Senex

Senex Energy Limited

Western Surat Gas Project

2019 Annual EPBC Report

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Document Status

Revision History

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A	17/10/2019	Issue for review		H.Wood
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Document Approval

Originator	H. Wood, Senior Environmental Advisor	**Signed**	Date
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Reviewed by	T. Jensen Environmental Manager	**Signed**	Date 5/11/2019
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		Signed	
Approved by		**Signed**	
		Signed	
		Signed	

1. Introduction

Stuart Petroleum Cooper Basin Gas Pty Ltd (ACN 130 588 055) is developing the Western Surat Gas Project (WSGP) in south-central Queensland. The proponent is a wholly owned subsidiary of Senex Energy Limited (Senex). The WSGP is a gas field, producing gas to supply the third party operators in Australian domestic east coast or export gas markets.

The gasfield is located in the Brigalow Belt South bioregion, 30 kilometres northeast of Roma in the Maranoa Regional Council area of southern-central Queensland. The area for gas production area is 685 km^2.

In May 2015, a delegate of the then Minister for the Environment determined the proposal was a controlled action due to potential for significant impacts on four matters of national environmental significance (MNES). In April 2017, the DoEE deemed the proposed action to be assessed by a Public Environment Report (PER). The approval was decided on 10 August 2018 for four controlling provisions, with conditions. The controlling provisions are:

- Wetlands of international importance (sections 16 & 17B)
- Listed threatened species and communities (sections 18 & 18A)
- Listed migratory species (sections 20 & 20A)
- Water resources/trigger (sections 24D & 24E).

The action is approved to develop 425 production wells, undertaking a staged drilling program. Supporting infrastructure includes: gas and water gathering networks; gas field compression facilities and a central processing facility; medium pressure infield and sales gas pipelines; a central processing plant; water storage and treatment facilities; and other associated and ancillary facilities. The targeted production rate is approximately 50 terajoules (TJ) per day over a 30 year project life.

Prior to the EPBC approval, exploration and appraisal activities had been undertaken by previous tenure holders, and Senex following the transfer of tenure in March 2015.

Relevant project details for the approved action are in Table 1-1.

Table 1-1 Western Surat Gas Project details

Approved Action Details	
Title of the Action	Stuart Petroleum Cooper Basin Gas Pty Ltd Western Surat Gas Project, NE of Roma, Queensland (EPBC 2015/7469)
Person to whom the approval is granted	Stuart Petroleum Cooper Basin Gas Pty Ltd
Proponent's ABN	130 588 055
Date of Decision	10 August 2018
Expiry date of approval	30 June 2068
Contact details	Level 30, 180 Ann Street, Brisbane Queensland 4000

