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Committee Secretary  
Senate Standing Committees on Environment and Communications  
PO Box 6100  
Parliament House  
Canberra ACT 2600

**By email: [ec.sen@aph.gov.au](mailto:ec.sen@aph.gov.au)**

Dear Committee,

**Submission: Inquiry into Water Use by the Extractive Industry**

I refer to the above mentioned inquiry referred by the Senate to the Environment and Communications References Committee on 18 October 2017.

Please find enclosed Buru Energy's submission in relation to this matter.

As a company with experience in conventional and unconventional petroleum operations, including hydraulic fracturing for tight gas, Buru Energy can provide a useful perspective on water use in the industry. In the interest of keeping the submission concise, information has been provided at a relatively high level; extensive reporting has been provided to the lead agency for petroleum operations in Western Australia, DMIRS, and is available on request.

If you have any queries in relation to this submission, please do not hesitate to contact me on

Yours sincerely,

**Dr Kris Waddington**  
Regulatory and Community Manager  
Buru Energy Limited



**SUBMISSION – BURU ENERGY LIMITED**  
Senate Inquiry into Water Use by the Extractive  
Industry  
15 December 2017

## 1. INTRODUCTION

On 18 October 2017, the Senate referred to the Environmental and Communications References Committee for inquiry:

*The adequacy of the regulatory framework governing water use by the extractive industry, with particular reference to:*

- a) *the social, economic and environmental impacts of extractive projects' take and use of water;*
- b) *existing safeguards in place to prevent the damage, contamination or draining of Australia's aquifers and water systems;*
- c) *any gaps in the regulatory framework which may lead to adverse social, economic or environmental outcomes, as a result of the take and use of water by extractive projects;*
- d) *any difference in the regulatory regime surrounding the extractive industry's water use, and that of other industries;*
- e) *the effectiveness of the 'water trigger' under the Environment Protection and Biodiversity Conservation Act 1999, and the value in expanding the 'trigger' to include other projects, such as shale and tight gas; and*
- f) *any other related matters.*

This document provides Buru Energy's submission to the inquiry.

## 2. ABOUT BURU ENERGY

Established in 2008, Buru Energy Limited is a Western Australian based, ASX listed oil and gas exploration and production company, with a sole focus on the Canning Basin in the West Kimberley region of Western Australia.

Buru Energy holds interests in an extensive portfolio of petroleum exploration permits covering approximately 22,100 square km in the Canning Basin. Buru Energy also holds a number of production licences in the Canning Basin.

On the period 2008 to 2017, Buru Energy has drilled over 25 petroleum wells and carried out hydraulic fracturing on three of these wells. Well sites are typically 150 m x 150 m (0.02 square km) each, with well sites and associated access tracks less than 0.01% of the land area under Buru Energy's acreage.

## 3. WATER RESOURCES IN THE CANNING BASIN

The Canning Basin is Australia's second largest groundwater resource after the Great Artesian Basin (Rockwater 2015). Estimates of sustainable yield from the basin are about 615,000 ML/year (WRC, 2001) and 827,000 ML/year (ANRA, 2010). Of that, only 33,134 ML/year (less than four percent) is being consumed (Rockwater 2015). Major users of groundwater in the Canning Basin include town water supplies (Broome, Derby and Fitzroy Crossing), pastoral use and irrigation.

The Western Australian Department of Water and Environmental Regulation (DWER) allocates water use via licences within the sustainable volume available for a particular resource. DWER (formerly Department of Water) have determined that the Canning-Kimberley groundwater area has an allocation limit of over 300,000 ML/year (Department of Water 2014).

#### 4. BURU ENERGY'S WATER USE

All water used during Buru Energy's operations is licenced in accordance with the *Rights in Water and Irrigation Act 1914*. Buru Energy uses water when it constructs a well site, whilst drilling a petroleum well, when it carries out hydraulic fracturing and for general camp site purposes. Buru Energy's water use to date has been minimal compared to other water users in the Kimberley region.

Buru Energy accesses water for use in its petroleum exploration activities from underground aquifers via water bores.

Buru Energy's records indicate that the average amount of water used in the construction of a well site and the drilling of a petroleum well is about 5 ML.

