Decision Report

Application for Licence Amendment

Division 3, Part V *Environmental Protection Act 1986*

Licence Number	L8777/2013/1
Applicant	Buru Energy Limited
ACN	130 651 437
File Number	DER2014/000609-2
Premises	Ungani Facility Petroleum Production Licences L20 and L21 GEEGULLY CREEK 6728 As defined by the coordinates in Schedule 1 of the Licence
Date of Report	1 February 2019
Status of Report	Final

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1. Definitions of terms and acronyms

In this Decision Report, the terms in Table 1 have the meanings defined.

Table 1: Definitions

Term	Definition
AACR	Annual Audit Compliance Report
ACN	Australian Company Number
AER	Annual Environment Report
Category/ Categories/ Cat.	Categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
Decision Report	refers to this document.
Delegated Officer	an officer under section 20 of the EP Act.
Department	means the department established under section 35 of the *Public Sector Management Act 1994* and designated as responsible for the administration of Part V, Division 3 of the EP Act.
DMIRS	Department of Mines, Industry Regulation and Safety
DWER	Department of Water and Environmental Regulation
EP Act	*Environmental Protection Act 1986* (WA)
EP Regulations	*Environmental Protection Regulations 1987* (WA)
Existing Licence	The Licence issued under Part V, Division 3 of the EP Act and in force prior to the commencement of, and during this Review
Licence Holder	Buru Energy Limited
m^3	cubic metres
Noise Regulations	*Environmental Protection (Noise) Regulations 1997* (WA)
Occupier	has the same meaning given to that term under the EP Act.
Prescribed Premises	has the same meaning given to that term under the EP Act.
Premises	refers to the premises to which this Decision Report applies, as specified at the front of this Decision Report
Primary Activities	as defined in Schedule 2 of the Revised Licence
Review	this Licence review

Revised Licence	the amended Licence issued under Part V, Division 3 of the EP Act following the finalisation of this Review.
Risk Event	As described in *Guidance Statement: Risk Assessment*
UDR	*Environmental Protection (Unauthorised Discharges) Regulations 2004* (WA)
WC Act	*Wildlife Conservation Act 1950 (WA)*

2. Purpose and scope of assessment

An application was received from Buru Energy Limited (the Licence Holder) on 30 October 2018 to amend the Ungani Facility (the Premises) operating Licence L8777/2013/1 to allow installation of new infrastructure required for oil production from two new wells to be drilled on the Premises. This Decision Report reviews emissions and discharges from operation of the Ungani Facility and assesses construction and operation of the proposed new infrastructure. The Revised Licence issued as a result of this review consolidates and supersedes all previously authorised licences and Amendment Notices previously issued in relation to the Premises.

2.1 Application details

Table 2 lists the documents submitted during the assessment process.

Table 2: Documents and information submitted during the assessment process

Document/information description	Date received
Application Form (Licence Amendment), L8777, Ungani Facility, Buru Energy Limited (30 October 2018)	30 October 2018

3. Background

The Licence Holder operates the Premises under a Category 10 oil production operating Licence, L8777/2013/1; to process crude oil abstracted from a series of oil production wells on site. The Premises is located on Petroleum Production Licences L20 and L21, approximately 100 kilometres (km) east of Broome and 85km south-west of Derby on Yakka Munga Pastoral Station. Table 3 lists the prescribed premises category in the Existing Licence.

Table 3: Prescribed Premises Categories in the Existing Licence

Classification of Premises	Description	*Approved Premises production or design capacity or throughput*
Category 10	Oil or gas production from wells: premises, whether on land or offshore, on which crude oil, natural gas or condensate is extracted from below the surface of the land or the seabed, as the case requires, and is treated or separated to produce stabilized crude oil, purified natural gas or liquefied hydrocarbon gases.	244,359 tonnes per year

4. Overview of Premises

4.1 Operational aspects

Processing of oil at the Premises involves physical separation of oil, gas and water from oil production wells using a three-phase production separator. Following separation, the oil flows to stock tanks, while Produced Formation Water (PFW) flows to a segregation tank for secondary separation and then into water storage tanks. From the water storage tanks, PFW is either re-injected back into the Ungani Dolomite formation via injection wells, or is stored for evaporation in the Ungani 3 Turkeys Nest Dam.

A small amount of natural gas (methane) is produced, which is vented from the separator and

stock tanks by cold vents with flame arrestors on each tank.

An emulsion breaker is added via a chemical injection unit prior to separation to maximise oil recovery from the oil/water mix. In addition to this, biocides may be added for biological protection and corrosion/scale inhibitors and oxygen scavengers to maintain pipe-work and well infrastructure. Flowmeters are present on each of the outlet water, oil and gas streams of the production separator to monitor the production rate of each phase.

The production separator and the oil and water storage tanks are located within lined bunded areas to contain spills. The oil load-out facility and refuelling bay is also lined and bunded, and any spills or contaminated stormwater in this area flows to a sump which is connected to an oil-water separator to remove any solids and hydrocarbons. Clean water from the system is discharged to the environment via a pipe. Separated solids and hydrocarbons are disposed of to a licensed facility.

A 1,500kL HDPE-lined Turkeys Nest Dam is used to store clean (bore) water for dust suppression and also to act as a contingency for storage of PFW in the event of any issues or maintenance downtime with the PFW re-injection process.

The majority of oil processing infrastructure on the Premises is located at the Ungani Central Processing Area (Figure 1), with the exception of a number of a number of 110kL oil storage tanks located at individual production wells. All oil / PFW storage tanks on the Premises are located within lined, bunded areas with containment capacity of at least 110% of the largest storage tank in the bund.

The Licence Holder is seeking an amendment to the Licence to expand the Premises boundary to include associated storage tanks and flowlines at two new oil production wells that are to be brought online in the near future. The additional infrastructure is required to maintain the current oil production rate throughputs at around 3,000 barrels (bbl) per day (~146,615 tonnes per year). The additional infrastructure will not result in any increase in the approved maximum production design capacity of the Category 10 activity, which is 244,359 tonnes per year.

4.2 Infrastructure

The Ungani Facility infrastructure, as it relates to Category 10 activities, is detailed in Table 4 and with reference to the Premises Layout Map (as shown in Figure 1 and also attached in the Revised Licence).