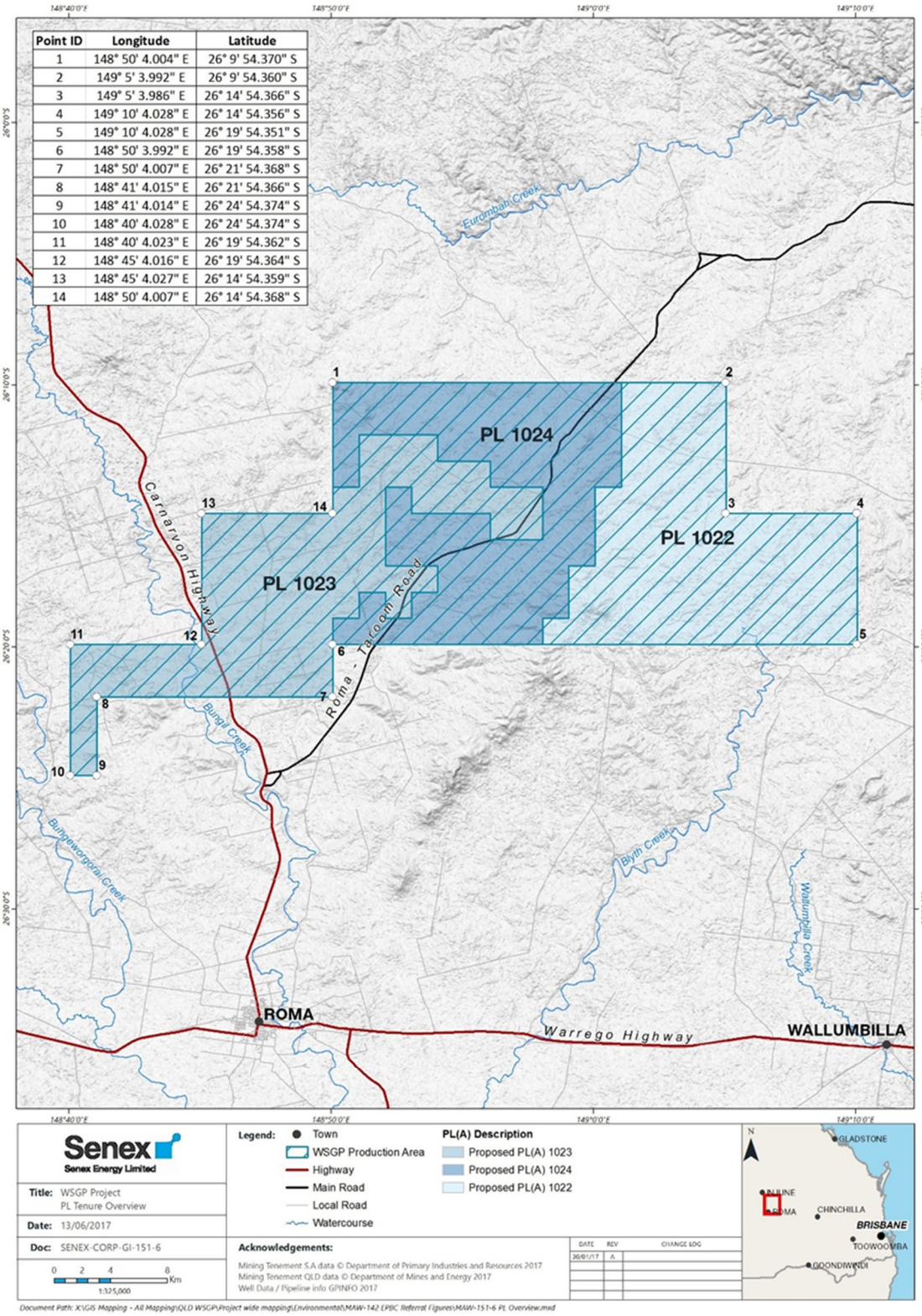

Figure 1 Location of the Western Surat Gas Project

1.1. Purpose

This report was prepared to address the approval requirements.

Senex is required to publish a report (the Annual Compliance Report) addressing compliance with each of the conditions of the approval during the previous 12 months (Condition 16). The report is to be published on the Senex website.

The report covers activities undertaken from August 2018 to August 2019.

1.2. Project status

In May 2019, Senex commenced the action on the ground with civil construction for 19 production wells and associated water and gas gathering pipelines on the Eos and Glenora blocks in petroleum lease (PL) 1022. Those activities are located within areas of remnant vegetation and appropriate management measures were implemented for habitat values, including for threatened species. All land disturbance was within the Stage 1 area, and the area of habitat disturbed was within the approved clearance limits (Refer to section 2.1).

A previous appraisal program was successfully converted into gasfield production.

2. Results

2.1. Clearance Limits

Condition 1. The approval holder must not clear more than 102 hectares of habitat for Koala and Yakka Skink in Stage 1 of the project.

Senex commenced constructing the wells and gathering for the production field. In the Stage 1 area, the following area was cleared for the wells, gathering pipeline and right of ways, and ancillary activities:

- 35.56 ha of Koala habitat
- 35.56 ha Yakka Skink habitat.

The areas cleared are within the approved area limits.

2.2. Stage 1 Offset Management Plan

Condition 2. To compensate for the loss of 102 ha of habitat for the Koala and Yakka Skink in Stage 1, the approval holder must implement the stage 1 Offset management plan.