In its pilot hydraulic fracturing program in 2015, Buru Energy used about 10 ML of water per well. Hydraulic fracturing was carried out on two wells in 2015, with a total water use of about 20 ML well below the licensed allocation of over 70 ML and a negligible portion of the Canning Basin allocation limit (<0.01%).

As predicted during planning for the hydraulic fracturing operations in 2015, the water use resulted in minimal groundwater drawdown, which was not detected in continuous depth loggers installed in the on-site water bores.

To give an indication of potential future water use in the Canning Basin, Buru Energy has modelled the water use from a gas field development that utilises hydraulic fracturing. The conceptual model is based on drilling and hydraulic fracturing of four horizontal wells per year, with 50% of injected water flowed back to surface and used in subsequent stimulations (thus reducing the groundwater required for each subsequent well).

Under the above scenario, approximately 60 ML of groundwater may be utilised per year. This equates to around 0.02% of the Canning Basin groundwater allocation limit.

Table 1 below outlines the current water uses from the Canning Basin resource and Buru Energy's use.

Table 1: Canning Basin groundwater use

Description	Water Use	
	ML/year	% of allocation limit
Broome Town Supply <sup>1</sup>	4,440.5	1.4
Derby Town Supply <sup>1</sup>	2,212	0.7
Fitzroy Crossing Town Supply <sup>1</sup>	315.5	0.1
Pastoral Use (Non-Irrigation) <sup>2</sup>	7,906	2.5
Irrigation (Pastoral and Horticulture) <sup>2</sup>	8,454	2.7
Drilling of a petroleum well	5	0.002
2015 hydraulic fracturing program	20	0.006
Indicative gas field development	60	0.02

<sup>1</sup> Kimberley Regional Water Plan 2010-2030 (Department of Water 2010)

<sup>2</sup> Water Futures for Western Australia 2008-2030 (Thomas 2008)

#### 5. SAFEGUARDS IN PLACE TO PROTECT AQUIFERS

When Buru Energy carries out any of its operation it puts in place numerous safeguards to protect aquifers. These safeguards are identified during extensive planning undertaken for each operation, and include bunding of chemicals and other potentially hazardous substances (in accordance with DWER's *Water Quality Protection Notes*) and obtaining water licences from DWER (as described above). The key safeguard to protect aquifers however is petroleum well integrity, and the key assurance of aquifer protection is water quality monitoring.

## **5.1. Petroleum Well Integrity**

In petroleum well activities, the integrity of the well is a key control for managing potential impacts to aquifers.

In Western Australia, well integrity is regulated by Department of Mines, Industry, Regulation and Safety (DMIRS) under the Petroleum and Geothermal Energy Resources (Resource Management and Administration) Regulations 2015, the objects of which include ensuring that operations relating to the exploration for petroleum or geothermal energy resources, or the recovery of petroleum or geothermal energy in the State are – “...carried out in a way that reduces the risk of aquifer contamination.”

Buru Energy's wells targeting tight and shale gas resources are typically more than 3 km deep. The depth of petroleum wells and lower volumes of water required and generated from tight and shale gas wells are key points of difference to coal seam gas operations. There are several aspects to ensuring well integrity including well design, well construction and monitoring of well parameters over time. Wells are designed and constructed with at least two independent and verified barriers in place to isolate productive aquifers from exposure to the well bore or well fluids (including stimulation fluids). Integrity of these barriers is monitored throughout the well's life. At the end of the productive life of a well, the well is decommissioned with multiple cement plugs downhole.

## **5.2. Water Quality Monitoring**

Buru Energy undertakes baseline, operational and post-operational water monitoring at its petroleum well sites.

Further, prior to, during, and following Buru Energy's 2015 hydraulic fracturing program, an extensive groundwater monitoring program was undertaken. The program was designed in consultation with DMIRS, DWER and academics and included monitoring of the surface alluvium and deeper aquifer both upstream and downstream of potential contamination sources (the petroleum well and flowback water storage reservoirs). Post-operational monitoring is continuing six-monthly. This program detected no impacts of the hydraulic fracturing operations on groundwater quality with results of the monitoring made publicly available on Buru's website.