Table 4: Ungani Facility Category 10 infrastructure

	Infrastructure	**Site Plan Reference**
	Prescribed Activity Category 10	
The Licence Holder abstracts fluids from a series of production wells on the Premises that intercept the Ungani Dolomite formation. The fluids are processed to separate crude oil, water and small amounts of gas. Fluids are stored in tanks on the premises prior to either being exported off-site via tanker trucks (crude oil), disposed of via reinjection back into the Ungani Dolomite formation (PFW) or vented to the atmosphere (gas). The Primary Activities and infrastructure related to the Category 10 activities are listed below.		
1	1 x three-phase (oil, PFW and gas) production separator with a capacity of around 387kL per day	Figure 1
2	2 x Segregation tanks with capacity of 150kL used to segregate unseparated oil (carried over from separator) from the water prior to storage	
3	2 x PFW tanks with a total capacity of 136kL	

	Infrastructure	Site Plan Reference
4	5 x vented oil stock gravity settling tanks with a total capacity of 839kL	
5	PFW unit comprising pump and filtration units; injection points and chemical injection unit	
6	Lined Turkeys Nest dam with a storage capacity of 1,500kL	
7	Road tanker oil load out facility and refueling facility	
8	Artificial lift (downhole) pumps to maintain oil production rates at approximately 198kL per day	
9	7 x 110kL oil storage tanks enclosed within HDPE bunded area that are lined to achieve a permeability of less than 2 x 10^{-9} $m.s^{-1}$ and have a minimum containment capacity of $123m^3$	Not shown

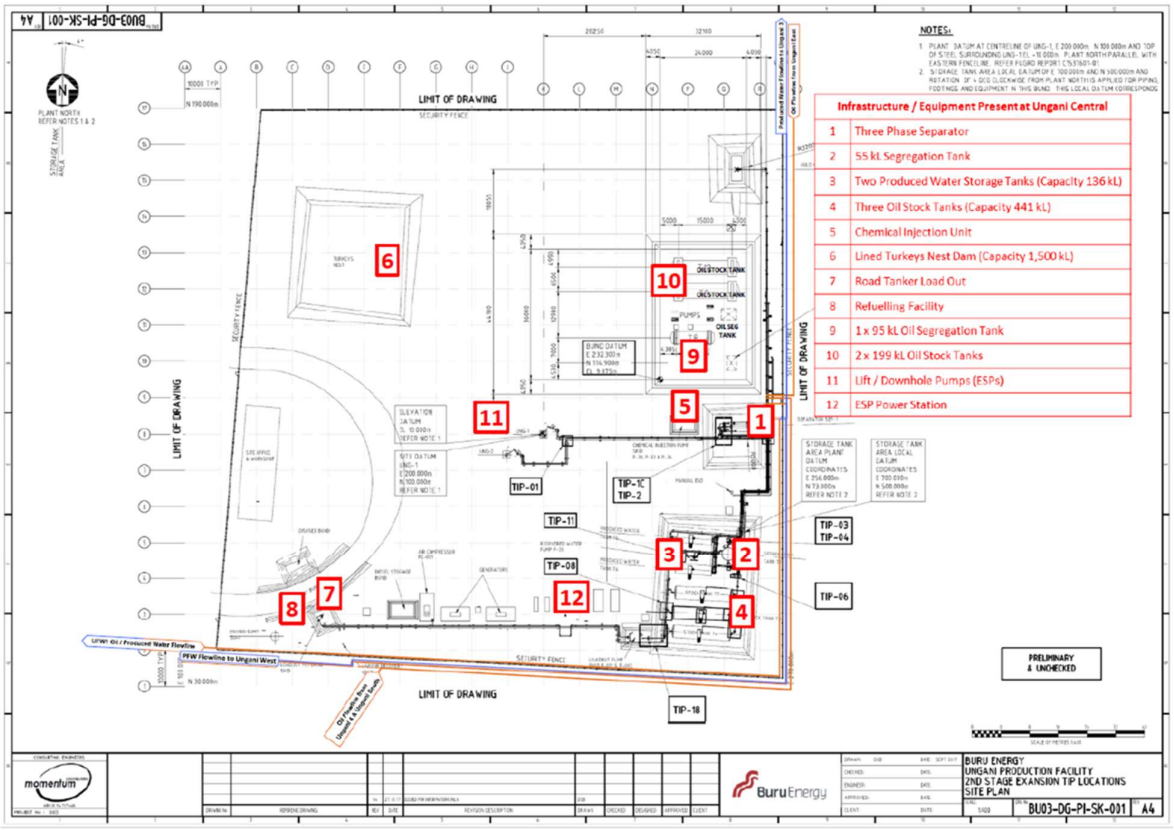

Figure 1: Layout of the Ungani Central Processing Area

4.3 Exclusions to the Premises

Infrastructure and associated activities that are not captured by this assessment include the administration office, workshop, and mobile camp facilities. Mobile camp facilities at the Premises include accommodation, kitchen, shower, laundry facilities, an ablution block, a refuelling area, a workshop, and water storage and power generation. Wastewater from the

accommodation facilities is treated by a small aerated wastewater treatment system, with a design capacity to treat less than 5m^3 per day. The wastewater treatment system is approved by the Department of Health and meets recommended treatment levels.

These activities do not meet the description of Prescribed Premises and as such are outside of the regulatory capture of the EP Act.

The oil production wells on the Premises are regulated under the *Petroleum and Geothermal Energy Resources Act 1967* (PGER Act).

The disposal of PFW is regulated under the *Petroleum and Geothermal Energy Resources (Environment) Regulations 2012 (WA)* (PGERE Regulations) and is therefore managed by DMIRS as appropriate.

5. Legislative context

Table 5 summarises approvals relevant to the assessment.

Table 5: Relevant approvals and tenure

Legislation	Number	Subsidiary	Approval
Rights in Water and Irrigation Act 1914	GWL 174785	Buru Energy Limited	Current version of licence issued 18/01/2017. Includes an entitlement of 40,000L for the Ungani Facility and other operations in the area.
Petroleum and Geothermal Energy Resources Act 1967 & Petroleum Pipelines Act 1969	Ungani Production Facility Modification Environment Plan (HSE-PLN-042)	Buru Energy Limited	Revision 6 approved by DMIRS on 8 March 2018 in relation to previous facility modifications.
	Ungani Far West 1 Production Conversion Environment Plan (HSE-PLN-050)		Revision 1 has been submitted to DMIRS in relation to proposed changes reviewed in this Amendment Notice and is pending approval.
	Ungani Production Facility Commissioning and Operations Environment Plan (HSE-PLN-037)	Buru Energy Limited	Revision 14 approved by DMIRS on 14 November 2018
	Production Licences L20 and L21	Buru Energy Limited	Issued 02/07/2015
	Pipeline Licence PL 109	Buru Energy Limited	Issued 04/06/2015
	Ungani Production Facility Health, Safety, Security Management System (HSE-SMS-002) Ungani Production Facility Safety Case	Buru Energy Limited	Revision 4 approved by DMIRS on 15 March 2018.

Legislation	Number	Subsidiary	Approval
	(HSE-SC-006) Ungani Production Facility Emergency Response Plan (HSE-ER-019)		

5.1 Other relevant approvals

5.1.1 Planning approvals

Advice was sought from Shire of Derby-West Kimberley (the Shire) on 4 November 2016 to determine if any planning approvals are in place for the Premises and to seek comment on the proposal. Advice from the Shire indicated that, prior to construction of the Premises, the Shire did not exercise any statutory planning controls over the area of land comprising the Premises and, as such, no Development Approval was required.