An annual report for offset management was prepared and issued in June 2019. The report 'Appletree Creek Offset Site – Western Surat Gas Project Annual Report' (SENEX-WSGP-EN-REP-017) was provided to the Department of Environment and Science and the Department of the Environment and Energy.

In summary, the Stage 1 Offset Management Plan has progressed into the implementation phase, after successfully being secured by all the relevant parties. The following actions were completed.

2.2.1. Legal security of the offset site

On 27 March 2019, Senex received the Voluntary Declaration Notice under sections 19E – 19L of the Queensland *Vegetation Management Act* 1999 (VMA) for the declaration of an area that contributes to the conservation of the environment (decision reference: 2018/005644), as identified on the Declared Area Map (Appendix A - DAM 2018/005644).

This completed a two-year process of identifying a suitable area, assessing the values, obtaining approval from the regulatory bodies and the landholder, and ensuring its declaration as an area of high nature conservation value under s 19G (1) (b) of the *VMA*.

As per the Agreed Delivery Arrangement (101/0027617), the Department of Environment and Science (Energy and Extractive Resources) was notified on 31 May 2019. This follows the agreement made between the Offset provider and Senex Energy to manage the offset site.

2.2.2. Formal agreement with Offset provider

In May 2019, a formal agreement was signed between Senex and the Offset provider. The offset provider will be responsible for implementing the OAMP.

2.2.3. Fencing, cattle exclusion, firebreaks

Prior to the wet season in 2018, the perimeter fence was installed enclosing the Offset implementation area. The fence is a strained, 4 stranded, barb wire fence with steel star picket posts. Photographs of the installed fence are in Photo 1.

Changes to grazing management commenced on 18 March 2019, when cattle were excluded from the site. They were returned on 6 May 2019 to reduce fire risk, following late seasonal rain and pasture growth.

A firebreak adjacent to the fence has been installed reducing the risk of fire from external sources to the site (Photo 2).

Photo 1 Perimeter fencing completed around the Appletree Creek paddock offset site

Photo 2 Firebreaks were established around the extremity of the offset area adjacent to the newly installed fence

2.2.4. Establishing monitoring sites

Four monitoring sites were identified in the OAMP. Permanent reference points were installed, and monitoring commenced by the Offset provider on 13 June 2019.

Photo 3 One of the four permanent monitoring sites established

2.2.5. Implementation plan finalized

Senex and the Offset provider finalized the implementation plan in June 2019 to ensure all the monitoring and management actions, identified from the monitoring are undertaken. The implementation plan will support future reporting requirements for the Offset Area Management Plan (OAMP).

Condition 2 is being addressed, as outlined by the actions outlined in section 2.2. The Offset Area Management Plan will continue to be implemented.

The actions outlined in section 2.2.1 demonstrates that condition 3 of the approval has been undertaken and is complete.

2.3. Stage 2 Offset Management plan

Conditions 4 to 7 relate to the Stage 2 Offset Management Plan and are not yet relevant for this annual report as Stage 2 of the project has not commenced.

2.4. Management plans

Condition 8. The approval holder must implement the following management plans:

a) Western Surat Gas Project Coal Seam Gas Water Management Plan (CSG WMP)

b) Western Surat Gas Project Water Monitoring and Management Plan (WWMP)

c) Western Surat Gas Project Environmental Management Plan (EMP)

d) Western Surat Gas Project Significant Species Management Plan (SSMP)

2.4.1. Coal Seam Gas Water Management Plan

The CSG WMP continues to be implemented.

A resource monitoring and management plan was prepared to enable produced water to be used for irrigation on a landholder's property, within the petroleum lease. Construction of the infrastructure for the irrigation project has commenced. The plan was prepared to address Queensland's End of Waste Code (Irrigation of Associated Water (including coal seam gas water) under the *Waste Reduction and Recycling Act 2011 (WRR Act)*. Senex are a Registered Resource Producer under the WRR Act to responsibly provide water to third parties for beneficial use.