## **5.3. Results of Aquifer Protection**

As a result of the numerous safeguards implemented by Buru Energy and other petroleum companies operating in Western Australia, there have been no known instances of groundwater contamination as a result of petroleum well operations in the State. This demonstrates the adequacy of the safeguards and the low risk nature of petroleum operations on groundwater.

The primary causes and pathways of groundwater pollution in the USA were considered by King & King (2013). They determined that the main sources of groundwater contamination in the preceding years were underground storage tanks (e.g. petrol stations), residential septic systems and landfills. Petroleum wells did not rank in the top 20 pollution sources for groundwater in the USA despite the onshore oil and gas industry in the USA being significantly larger than Australia's.

# **6. IMPACTS OF BURU ENERGY'S USE OF WATER**

## **6.1. Potential Impacts**

Given the relatively small volumes of groundwater used by Buru Energy during its operations, which are well within licensed limits, negative social, economic and environmental impacts associated with water use in the Canning Basin have been negligible. The demonstrated lack of groundwater contamination also restricts the potential for negative social, economic or environmental impacts.

The low impact nature of Buru Energy's recent hydraulic fracturing program was confirmed by the Environmental Protection Authority after Buru Energy referred the program to the Authority for assessment under Part IV of the *Environmental Protection Act 1986* in 2013. The EPA determined that the proposal did not require formal assessment as it was unlikely to have a significant effect on the environment, and would be adequately managed by DMIRS and DWER.

## 6.2. Independent Scientific Review

The low risk nature of Buru Energy's hydraulic fracturing program was also confirmed by independent specialist reviews. The reviews were undertaken on behalf of the Traditional Owner groups with native title in Buru Energy's acreage, by 11 specialists from four different universities (Curtin, UQ, Adelaide, UWA) and the CSIRO, as well as various specialist consultants. Each review determined that the operations had a low risk to groundwater (Table 2).

Table 2: Findings of Traditional Owner specialist reviews relevant to groundwater

Independent Review	Key Findings Related to Groundwater
Yawuru Traditional Owners	<ul style="list-style-type: none"> <li>• <i>The approach to water and wastewater management, proposed by Buru Energy, conforms to internationally accepted standards.</i></li> <li>• <i>Buru Energy's baseline groundwater monitoring programme for the upper aquifer system is considered comprehensive and consistent with internationally accepted standards.</i></li> </ul>
KRED Enterprises (representing Nyikina Mangala, Karajarri and Ngurrara groups)	<ul style="list-style-type: none"> <li>• <i>There is general confidence that the well design provides the necessary control measures for fracking.</i></li> <li>• <i>Potential risks to ground and surface water are considered to be low due to both geological barriers and engineering controls.</i></li> <li>• <i>Provided the proposed best practice is used so that there are no surface and groundwater exposure pathways, residual risks from chemicals and flowback water should be minimal.</i></li> <li>• <i>We believe there is a bigger risk associated with on ground operations than below ground.</i></li> </ul>
Noonkanbah (Yungngora and Warlangurru Traditional Owners)	<ul style="list-style-type: none"> <li>• <i>This review finds that Buru's plans represent best practice for protection of surface water and groundwater in the field of tight gas development.</i></li> <li>• <i>Analysis provided by Buru and analysis performed by CDM Smith suggests that the quantity of groundwater will not be significantly affected by pilot fracking operations, and that any potential contamination will be identified through operations and monitoring.</i></li> <li>• <i>Hydrofracturing will take place at sufficient depths that it should not impact shallower groundwater supplies.</i></li> </ul>

## 6.3. Potential Benefits

The water used during operations allows Buru Energy to develop the petroleum resources present in the Canning Basin, which in turn provides substantial social and economic benefits to Kimberley communities, with a small environmental footprint. This was successfully demonstrated during Buru's 2015 hydraulic fracturing program, when more than 30 members of the nearby Noonkanbah community received on-site training and/or employment during the operations. Similarly, Buru's Ungani Oilfield operators are all residents of the nearby town of Broome. Under the land use agreements in place with Traditional Owners for the Ungani Oilfield, positions at Ungani are preferentially given to Traditional Owners with suitable qualifications or experience. Wherever possible and appropriate, Buru gives preference to local people and contractors including Traditional Owners across its operations.