5.1.2 Department of Mines, Industry Regulation and Safety

The Premises is operated in accordance with the *Ungani Production Facility Commissioning and Operations Environment Plan* (HSE-PLN-037) which has been approved by Department of Mines, Industry Regulation and Safety (DMIRS) as a requirement of the PGERE Regulations. A revised Environment Plan (EP) has been submitted and approved by DMIRS (on 14 November 2018) in relation to the proposed upgrade works.

The PGERE Regulations require the EP implementation strategy to specifically consider the injection of PFW into wells, including specification of the maximum permissible concentration of petroleum in the PFW, and details regarding any chemicals or other substances that may be used in treatment fluids or introduced to the subsurface environment.

5.1.3 Key findings

The Delegated Officer has considered the legislation administered by DMIRS in relation to petroleum activities on the Premises and has found:

1. In accordance with the PGERE Regulations, DMIRS regulates the disposal of PFW via the reinjection wells at the Premises through the approval of the *Ungani Production Facility Commissioning and Operations Environment Plan (HSE-PLN-037);* and
2. The discharge of PFW to the Ungani Dolomite Reservoir via the reinjection wells at the Premises has not been assessed by DWER.

5.2 Part V of the EP Act

5.2.1 Applicable regulations, standards and guidelines

The overarching legislative framework of this assessment is the EP Act and EP Regulations.

The guidance statements which inform this assessment are listed in Appendix 1.

5.2.2 Works approval and licence history

Table 6 summarises the works approval and licence history for the premises.

Table 6: Works approval and licence history

Instrument	Issued	Nature and extent of works approval, licence or amendment
L8777/2013/1	30/10/ 2014	Authorised expansion of the Premises boundary to incorporate a second turkey nest dam, constructed in January 2014 for the drilling of the Ungani 3 well.
	3/9/2015	Authorised the use of a floating evaporator on the Ungani 3 turkey nest dam in order to enhance evaporation rates of produced formation water (PFW) stored in the dam.
	29/4/2016	Extended the duration of licence from 17/11/2018 to 17/11/2034.
	25/5/2017	Authorised the construction and operation of new water handling and oil storage infrastructure and removal of existing infrastructure not required following the upgrades.
	20/12/2017	Amendment Notice 1: to authorise an increase in production design capacity associated with the drilling of new petroleum wells and installation of new oil and produced water storage infrastructure.
	20/08/2018	Amendment Notice 2: to authorise the configuration of new and existing wells on the Premises and construction of additional in-field flowlines and oil storage tanks and change of boundary.
	01/02/2019	Amendment to consolidate previous Amendment Notices, authorise infrastructure associated with two new wells to be installed at the Premises and update Premises Boundary.

5.2.3 Compliance inspections and compliance history

Several compliance inspections have been performed at the Premises since the commencement of oil production, with the most recent occurring on 10 June 2015. The Premises was found to be compliant with all licence conditions at this inspection.

6. Consultation

DWER sought comment from DMIRS regarding the proposed amendment to L8777/2013/1 on 7 November 2018. DMIRS provided a response on 11 December 2018 indicating no comments.

A copy of the draft Decision Report and Revised Licence were provided to the Licence Holder on 16 January 2019. Comments received from the Licence Holder have been considered by the Delegated Officer as shown in Appendix 2.

7. Location and siting

7.1 Siting context

The Premises is located within Petroleum Production Licences L20 and L21, approximately 100 kilometres (km) east of Broome and 85km south-west of Derby on Yakka Munga Station (refer Figure 2).

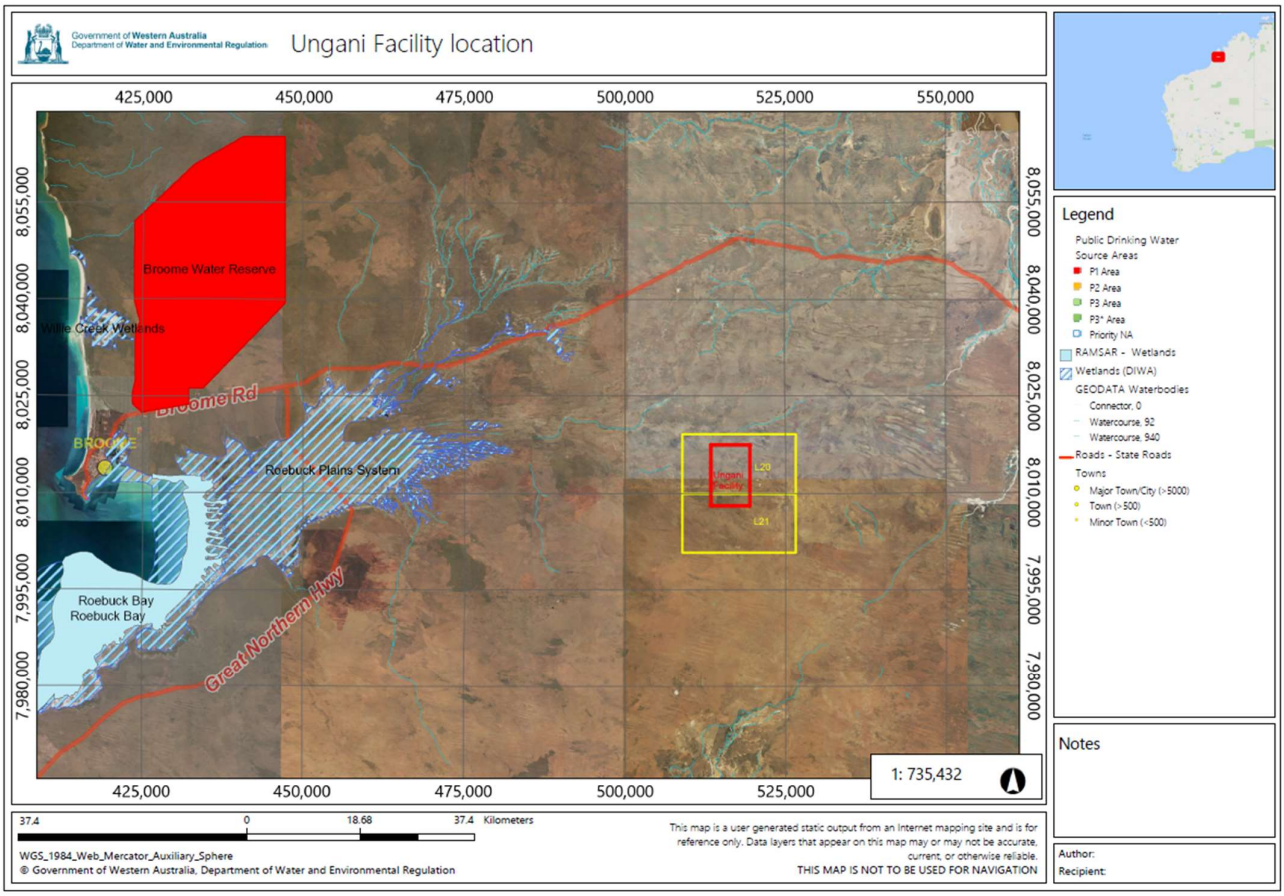

Figure 2: Ungani Facility location map. The red line shows the Premises boundary.