2.4.2. Water Monitoring and Management Plan

The WMMP continues to be implemented. As a tenure holder within the Surat Cumulative Management Area, Senex has installed groundwater monitoring bores to address its obligations under the Surat CMA Underground Water Impact Report (UWIR). The bores are part of a large network monitoring the CMA that reports on changes in groundwater within the area. Senex drilled and completed monitoring bores Tethys 6M / 7M in early 2019. Data is not currently available from the Tethys bores.

Prior to the reporting period, Senex drilled and completed two monitoring bores. Data collection commenced at Glenora 4M in December 2016 for groundwater levels in the following formations:

- Springbok Sandstone
- Upper Juandah Coal Measures
- Lower Juandah Coal Measures
- Taroom Coal Measures
- Hutton Sandstone.

Glenora 6M was drilled at the same location as Glenora 4M to monitor groundwater levels in the Gubberamunda Sandstone with data collection starting in February 2017.

Data from the monitoring bores is provided to the Office of Groundwater Impact Assessment (OGIA) to cumulatively assess groundwater in the CMA.

In May 2019, the draft 2019 UWIR was released. Once this report is finalized, the monitoring data will be compared to the 2019 UWIR model outputs.

2.4.2.1. Groundwater Data Management and Analysis

Groundwater level data from the Glenora bores has been reviewed by assessing the groundwater elevation hydrographs and any data quality issues identified. Triggers have been developed to provide for the early-warning of unpredicted impacts to groundwater dependent assets in the vicinity of the WSGP. The early-warning impacts specifically relate to deviations from the groundwater level decline predicted as part of the 2016 UWIR model.

Outputs were received from the 2016 UWIR cumulative impact groundwater model. The water level decline in the 2016 UWIR model was predicted from a starting point of steady state groundwater levels in 1995, which represents pre CSG development conditions. This date also precedes most groundwater monitoring activities (including Senex) in the Surat CMA and consequently the modelled water levels are expected to be different than the measured water levels at Glenora 4M / 6M.

For the purpose of evaluating early warning of impacts in the vicinity of WSGP, drawdown has been calculated as the difference between groundwater levels from July 2018 to January 2019, with drawdown being calculated for both modelled and actual water levels. A summary of the modelled groundwater drawdown compared with the actual drawdown measured at Glenora 4M is presented in Table 2-1.

Table 2-1 Comparison of 2016 UWIR model predicted drawdown and actual drawdown at Glenora 4M calculated between 1st July 2018 and 1st January 2019

UWIR model layer	Lower Springbok	Middle 1 WCM	Middle 2 WCM	Middle 3 WCM	Upper Hutton
Modelled (m)	0.019	1.722	2.114	2.284	0.002
Actual (m)	3.389	1.473	8.602	2.093	1.025
Actual > modelled	Yes	No	Yes	No	Yes

Lower Springbok Sandstone

There was more drawdown in the lower Springbok than the model predicted. The difference between the model and the actual drawdown is due to the low permeability in the sandstone formation and the time taken to reach equilibrium in water levels following bore completion. The most recent data point of 308.78 mAHD is approaching the calculated freshwater hydrostatic water level of 299mAHD. Any difference between the model and actual readings is likely to be small after equilibrium is reached.

Walloon Coal Measures Mid 1,2 and 3

The actual drawdown is less than the modelled drawdown, based on the 2016 UWIR, in the Mid Walloon Coal Measures 1 and 3 layers, but not the Mid Walloon Coal Measures 2 layer. This may reflect a difference between water production by operators in the Surat CMA and water production used as inputs to the model, which has resulted in different drawdown within the reservoir for the corresponding time period.

Upper Hutton Sandstone

Actual drawdown in the Upper Hutton Sandstone was higher than the modelled drawdown, which may represent the effects of unknown groundwater extraction by other parties from the Hutton Sandstone in the vicinity of WSGP, rather than the influence of water extraction as part of the WSGP project.

Gubberamunda Sandstone

No drawdown has been modelled for the Gubberamunda Sandstone at the location of Glenora 6M from 1st July 2018 to 1st January 2019. Approximately 0.17m of drawdown was measured for the corresponding period which may reflect the effects of groundwater pumping by others.

