to ensure groundwater is directed to bores and not lower parts of the catchment.*
Refinery Catchment Lake (RCL)	*Recirculated process cooling water from Refinery, residue liquor from PHD's and outflow from Sequence Batch Reactor*	*Low permeability clay lined.*
Sewage sludge vessels	*Sewage sludge*	*Enclosed tanks which return sludge leachate to the start of the Sequence Batch Reactor process.*
Solar Evaporation Ponds (SEP) 1 and 2a	*Spent sulphuric and hydrochloric acid*	*HDPE lined with a permeability of 10^{-9} and slotted underflow pipes to collect groundwater which may impact on the base of the liners.*

Table 1.2.3: Containment infrastructure		
Reference and location on Map of premises and containment infrastructure	***Material***	***Requirements***
SEP 3	*Oxalate*	*HDPE lined with a permeability of 10^{-9} and slotted underflow pipes to collect groundwater which may impact on the base of the liners.*
Water Body 1	*Process water and decant water balancing pond*	*HDPE lined with a permeability of 10^{-9} and slotted underflow pipes to collect groundwater and seepage which may impact on the base of the liners.*

3. The Licence is amended by the insertion of the following Condition 1.2.8

1.2.8 *The Licensee must construct Water Body 1:*

(a) at the location shown in Figure 2; and
(b) prior to 30 June 2020.

4. The Licence is amended by the insertion of the following Condition 1.2.9

1.2.9 The Licensee must construct Water Body 1(WB1) to the requirements detailed in Column 2 of Table 1.3.4.

Table 1.3.4: Construction requirements	
Infrastructure	***Requirements***
Subgrade soils	*Floor of WB1 to be lined with clay not less than 300mm thick and compacted to 96%Peak Converted Wet Density or greater (Hilf)* *Reference: Design Report WB1, page 33 and Earthworks Specifications WB1, page 12.*
Groundwater underdrainage system	*Consisting of a network of slotted pipes draining to a sump located on the downstream side of the southern embankment as detailed in Figure 19 of the Design Report WB1.*
Geosynthetic Clay Liner	*Consisting of a bentonite layer sandwiched between to non-woven geotextiles which are needle punched to form a stable network* *Reference: Design Report WB1, page 33.*
Geomembrane	*The upper liner of the composite liner consist of HDPE with a minimum thickness of 1.5mm, textured on both sides.* *Reference: Design Report WB1, page 33.*
Embankments	*Barter slope design of 1h:2.2Vdownstream barter slopes and incorporating a break and diversion drain every 10m or less.*
Surface water diversion drains	*Construction of a western diversion drain, norther v-drain, eastern V-drain and WB1 toe drain as shown in Figure 20 of the Design Report WB1.*

5. The Licence is amended by the insertion of the following Condition 1.2.10:

1.2.10 The Licensee must not depart from the requirements specified in Column 2 of Table 1.3.4 except where such departure does not increase risks to the public health, public amenity or the environment.

6. The Licence is amended by the insertion of the following Condition 1.2.11:

1.2.11 Subject to Conditions 1.2.9 and not more than 30 days after completing construction of Water Body 1, the Licensee must provide to the CEO certification from a suitably qualified Engineer confirming each item of infrastructure or component of infrastructure specified in Column 1 of Table 1.3.4 has been constructed with no material defects and to the requirements specified in Column 2 of Table 1.3.4.

7. The Licence is amended by the insertion of the following Condition 1.2.12:

1.2.12 Where a departure from the requirements specified in Column 2 of Table 1.3.4 occurs, the Licensee must provide to the CEO a description of, and explanation for, the departure together with the report required by Condition 1.2.11.

8. The Licence is amended by the insertion of the following Condition 1.2.13:

1.2.13 The Licensee shall manage Water Body 1 identified in Table 1.2.3 such that:
(a) a minimum top embankment freeboard of 500mm is maintained at all times; and
(b) the under drainage system is used to capture seepage and retain it within the refinery.

9. Table 2.2.3 of the Licence is amended by the deletion of the text shown in strikethrough below and by the insertion of the red underlined text shown below:

Table 2.2.3: Management actions			
Emission point reference	***Event/ action reference***	***Event***	***Management action***
A1-A3 A5-A11 A13- A14	*EA1a*	*Parameters monitored by CEMS exceed the target specified in Table 2.2.2*	*The Licensee shall submit a ~~monthly~~ quarterly summary of environmental controls for an emission point that triggers EA1a or EA1b and includes:* *(a) An analysis of the root cause(s) and contributing factors of the target exceedances; and* *(b) Short and long term corrective actions taken or planned to prevent reoccurrence of the exceedances, including timelines for implementation;*
A1-A14	*EA1b*	*Parameters monitored by stack tests exceed the target specified in Table 2.2.2*	
A1-A3 *A5-A10* *A13- A14*	*EA2*	*USEPA Performance Specification 11 CEMS correlation via manual stack sampling causes an exceedance of particulates target.*	*The Licensee shall notify the CEO in writing 7 days prior to the commencement of the annual CEMS calibration curve correlation.*
A4	*EA4*	*Digestion Unit 1 (RTO60) or 2 (RTO70) average RTO bed temperature falls below target temperature in Table 2.2.4.*	*The Licensee shall initiate shut down of the digestor RTO unit.*
A11	*EA3*	*Online instrumentation identifies the failure of 3 or more baghouse cells.*	*The Licensee shall immediately initiate shut down of the Liquor Burner.*