7.2 Residential and sensitive Premises

The distances to residential and sensitive receptors are detailed in Table 7.

Table 7: Receptors and distance from activity boundary

Sensitive Land Uses	Distance from Prescribed Activity
Yakka Munga Pastoral Station Homestead	30km to the east
Bedunburra Aboriginal Community	40km to the north

7.3 Specified ecosystems

Specified ecosystems are areas of high conservation value and special significance that may be impacted as a result of activities at or Emissions and Discharges from the Premises. The distances to specified ecosystems are shown in Table 8. Table 8 also identifies the distances to other relevant ecosystem values which do not fit the definition of a specified ecosystem.

The table has also been modified to align with the *Guidance Statement: Environmental Siting.*

Table 8: Environmental values

Specified ecosystems	Distance from the Premises
Ramsar Sites in Western Australia	Roebuck Bay Wetland is located 75km west of the Premises boundary
Nationally significant wetlands identified in A Directory of Important Wetlands in Australia (ANCA Wetland)	Taylor's Lagoon and associated Roebuck Plains Wetland System 25km northwest and 30km east
Threatened Ecological Communities and Priority Ecological Communities	Kimberley Vegetation Association 767 located 9km west and 9.8km north of the Premises boundary
Biological component	**Distance from the Premises**
Threatened/Priority Flora	Priority 3 flora: *Nymphoides beaglensis* located around 30km northwest of Premises boundary
Threatened/Priority Fauna	Several recordings of Threatened/Priority fauna external to the Premises boundary: • *Lagorchestes conspicillatus leichardti* (Spectacled Hare-wallaby) Priority 4 species listed under the *Wildlife Conservation Act 1950 (WA)* (WC Act). The closest recording is located around 7.3km west of the Premises boundary; and • *Macrotis lagotis* (Greater Bilby) listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999 (Cwth)* (EPBC Act) and the WC Act. The closest recording is located around 15km northwest of Premises boundary; and • *Isoodon auratus auratus* (Golden bandicoot) listed as Vulnerable under the EPBC Act and the WC Act. The closest recording is located around 22.3km west of Premises boundary.

7.4 Groundwater and water sources

The distances to groundwater and water sources are shown in Table 9.

Table 9: Groundwater and water sources

Groundwater and water sources	Distance from Premises	Environmental value
Public drinking water source areas	70km west-northwest of Premises boundary	Broome town site drinking water supply (groundwater)
The Premises is located within the Proclaimed (RIWI Act 1914) Canning Kimberley Groundwater Area. Several aquifers make up this Groundwater Area, however the Wallal Sandstone Aquifer is the	30m bgl	The Wallal Sandstone formation is the bore water supply currently utilised by the Licence Holder for site activities (dust suppression etc.). Other beneficial uses of the Wallal Sandstone aquifer include livestock

groundwater resource located at the Premises. The Wallal Sandstone is around 30m below ground level (bgl) and is considered brackish (1,000-2,000mg/L TDS).		drinking water (beef cattle) which can safely consume brackish water up to 4,000mg/L TDS with no adverse health impacts (ANZECC / ARMCANZ, 2000).
Proclaimed (RIWI Act 1914) Surface Water Area – Fitzroy River and Tributaries	35km east of Premises boundary	The Fitzroy River has significant and diverse ecological, cultural and heritage values. In addition to important environmental and cultural values, other beneficial uses include recreation, tourism, irrigation and pastoral purposes.

7.5 Soil type

Soil types in the area are described as Pindan country: gently undulating sand plain with a few small rocky sandstone residuals with no external drainage. Chief soils are red earthy sands, with associated Uc5.11 profiles and hummocks of siliceous sands (Uc1.23) *(Northcote et al, 1960-68).*

7.6 Meteorology

The closest Bureau of Meteorology (BoM) weather station to the Premises that has recorded statistics for wind, rainfall and temperature is located at Derby Aero approximately 90km north-west. In the absence of any other weather data available for the Premises, a review of the meteorology data from Derby Aero station (BoM, 2017) is provided below.

7.6.1 Wind direction and strength

The average annual 9am wind direction in Derby blows from the east and south-east for around 35% of the year and south for around 15% of the year. Wind speeds at 9am range predominantly from 10 to 20km per hour but can reach up to 30km per hour at times. The average annual 3pm wind direction in Derby blows north-west for up to 45% of the year. Wind speeds are predominantly recorded at between 10 and 20km throughout the year, with north westerlies reaching up to 30km per hour throughout the year.

7.6.2 Regional climatic aspects

The West Kimberley Region experiences a semi-arid climate. Like most parts of the Australian tropics, the Region has two seasons: a dry season and a wet season. The West Kimberley is susceptible to tropical cyclones and these, along with the equally unpredictable nature of summer thunderstorms, play a large part in the erratic nature of the rainfall received in the area. A high average daily evaporation rate of around 9.2mm per cubic metre (annual average) is experienced in Derby.

7.6.3 Rainfall and temperature

The dry season occurs from April to November with nearly every day clear and maximum temperatures averaging around 34°C. The wet season extends from December to March, with maximum temperatures of around 38°C, rather erratic tropical downpours and high humidity. Derby's annual rainfall average is 691mm, 76% of which falls from January to March. Figure 2 shows average maximum temperatures and rainfall for Derby Aero.

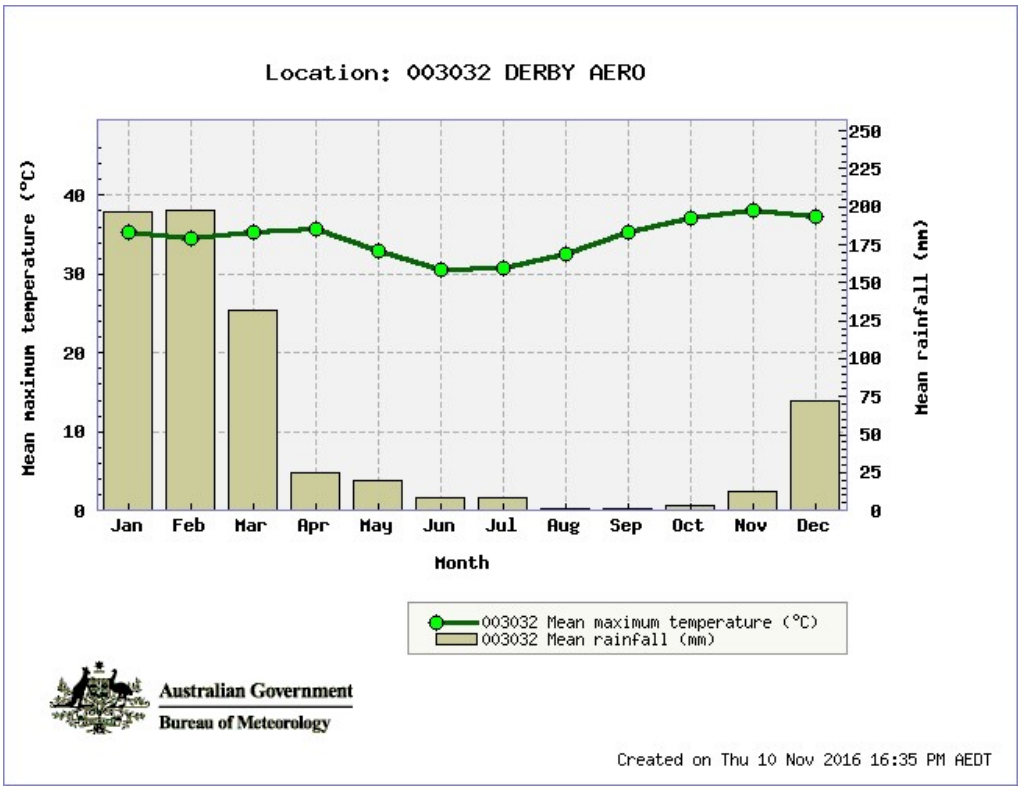

Figure 3: Derby Aero Mean Maximum Temperature and Mean Rainfall (BoM, 2017)