2.4.2.2. Trigger levels

Trigger levels as defined in the *Water Act 2000* are 5 m for a consolidated aquifer and 2 m for an unconsolidated aquifer (unconsolidated aquifers do not occur at WSGP). The 2016 UWIR did not predict any private water bores to exceed the 5 m trigger within the next 3 years. Therefore, Senex did not have any Make Good obligations under the *Water Act 2000* at that time.

It is expected that the next reporting period will incorporate data outputs for groundwater from the finalised 2019 UWIR.

2.4.2.3. Petroleum Hydrocarbon Monitoring

Monthly monitoring for petroleum hydrocarbons of the pre-treated produced water has been undertaken. The water has been sampled at the Glenora Tank (149.142, -26.323), which represents the water quality of the aggregated produced water for the field.

Three consecutive monthly samples were collected from September to November 2018. Samples were collected at the sampling point and analysed by ALS Environmental (Nata Accredited). Samples were analysed for:

- total petroleum hydrocarbons
- total recoverable hydrocarbons
- BTEXN.

The results have shown that for all samples, the results have not registered i.e. they are below the limits of laboratory detection. There is no indication of the presence of hydrocarbons in any of these samples taken from produced water. The analytical results are provided for the three sampling events (Appendix B).

Water quality criteria have not been required to be determined for using treated produced water for any authorised uses, as the results of the water samples concluded that the pretreated water quality in relation to the analytes is below the limit of reporting.

Similarly, it has not be necessary to develop measures for addressing exceedances for beneficial use of water, as there have been no detectable amounts found.

2.4.3. Environmental Management Plan

The EMP is a working plan that has been implemented for all construction and operating activities for the project. All contractors have been required to comply with the plan through their contractual arrangements.

2.4.4. Significant Species Management Plan

The SSMP has been implemented for the project for preconstruction, construction and operating stages of the project. There was a particular focus on flora and fauna management with the construction activities, during the well and gathering field development and the water infrastructure.

In May 2019, Senex commenced developing 19 production wells and associated water and gas gathering pipelines on the Eos and Glenora blocks in petroleum lease (PL) 1022. The project is located within remnant habitat and was managed for habitat values that included habitat for threatened species. After assessing and remapping areas of the MNES community Brigalow (*Acacia harpophylla* dominant and codominant) threatened ecological community, all patches of the TEC were avoided. No threatened EPBC flora species were found to occur within the project area during the ecological field surveys.

Regarding EPBC fauna species, there was a specific focus on managing habitat for Yakka Skinks (*Egernia rugosa*) by avoiding known colonies. This followed an extensive survey to identify and map Yakka Skink colonies within the footprint or areas adjacent to the proposed activities. The survey informed right of way route selection and selecting sites for well pads. In all circumstances, the identified colony features were able to be avoided by relocating the infrastructure.

The SSMP was implemented for site works. A fauna spotter catcher program was implemented and they remained on site during all the land disturbance, to undertake preclearance checks of the area, and relocate fauna where required. The preclearance checks did not identify any other EPBC threatened species.

Regular environmental inspections were undertaken during the project. There were no major non conformances identified.

2.4.5. Revising water management plans

Condition 9. Between years 3 and 5 after the approval date, the approval holder must submit a revised Western Surat Gas Project Coal Seam Gas Water Management Plan and Western Surat Gas Project Water Monitoring and Management Plan for the written approval of the Minister. The revised plans must:

a) be in accordance with the Department's Environmental Management Plan guidelines

b) include an assessment of the effectiveness of measures contained in the Western Surat Gas Project Coal Seam Gas Water Management Plan and Western Surat Gas Project Water Monitoring and Management Plan in avoiding, mitigating and managing impacts on protected matters, and

c) include a comparison of impacts on protected matters against impacts predicted in the Public Environment Report.

Condition 10. The approval holder must not implement the revised Western Surat Gas Project Coal Seam Gas Water Management Plan and Western Surat Gas Project Water monitoring and management plan until the revised plans have been approved by the Minister. The approved revised plans must be implemented within 12 months of plan approval.