## 7. REGULATORY FRAMEWORK

The oil and gas industry in Western Australia is heavily regulated. Buru Energy's operations are regulated by numerous State government departments under multiple different laws. The main Western Australian laws most relevant to water use during Buru Energy's activities include:

- a) *Petroleum and Geothermal Energy Resources Act 1967* and associated regulations administered by DMIRS;
- b) *Rights in Water and Irrigation Act 1914* administered by DWER; and
- c) *Environmental Protection Act 1986* administered by DWER and EPA.

These agencies have the local and specialist knowledge of the Western Australian environment and industries.

In regards to protection of water resources, the current regulatory framework provides thorough assessment and monitoring of operations undertaken by Buru Energy, ensuring groundwater resources are not negatively impacted.

Under the *Rights in Water and Irrigation Act 1914*, Buru Energy is required to monitor and report its water usage under each of the company's licences. In this sense, Buru's water use is subject to the same regulatory requirements as many other industries. However, additional requirements were placed on the licences relating to hydraulic fracturing, including the requirement to analyse groundwater quality and report it to DWER annually. Further, to attain approval under the *Petroleum and Geothermal Energy Resources (Environment) Regulations 2012*, Buru Energy must demonstrate that risks to groundwater are as low as reasonably practicable ('ALARP'), meaning that all reasonable measures must be undertaken to prevent impact. Petroleum companies are therefore under more stringent regulatory requirements than many other industries.

It should be noted that the Western Australian State government is currently reviewing the regulatory framework around hydraulic fracturing as part of a scientific inquiry into the practice, and has placed a moratorium on the practice while the inquiry takes place. It is also worth noting that numerous previous inquiries into hydraulic fracturing have all found that hydraulic fracturing for tight and shale gas can be conducted safely with minimal impacts on groundwater if carried out properly.

## 8. PROPOSED AMENDMENT OF THE EPBC ACT 1999

The inquiry is considering whether the 'water trigger' under the *Environment Protection and Biodiversity Conservation Act 1999* should be expanded to include other industries, such as shale and tight gas. The trigger currently only applies to coal seam gas and large coal mining developments.

The Canning Basin is a large and underutilised water resource, of which Buru Energy utilises (and would only ever utilise) a negligible portion. The DWER licences water use under the *Rights in Water and Irrigation Act 1914*, within sustainable yields of the relevant aquifers. Buru Energy (as well as other operators) has been able to demonstrate that risks to groundwater as a result of hydraulic fracturing or other petroleum operations are similarly negligible. Given the lack of impact on groundwater, there is a corresponding lack of potential for negative social, economic and environmental impacts. Conversely, development of petroleum resources provides significant social and economic benefits.

Buru Energy considers that the current regulatory regime in relation to water resources is thorough and effective, and that there are adequate safeguards in place for such a low risk activity.

For these reasons, Buru Energy does not consider further regulation at the Federal level via expansion of the 'water trigger' as being necessary.

## 9. LITERATURE CITED

ANRA (2010). Australian Natural Resources Atlas, based on records from 2000 to 2002.

Department of Water (2010). Kimberley Regional Water Plan 2010-2030: Strategic Directions and Actions. Department of Water, December 2010.

Department of Water (2014). Water resources inventory 2014: Water availability, quality and trends. Department of Water, May 2014.

King, G.E. & King, D.E. (2013). Environmental Risk Arising From Well Construction Failure: Difference Between Barrier and Well Failure, and Estimates of Failure Frequency Across Common Well Types, Locations and Well Age. Society of Petroleum Engineers (SPE-166142).

Rockwater (2015). Hydrogeological assessment of project areas. Report for Buru Energy Ltd, June 2015.

Thomas, J.F. (2008). Water Futures for Western Australia 2008-30. Volume 2: Region Reports. Report prepared by Resource Economics Unit for Department of Water, December 2008.

WRC (2001). Caring for Kimberley groundwater. Water and Rivers Commission water advice No. 15.