8. Risk assessment

8.1 Determination of emission, pathway and receptor

In undertaking its risk assessment, DWER will identify all potential emissions pathways and potential receptors to establish whether there is a Risk Event which requires detailed risk assessment.

To establish a Risk Event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission. Where there is no actual or likely pathway and/or no receptor, the emission will be screened out and will not be considered as a Risk Event. In addition, where an emission has an actual or likely pathway and a receptor which may be adversely impacted, but that emission is regulated through other mechanisms such as Part IV of the EP Act, that emission will not be risk assessed further and will be screened out through Table 11.

The identification of the sources, pathways and receptors to determine Risk Events are set out in Tables 10 and 11 below.

Table 10: Identification of emissions, pathway and receptors during construction

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**		
Construction, mobilisation and positioning of infrastructure	Increased vehicle movements on unsealed access roads	*Noise*	*No residences or other sensitive receptors in proximity.* *Closest residence is 30km east.*	*Air / wind dispersion*	*None*	*No*	The EP Noise Regulations apply to noise emissions. The Delegated Officer considers that a sufficient separation distance exists between the Premises and any sensitive receptors. Note: the construction period is expected to take around 6 weeks.
		Dust					
	Construction / installation of new infrastructure including pumps, separator, tanks, flowline and extension of bunded areas (will require some earthworks)	*Noise*					
		Dust					

Table 11: Identification of emissions, pathway and receptors during operation

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**		
Production of oil from wells	Operation of pumps and flowlines to separator	Discharge to land: spills / leaks of reservoir fluids (oil and PFW)	Soils and groundwater. Depth to groundwater is approximately 30m bgl.	Direct discharge to soils, seepage to groundwater	Contamination of soils. Reduction in groundwater quality / availability for dependent fauna / vegetation and / or stock on adjacent pastoral land	Yes	See section 8.4 and 8.5
Processing (separation) of oil from reservoir fluids	Separation and storage of oil	Discharge to land: spills or leaks of oil		Direct discharge to soils, seepage to groundwater			
	Separation and storage of PFW	Discharge to land: spills or leaks of PFW from pipelines or seepage from / overtopping of Turkeys Nest Dam					
	Reinjection of PFW	Discharge to land: spills or leaks of PFW. Injection well failure		Direct injection		No	This activity is regulated under Petroleum and *Geothermal Energy Resources (Environment) Regulations 2012*

	Separation and venting of gas	Discharge to air: natural gas (mostly methane)	Closest residence is 30km east.	Air / wind dispersion	None	No	The Delegated Officer considers that a sufficient separation distance exists between the Premises and any sensitive receptors. The Licence Holder has previously provided estimates that around 36m^3 of VOCs will be vented each day during operations. As there will be no change to oil production volumes, VOC emissions are not expected to increase. Air emissions modelling has shown that any reduction in air quality during operations will be restricted to the immediate vicinity (~2m) of the tank vents. Due to the absence of receptors the Delegated Officer considers that the risks to public and environment are negligible and regulatory controls are not required.
	Operation of pumps and separators	Noise	Closest residence is 30km east.	Air / wind dispersion	None	No	The Delegated Officer considers that a sufficient separation distance exists between the Premises and any sensitive receptors. The EP Noise Regulations apply to noise emissions.
	Load out of crude oil and refuelling of trucks at Tanker Load-out / Refuelling Facility	Discharge to land: spills or leaks of oil or diesel. Direct (controlled) discharge of treated stormwater from Premises oil-water separator.	Soils and groundwater. Depth to groundwater is approximately 30mbgl.	Direct discharge to soils, seepage to groundwater	Contamination of soils. Reduction in groundwater quality / availability for dependent fauna / vegetation and / or stock on adjacent pastoral land	Yes	See section 8.4

8.2 Consequence and likelihood of risk events

A risk rating will be determined for risk events in accordance with the risk rating matrix set out in Table 12 below.

Table 12: Risk rating matrix

Likelihood	Consequence				
	Slight	Minor	Moderate	Major	Severe
Almost certain	Medium	High	High	Extreme	Extreme
Likely	Medium	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	Extreme
Unlikely	Low	Medium	Medium	Medium	High
Rare	Low	Low	Medium	Medium	High

DWER will undertake an assessment of the consequence and likelihood of the Risk Event in accordance with Table 13 below.

Table 13: Risk criteria table

Likelihood		Consequence		
The following criteria has been used to determine the likelihood of the Risk Event occurring.		The following criteria has been used to determine the consequences of a Risk Event occurring:		
			Environment	Public health* and amenity (such as air and water quality, noise, and odour)
Almost Certain	The risk event is expected to occur in most circumstances	Severe	• **onsite impacts**: catastrophic • **offsite impacts local scale**: high level or above • **offsite impacts wider scale:** mid-level or above • Mid to long-term or permanent impact to an area of high conservation value or special significance^ • Specific Consequence Criteria (for environment) are significantly exceeded	• Loss of life • **Adverse health effects:** high level or ongoing medical treatment • Specific Consequence Criteria (for public health) are significantly exceeded • **Local scale impacts:** permanent loss of amenity
Likely	The risk event will probably occur in most circumstances	Major	• **onsite impacts**: high level • **offsite impacts local scale**: mid-level • **offsite impacts wider scale**: low level • Short-term impact to an area of high conservation value or special significance^ • Specific Consequence Criteria (for environment) are exceeded	• **Adverse health effects:** mid-level or frequent medical treatment • Specific Consequence Criteria (for public health) are exceeded • **Local scale impacts**: high level impact to amenity
Possible	The risk event could occur at some time	Moderate	• **onsite impacts**: mid-level • **offsite impacts local scale**: low level • **offsite impacts wider scale**: minimal • Specific Consequence Criteria (for environment) are at risk of not being met	• **Adverse health effects:** low level or occasional medical treatment • Specific Consequence Criteria (for public health) are at risk of not being met • **Local scale impacts:** mid-level impact to amenity
Unlikely	The risk event will probably not occur in most circumstances	Minor	• **onsite impacts**: low level • **offsite impacts local scale**: minimal • **offsite impacts wider scale**: not detectable • Specific Consequence Criteria (for environment) likely to be met	• Specific Consequence Criteria (for public health) are likely to be met • **Local scale impacts:** low level impact to amenity
Rare	The risk event may only occur in exceptional circumstances	Slight	• **onsite impact**: minimal • Specific Consequence Criteria (for environment) met	• **Local scale**: minimal to amenity • Specific Consequence Criteria (for public health) met

^ Determination of areas of high conservation value or special significance should be informed by the *Guidance Statement: Environmental Siting.*

* In applying public health criteria, DWER may have regard to the Department of Health's *Health Risk Assessment (Scoping) Guidelines.*

"onsite" means within the Prescribed Premises boundary.