These conditions are not due to be enacted until 2021. No further action required.

2.5. Chemical risk assessment

Condition 11. Prior to use of new drilling fluid compounds, the approval holder must undertake a chemical risk assessment.

Condition 12. Where a new drilling fluid compound/s is determined by the chemical risk assessment to be high risk, the approval holder must submit the chemical risk assessment for the high risk new drilling fluid compound/s for the written approval of the minister.

Condition 13. The approval holder must not use the new drilling fluid compounds considered high risk until the chemical risk assessment has been approved by the Minister.

A total of 5 new chemicals were risk assessed for use. The chemicals were predominantly to be used for well drilling and workovers. The drilling fluids were risk assessed by KCB (190503L_ChemRAUpdate).

All chemicals were assessed and the overall risk to MNES was found to be low to insignificant. The Senex Chemical Risk assessment (SENEX-QLDS-EN-REG-001) was updated.

No further action is required to address the condition for the reporting period.

2.6. Administrative Conditions

Condition 14. *Within 20 business days after the commencement of the action, the approval holder must advise the department in writing of the actual date of commencement.*

The department was advised in 2018 and a receipt acknowledging the commencement of the project was received from the department (dated 10 September 2018, 2015/7469). No further action is required for this condition.

Condition 15. The approval holder must maintain accurate records substantiating all activities associated with or relevant to the conditions of approval, including measures taken to implement the plans required by this approval, and make them available upon request to the Department. Such records may be subject to audit by the Department or an independent auditor in accordance with section 458 of the EPBC Act, or used to verify compliance with the conditions of approval. Summaries of audits will be posted on the Department's website.

Senex conducted two internal audits of the EPBC approval conditions in 2019 as part of an overarching environmental assurance program. The results of the audit are recorded as part of Senex's EMS. No non compliances were noted.

Condition 16. Within 3 months of every 12 month anniversary of the commencement of the action, the approval holder must publish a report (the annual compliance report) on its website addressing compliance with each of the conditions of this approval during the previous 12 months. Documentary evidence providing proof of the date of publication and non compliance with any conditions of this approval must be provided to the Department at the same time as the Annual Compliance Report is published. Reports must remain published for the duration of this approval. The approval holder must continue to publish the annual compliance report until otherwise advised by the Minister in writing.

This report addresses condition 16, once available on the website. No further action is required.

Condition 17. Any contravention of the conditions of this approval (including contravention of a commitment made in a management plan, program or strategy) must be reported to the Department within 7 days of the approval holder becoming aware of the contravention.

No contravention with the conditions has occurred during the reporting period.

Condition 18. Upon the direction of the Minister, the approval holder must ensure that an independent audit of compliance with the conditions of the approval is conducted and a report submitted to the Minister. The approval holder? must not commence the audit until the Minister approves the independent auditor and audit criteria in writing. The audit report must address the criteria to the satisfaction of the Minister.

No action required for this condition. An audit was not requested by the department.

Condition 19. The approval holder may choose to revise a management plan specified under conditions 8 and 9 without submitting it for approval under section 143A of the EPBC Act, if the taking of the action in accordance with the revised plan would not be likely to have a new or increased impact. If the approval holder makes this choice, it must:

a) notify the department in writing that the approved plan has been revised and provide the department, at least 4 weeks before implementing the revised plan, with:

i. an electronic copy of the revised plan;

ii an explanation of the differences between the revised plan and the approved plan; and

iii reasons the approval holder considers that the taking of the action in accordance with the revised plan would not be likely to have a new or increased impact.

No plans have been revised during the reporting period.

Condition 20. The approval holder may revoke its choice under condition 19 at any time by notice to the department. If the approval holder revokes the choice to implement a revised plan, without approval under section 143A of the EPBC Act, the plan approved by the Minister must be implemented.

No action undertaken for this condition during the reporting period.