10. Table 4.1.1 of the Licence is amended by the deletion of row two and row three of the table and by the deletion of the text shown in strikethrough below:

Table 4.1.1: Improvement program		
Improvement reference	***Improvement***	***Date of completion***
IR1	*The Licensee shall submit a final report for Version 3 of the Air Emissions Inventory as described in the Scope of Works for Development of "Versions 3" Air Emissions Inventory BHP Billiton Worsley Alumina Refinery Draft (ENVALL, March 2015)*	*30/03/2018*
~~*IR2*~~	~~*The Licensee shall submit to the CEO, a Continuous Emissions Monitoring System (CEMS) Implementation Plan for monitoring temperature, flow rate, oxygen, particulates, SO_2 and opacity from emission points A1 to A3 where currently not available. The Plan shall include but not be limited to the following:*~~ ~~*(i) Identification of the CEMS technology of choice in accordance with the CEMS code;*~~ ~~*(ii) Timeframe for installation, calibration and operation of the CEMS on boilers 1-3; and*~~ ~~*(iii) Proposed action plan, which addresses any constraints identified, with the objective of having the CEMS technology identified above operational as early as possible.*~~	~~*30/11/2016*~~
~~*IR3*~~	~~*The Licensee shall submit a report containing design specifications and criteria for the RLC expansion project at least 3 months prior to commencement of the project . This report shall include and not be limited to:*~~ ~~*(i) size and extent of the proposed extension;*~~ ~~*(ii) updated maps;*~~ ~~*(iii) an updated water balance for the site;*~~ ~~*(iv) liner specifications and construction methods including third party construction quality assurance testing;*~~ ~~*(v) a description of localised hydrogeology and separation distances to surface and groundwater resources; and*~~ ~~*(vi) water resource protection measures employed during and post construction, including seepage management practices.*~~	~~*31/01/2017*~~

11. Table 5.3.1 of the Licence is amended by the deletion of the text shown in strikethrough, the insertion of one row, and by the insertion of the red underlined text shown below:

Table 5.3.1: Notification requirements			
Condition or table (if relevant)	***Parameter***	***Notification requirement[1]***	***Format or form[1]***
1.2.11	*Certification report for approved works*	*Not more than 30 days after the completion of approved works.*	*None specified*
1.2.12	*Report on works departing from specifications*	*Not more than 30 days after the completion of approved works, if needed.* *To accompany the report pursuant to Conditions 1.2.11*	*None specified*
3.1.5	*Calibration report*	*As soon as practicable.*	*None specified*
2.6.2	*Breach of any limit specified in the Licence*	*Part A: As soon as practicable but no later than 5pm on the next usual working day.* *Part B: Within 7 working days of becoming aware of the exceedance.*	*N1*
Table 2.2.2	*Exceedance of any descriptive or numerical target*	~~*Within 30 days of becoming aware of the exceedance*~~. *Not more than 35 days after the end of the quarter in which the Licensee identified that an exceedance occurred.*	*ET1*

Note 1: Forms are in Schedule 2

Appendix 1 – Key documents

	Document	Date	In text ref	Availability
1.	Application Application form	23 February 2017	NA	A1382286
2.	Application supporting information Document 1 of 5 Design Report Water Body 1, 21 February 2017	21 February 2017	AECOM, 2017a	DWER record: A1382287
3.	Application supporting information Document 2 of 5 070- Earthworks Specification FY2017-2019	23 February 2017	NA	DWER record: A1396443
4.	Application supporting information Document 3 of 5 Hydrogeological Risk Assessment- Water Body 1	28 July 2016	NA	DWER record: A1382287
5.	Application supporting information Document 4 of 5 Refinery Catchment Lake Extension Cover Letter	18 January 2017	S32 WAPL, 2017a	DWER record: A1382286
6.	Application supporting information Document 5 of 5 Water Body 1 Liner Construction Quality Assurance Plan, 21 February 2017	21 February 2017	NA	DWER record: A1382287
7.	Licence L4504/1981/17 – Worsley Alumina Refinery – South32 Worsley Alumina Pty Ltd	11 November 2016	L4504/1981/17	accessed at http://www.dwer.wa.gov.au
8.	DER, July 2015. *Guidance Statement: Regulatory principles.* Department of Environment Regulation, Perth.		DER 2015a	accessed at http://www.dwer.wa.gov.au
9.	DER, October 2015. *Guidance Statement: Setting conditions.* Department of Environment Regulation, Perth.		DER 2015b	
10.	DER, November 2016. *Guidance Statement: Risk Assessments*. Department of Environment Regulation, Perth.		DER 2016b	
11.	DER, November 2016. *Guidance Statement: Decision Making*. Department of Environment Regulation, Perth.		DER 2016c	

Appendix 2 – New Infrastructure

	Infrastructure
	Prescribed Activity Category 46
Bauxite ore is refined using the Bayer process to produce alumina.	
1	WB1 will be constructed with the following design features: • within an existing excavation area following the excavation of a further 13,000m^3 of material from the void; • Lined with a composite liner of a compacted subgrade soils, overlain with geosynthetic clay liner and a 1.5mm thick HDPE geomembrane; • An under drainage system beneath the geomembrane which consists of a network of pipes and underdrain sump containing a pump; • The southern and western embankments will contain vibrating wire piezometers; • A western diversion drain, northern v-drain, eastern v drain, and a toe drain; • A drain on the southern end of WB1 embankment which will be used to release water to the RCL; • Access ramp; and • Washdown pad