8.3 Acceptability and treatment of Risk Event

DWER will determine the acceptability and treatment of Risk Events in accordance with the Risk treatment Table 14 below:

Table 14: Risk treatment table

Rating of Risk Event	Acceptability	Treatment
Extreme	Unacceptable.	Risk Event will not be tolerated. DWER may refuse application.
High	May be acceptable. Subject to multiple regulatory controls.	Risk Event may be tolerated and may be subject to multiple regulatory controls. This may include both outcome-based and management conditions.
Medium	Acceptable, generally subject to regulatory controls.	Risk Event is tolerable and is likely to be subject to some regulatory controls. A preference for outcome-based conditions where practical and appropriate will be applied.
Low	Acceptable, generally not controlled.	Risk Event is acceptable and will generally not be subject to regulatory controls.

8.4 Risk Assessment – discharges to land (oil processing and loadout)

8.4.1 Description of discharges to land (oil processing and loadout)

Failure of containment infrastructure related to production and processing of oil including storage tanks and load-out areas resulting in a release of hydrocarbons, PFW or injection chemicals into the environment.

There is also the potential for stormwater to become contaminated by activities on the Premises which may be discharged to land if not appropriately stored, treated and disposed of. A malfunction of the oil-water separator may result in higher levels of hydrocarbon contaminated stormwater being discharged to land. Similarly, bunded storage areas have the potential to generate contaminated stormwater should drips/leaks of hydrocarbons or PFW occur in these areas.

8.4.2 Identification and general characterisation of emission

The tanker truck load out facility drains to a Humeceptor oil-water separator that treats contaminated stormwater in this area to less than 15mg/L Total Recoverable Hydrocarbons (TRH) and discharges treated water to the environment via a decant outlet pipe. Discharges occur as required during the wet season (December to April).

8.4.3 Description of potential adverse impact from the emission

Crude oil is a toxic substance, comprised mainly of hydrocarbons and other substances including heavy metals, Monocyclic Aromatic Hydrocarbons (BTEX) and Polycyclic Aromatic Compounds (PAH's). Spills or leaks of these substances as a result of abnormal operating conditions could potentially cause contamination of soils and infiltrate groundwater, degrading

the quality of groundwater any impacting beneficial uses and dependent vegetation and / fauna (including stock on adjacent pastoral land).

8.4.4 Criteria for assessment

Relevant land and groundwater quality criteria relevant include:

- *Australian Water Quality Guidelines* (ANZECC & ARMCANZ 2000) provides fresh and marine water criteria (including livestock drinking water); and
- *Assessment and Management of Contaminated Sites* (DER 2014) provides ecological and human health assessment levels for soil.

8.4.5 Licence Holder controls

The Licence Holder has proposed the following controls to reduce and manage potential discharges to land which are set out in Table 15 below.

Table 15: Licence Holder infrastructure controls for discharges to land

Control	Description[1]
Engineering	• All PFW tanks, oil stock tanks and chemical storage areas are bunded with impervious lining (HDPE and Concrete Canvas) with coefficient of permeability of less than 2 x 10^{-10} $m.s^{-1}$. Bunds will be sized to accommodate 110% of the capacity of the largest tank in the bund; • Storage areas and tanks comply with Australian Standard 1940:2004: *The storage and handling of flammable and combustible materials*; • The Tanker Truck Load-Out and Refuelling area is PVC lined and bunded to capture any spills / leaks during operations. The lined Refuelling area drains to a Humeceptor Oil-Water Separator (OWS) designed to treat any potentially contaminated stormwater during rainfall events. • Treated water from the OWS is sampled prior to discharge to the environment via a decant outlet pipe; • PFW flowlines are installed above ground and positioned along access tracks enabling leaks to be readily detected; • Hydrotesting of PFW flowline is performed prior to operations (using bore water) to ensure new flowline has no leaks; • Flowlines will be installed with pressure sensing devices that will activate shut-down in the event of high or low-pressure readings, to prevent significant spills; • PFW flowline is under low pressure and secured at the produced water tank and Ungani Far West 1 well site; and • Overland stormwater flows are prevented from flowing onto the Ungani Facility by flood control bunding, which has been installed to the south of the Premises where surface water flows emanate from.
Management / Procedures	• Any spills of contaminated water from within bunded areas is transferred into the water segregation tank and either reprocessed or taken offsite by a licensed waste contractor; • Any contaminated soil is removed and stored in an impervious

Control	Description[1]
	bund or appropriate container, prior to being taken offsite for disposal at a licensed facility; • Produced water flowlines inspected daily while in operation; • Spill kits are located on site to clean up any spills/leaks of hazardous materials; • Quarterly groundwater monitoring for Total Recoverable Hydrocarbons is conducted via two wells within and one well outside of the Prescribed Premises to detect any potential impacts from petroleum operations; • Buru Energy Limited has the following relevant Operational Procedures to manage spills and stormwater: (i) Canning Basin Oil Spill Contingency Plan (HSE-OP-010); (ii) Bund Maintenance and Stormwater Control Procedure (OP-PR-013); and (iii) Refuelling Procedure (HSE-PR-011)

8.4.6 Consequence

The Delegated Officer considers that a release of contaminated stormwater or failure of containment infrastructure could result in a moderate spill of hydrocarbons, PFW or injection chemicals which have the potential to result in localised soil contamination, terrestrial vegetation impacts and groundwater impacts. However, there are no specified ecosystems or threatened/rare flora in close proximity to the Premises Therefore, the Delegated Officer considers the consequence to be **minor**.

8.4.7 Likelihood of Risk Event

The Delegated Officer considers the likelihood of hydrocarbons and chemicals impacting on receptors as a result of a spill or containment failure is **unlikely** when the Licence Holder's controls are implemented.

8.4.8 Overall rating of spills or leaks from oil processing and loadout

The Delegated Officer has compared the consequence and likelihood ratings described above for the Risk Criteria (Table 13) and determined that the overall rating for the risk of Discharges to land on sensitive receptors during operation is **medium**.

8.5 Risk assessment – discharges to land (Produced Formation Water within the Turkeys Nest Dam)

8.5.1 Description of discharges to land (PFW within the Turkeys Nest Dam)

Separated PFW is stored in tanks within bunded areas before being transported via pipelines for reinjection back into the Ungani Dolomite Oil Reservoir.

PFW contains low concentrations of crude oil and is also expected to be high in TDS which is likely to be hazardous to vegetation. Discharges of PFW as a result of overtopping and / or seepage from the Turkeys Nest Dam could potentially cause contamination of soils and infiltrate groundwater, degrading the quality of groundwater any impacting beneficial uses and dependent vegetation or fauna (including stock on adjacent pastoral land).

8.5.2 Identification and general characterisation of emission

The Turkeys Nest Dam is used as a contingency storage facility for PFW in the event of any issues or maintenance downtime with the PFW reinjection process. Any discharges of PFW from the Turkey's Nest Dam would occur as a result of abnormal operating conditions.

8.5.3 Criteria for assessment

Relevant land and groundwater quality criteria relevant include:

- *Australian Water Quality Guidelines* (ANZECC & ARMCANZ 2000) provides fresh and marine water criteria (including livestock drinking water); and
- *Assessment and Management of Contaminated Sites* (DER 2014) provides ecological and human health assessment levels for soil.

8.5.4 Licence Holder controls

The Turkeys Nest Dam is lined with HDPE liner to comply with Australian Standard 1940:2004: *The storage and handling of flammable and combustible materials*. The Licence Holder conducts regular visual inspections of the liner to ensure its integrity is maintained. The Turkeys Nest Dam is designed and operated to maintain a 500m freeboard at all times.

8.5.5 Consequence

The Delegated Officer considers that a release of PFW has the potential to result in localised soil contamination, terrestrial vegetation impacts and groundwater impacts. However, there are no specified ecosystems or threatened/rare flora in close proximity to the Premises Therefore, the Delegated Officer considers the consequence to be **minor**

8.5.6 Likelihood of risk event

The Delegated Officer considers the likelihood of PFW impacting on receptors as a result of seepage or overtopping of the Turkeys Nest Dam is **unlikely** when the Licence Holder's controls are implemented.

8.5.7 Overall rating of spills or leaks from Turkeys Nest Dam

The Delegated Officer has compared the consequence and likelihood ratings described above for the Risk Criteria (Table 13) and determined that the overall rating for the risk of Discharges to land on sensitive receptors during operation is **medium**.

8.6 Summary of acceptability and treatment of Risk Events

A summary of the risk assessment and the acceptability or unacceptability of the risk events set out above, with the appropriate treatment and control, are set out in Table 16 below. Controls are described further in section 9.

Table 16: Risk assessment summary

	Description of Risk Event			Licence Holder controls	Risk rating	Acceptability with controls (conditions on instrument)
	Emission	**Source**	**Pathway/ Receptor (Impact)**			
1.	Discharge to land	Spills or leaks of oil process chemicals during processing and load out activities. Contaminated stormwater generated on the Premises.	Direct discharge to soils and seepage to groundwater	Engineering (bunding, lining, flowline controls); and management procedures (visual monitoring, regular checks).	Minor consequence Unlikely **Medium risk**	Acceptable subject to Licence Holder controls conditioned
2.	Discharge to Land	Discharge of PFW as a result of seepage or overtopping of the Turkey's Nest Dam	Direct discharge to soils and seepage to groundwater	Engineering (liner, freeboard management); and management procedures (visual monitoring, regular checks).	Minor consequence Unlikely **Medium risk**	Acceptable subject to Licence Holder controls conditioned

9. Regulatory controls

A summary of regulatory controls determined to be appropriate for the Risk Event is set out in Table 17. The risks are set out in the assessment in section 8 and the controls are detailed in this section. DWER will determine controls having regard to the adequacy of controls proposed by the Licence Holder. The conditions of the Licence will be set to give effect to the determined regulatory controls.

Table 17: Summary of regulatory controls to be applied

		Controls			
		8.1.1 and 8.1.2 Specified infrastructure requirements	8.1.3 Specified actions	8.1.4 Emission Limits and Monitoring	8.1.5 Reporting
Risk Items (see section 7)	1. Discharge to land and groundwater from spills or leaks of oil / PFW / process chemicals during processing and load out activities. Contaminated stormwater generated on the Premises.	•	•	•	•
	2. Discharge of PFW to land as a result of seepage from or overtopping of the Turkeys Nest Dam	•	•	•	

9.1 Licence controls

9.1.1 Construction works

The following works have been approved as per the Licence Holder's amendment application (Licence conditions 2, 3, 4 and 5):

Table 18: Works Infrastructure and equipment to be constructed on the Premises

Works	Specifications
Ungani North 1	Installation of: • 1 x 110kL oil storage tank enclosed within HDPE bunded area that is lined to achieve a permeability of less than 2 x 10^{-9} m.s^{-1} and has a minimum containment capacity of 123m^3; and • Production Flowline between Ungani Central Facility and Ungani North 1 well site

Works	Specifications
Ungani West 1	Installation of: • Flowline between Ungani Central Facility and Ungani West 1 well site
Ungani 6	Installation of: • 1 x 110kL oil storage tank enclosed within HDPE bunded area that is lined to achieve a permeability of less than 2 x 10^{-9} m.s^{-1} and has a minimum containment capacity of 123m^3; and • Production Flowline between Ungani Central Facility and Ungani North 1 well site
Ungani South A	Installation of: • 1 x 110kL oil storage tank enclosed within HDPE bunded area that is lined to achieve a permeability of less than 2 x 10^{-9} m.s^{-1} and has a minimum containment capacity of 123m^3; and • Production Flowline between Ungani Central Facility and Ungani North 1 well site

9.1.2 Chemical containment infrastructure and equipment

The following chemical containment infrastructure and equipment should be constructed, maintained and operated to manage the risk of chemical spills and leaks (specified in Licence conditions 6 and 7):

- all oil and PFW storage tanks must be stored in bunded areas that are lined to achieve a permeability of less than 2 x 10^{-9} m.s^{-1} and sized to accommodate 110% of the capacity of the largest tank in the bund;
- the Ungani Central Turkeys Nest Dam must be lined with a synthetic material to achieve a permeability of less than 1 x 10^{-9} m.s^{-1}
- the road tanker load out facility and refuelling facility must be bunded and lined with a synthetic material to achieve a permeability of less than 1 x 10^{-9} m.s^{-1}; and
- stormwater drains to sump with oil-water separator installed to treat stormwater prior to discharge.

Note: These requirements are derived from construction and design specifications in the Licence Holder's original licence application (Buru 2013). Design of chemical containment infrastructure on the Premises is based on the Australian Standard AS 1940-2004 *The storage and handling of flammable and combustible liquids*.

In accordance with the *Guidance Statement: Risk Assessments* (DER 2016b) the Licence Holder's controls in relation to management chemical containment and infrastructure will be conditioned as they lower the assessed likelihood of the risk event.

9.1.3 Specified actions

The following actions have been specified to control the risk of unacceptable discharges to land during operation of the Premises (Licence conditions 7, 8 and 9):

- the Ungani Central Turkeys Nest Dam must be managed to maintain a 500mm freeboard to ensure the risk of overtopping or embankment failure is reduced;

- the Ungani Central Turkeys Nest Dam must be managed to ensure the integrity of the liner and containment infrastructure is monitored and maintained;
- daily visual monitoring of all flowlines must be performed during operations to detect and rectify any leaks or discharges of hazardous materials to the environment; and
- discharge of treated stormwater may only occur from the approved outlet pipe of the Stormwater Oil-Water Separator as defined in Monitoring Locations Map in the licence.

Note: The above requirements are derived from Licence Holder controls.

The risk assessment for the operation of the Turkeys Nest Dam and Flowlines assumes discharges would only occur as a result of abnormal operating conditions. Conditions 7 and 8 have been conditioned to ensure appropriate monitoring and management to reduce the risk of abnormal discharges. Condition 9 restricts the discharge of treated stormwater to the approved outlet as proposed in the original Licence application (Buru 2013).

9.1.4 Emission limits and monitoring requirements

The following operational controls have been specified to control the risk of unacceptable discharges to land during operation of the Premises (Conditions 10, 11, 12, 13 and 14):

- A stormwater discharge limit of 15mg/L Total Recoverable Hydrocarbons (TRH) will be applied to the licence;
- Annual sampling of any treated stormwater discharged to the environment from the Stormwater Oil-Water Separator to ensure compliance with the discharge limit; and
- Two groundwater monitoring bores exist on the Premises that will be sampled on a quarterly basis for Total Recoverable Hydrocarbons.

Note: The requirements specified above are Licence Holder derived and based on commitments made in the original Licence application (Buru 2013).

A material consideration of the discharge of treated oily waters is that the concentration of TRH in the discharge is consistent with the design parameters of the treatment system, which has been assessed as presenting a low risk of adverse impacts to the receiving environment. Groundwater monitoring will enable verification that the groundwater resource is not being impacted over time by spills or leaks during operation of the Premises. In accordance with the *Guidance Statement: Risk Assessments* (DER 2016b) the Licence Holder's controls in relation to management discharges to land will be conditioned as they lower the assessed likelihood of the risk event.

9.1.5 Monitoring reports

Monitoring information (as outlined in section 9.1.4) will be required to be reported to DWER annually (Licence conditions 17 and 18). Reporting of the results of monitoring is required to inform future risk assessments.

10. Determination of Licence conditions

The conditions in the issued Licence in Attachment 1 have been determined in accordance with the *Guidance Statement: Setting Conditions* (DER 2015b).

The *Guidance Statement: Licence Duration* (DER 2016c) has been applied and the issued licence expires 21 years from the date of issue.

Table 19 provides a summary of the conditions to be applied to this licence.

Table 19: Summary of conditions to be applied

Condition Ref	Grounds
Emissions Condition 1	Environmental compliance is a valid, risk-based condition to ensure appropriate linkage between the licence and the EP Act.
Works Conditions 2, 3, 4 and 5	These conditions are valid, risk-based and contain appropriate controls (see section 6.1).
Infrastructure and Equipment Condition 6	These conditions are valid, risk-based and contain appropriate controls (see section 9).
Specified Action Conditions 7, 8 and 9	This condition is valid, risk-based and consistent with the EP Act.
Emission to Land Limits Condition 10	
Emissions to Land Monitoring Conditions 11 and 12	
Groundwater Monitoring Conditions 13 and 14	
Record Keeping Conditions 15 and 16	These conditions are valid and are necessary administration and reporting requirements to ensure compliance.
Reporting Conditions 17, 18 and 19	

DWER notes that it may review the appropriateness and adequacy of controls at any time and that, following a review, DWER may initiate amendments to the licence under the EP Act.

11. Applicant's comments

The Licence Holder was provided with the draft Decision Report and draft Revised Licence on 16 January 2019. The Licence Holder provided comments which are summarised, along with DWER's response, in Appendix 2.

12. Conclusion

This assessment of the risks of activities on the Premises has been undertaken with due consideration of a number of factors, including the documents and policies specified in this Decision Report (summarised in Appendix 1).

Based on this assessment, it has been determined that the Issued Licence will be granted subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

Caron Goodbourn
MANAGER, PROCESS INDUSTRIES
Delegated Officer
under section 20 of the *Environmental Protection Act 1986*

Appendix 1: Key documents

	Document title	In text ref	Availability
1.	Atlas of Australian Soils (Northcote et al, 1960-68).	Northcote et al, 1960-68	http://www.asris.csiro.au/themes/Atlas.html#Atlas_Attributes
2.	Bureau of Meteorology, 2017, *Climate statistics for Australian locations – Derby Aero*	BoM 2017	www.bom.gov.au
3.	Buru Energy Limited –Application to Amend Licence Form – 30 October 2018 – Upgrades to Ungani Production Facility (Licence L8777/2013/1)	Buru 2018	DWER records (A1733754)
4.	Buru Energy Limited – 30 July 2013. Ungani Facility Operating Licence Application (OP-LAN-001)	Buru 2013	DWER records (A656090)
5.	DER, December 2014. *Guideline: Assessment and Management of Contaminated Sites: Contaminated Sites Guidelines*. Department of Environment Regulation, Perth.	DER 2014	accessed at www.dwer.wa.gov.au
6.	DER, July 2015. *Guidance Statement: Regulatory principles.* Department of Environment Regulation, Perth.	DER 2015a	
7.	DER, October 2015. *Guidance Statement: Setting conditions.* Department of Environment Regulation, Perth.	DER 2015b	
8.	DER, November 2016. *Guidance Statement: Environmental Siting.* Department of Environment Regulation, Perth.	DER 2016a	
9.	DER, February 2017. *Guidance Statement: Risk Assessments*. Department of Environment Regulation, Perth.	DER 2016b	
10.	DER, August 2016. *Guidance Statement: Licence duration.* Department of Environment Regulation, Perth.	DER 2016c	
11.	*National Water Quality Management Strategy: Paper No. 4. Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ 2000)*	ANZECC ARMCANZ 2000	http://www.agriculture.gov.au/water/quality/nwqms/nwqms-australian-guidelines-water-quality-monitoring-reporting

Appendix 2: Summary of Licence Holder's comments on risk assessment and draft conditions

Condition	Summary of Licence Holder comment	DWER response
Condition 2 (Table 3) of L8777/2013/1	Requested correction of several references to well sites on the Premises	Noted and corrected in the Licence
Schedule 2 of L8777/2013/1	Confirmation of Premises production capacity	Additional petroleum wells and oil and produced water storage infrastructure Previously approved under Amendment Notice 1 resulted in an increase to the Premises design capacity. Although throughputs are estimated to be around 146,615 tpa, the theoretical production design capacity as advised by the Licence Holder is 244,359 tpa. Licence L8777/2013/1 and the associated Decision Report updated to reflect theoretical production design capacity of the Premises.
Table 5 of the Decision Report	Confirmation of DMIRS Approval for proposed works. DMIRS approved the *Ungani Production Facility Commissioning and Operations Environment Plan* (HSE-PLN-037) Revision 14 on 14 November 2018.	Noted and updated in the Decision Report