Condition 21 If the Minister gives a notice to the approval holder that the Minister is satisfied that the taking of the action in accordance with the revised plan would be likely to have a new or increased impact, then:

a. condition 19 does not apply, or ceased to apply, in relation to the revised plan; and

b. the *approval holder must implement the plan approved by the Minister.*

To avoid any doubt, this condition does not affect any operation of conditions 19 and 20 in the period before the day the notice is given.

At the time of giving notice, the Minister may also notify that for a specified period of time condition 19 does not apply for one or more specified plans required under the approval.

No action undertaken for this condition during the reporting period.

Condition 22. Conditions 19, 20 and 21 are not intended to limit the operation of section 143A of the EPBC Act which allows the approval holder to submit a revised plan to the Minister for approval.

No action undertaken for this condition during the reporting period.

Condition 23. If, after 5 years from the date of this approval, the approval holder has not commenced the action, then the approval holder must not commence the action without the written agreement of the Minister.

The action has commenced. No further action required.

Condition 24. Unless otherwise agreed to in writing by the Minister, the approval holder must publish all plans referred to in the conditions of the approval on its website. Each plan must be published on the website within one month of being approved by the Minister. All plans must remain on the website for the duration of this approval unless otherwise agreed to in writing by the minister.

No action undertaken for this condition during the reporting period.

3. Closing summary

This report is the first annual report for the Western Surat Gas Project EPBC approval. There were no non conformances identified with the conditions for approval EPBC 2015/7469.

Appendix A

Declared Area Map (DAM 2018/005644)

Declared Area Map

Sheet 1 of 3

DAM 2018/005644

LOT on PLAN
5CP861820

Queensland Government

Scale 1:80 000 at A3 paper size

0 1 2 3 4 km

LEGEND

- Derived Coordinate Point
- Subject Lot(s)
- Declared Area

N

See Sheet 2 For Details

Notes:

Property boundary provided by Department of Natural Resources, Mines and Energy
The property boundaries shown on this plan are approximate only. They are not an accurate representation of the legal boundaries.

Imagery supplied by the Department of Natural Resources Mines and Energy.
Imagery - Surat_Basin_Nth_2014_25cm_Mosaic_6_Z55.ecw
Map Information:
Horizontal Datum: GDA 1994
Projection: Universal Transverse Mercator - Zone 56

Derived refernece points are provided by the Department of Natural Resources Mines and Energy and may be used to assist in locating areas delineated on this plan.
All derived reference points continue sequentially when labels are missing.

This is a colour plan and should be reproduced in colour.

Map Prepared by: NWF
Department of Natural Resources, Mines and Energy
PO Box 864, Ipswich, Qld, 4305

Map Preparation Date: 28/11/2018

Declared Area Map

Sheet 2 of 3

DAM 2018/005644

LOT on PLAN
5CP861820

Queensland Government

Scale 1:12 500 at A3 paper size

0 250 500 750 1000 m

LEGEND

- Derived Reference Point
- Subject Lot(s)
- Declared Area

N

Notes:

Property boundary provided by Department of Natural Resources, Mines and Energy
The property boundaries shown on this plan are approximate only. They are not an accurate representation of the legal boundaries.

Imagery supplied by the Department of Natural Resources Mines and Energy.
Imagery - Surat_Basin_Nth_2014_25cm_Mosaic_6_Z55.ecw
Map Information:
Horizontal Datum: GDA 1994
Projection: Universal Transverse Mercator - Zone 55

Derived refernece points are provided by the Department of Natural Resources Mines and Energy and may be used to assist in locating areas delineated on this plan.
All derived reference points continue sequentially when labels are missing.

This is a colour plan and should be reproduced in colour.

Map Prepared by: NWF

Department of Natural Resources, Mines and Energy
PO Box 864, Ipswich, Qld, 4305

Map Preparation Date: 28/11/2018

Derived Reference Points

Parcel	Point	Easting	Northing	Parcel	Point	Easting	Northing	Parcel	Point	Easting	Northing
A1	1	614450	7140397	A1	51	613898	7139144	A2	101	614155	7138747
A1	2	614459	7140399	A1	52	613843	7139133	A2	102	614155	7138715
A1	3	614486	7140348	A1	53	613794	7139158	A2	103	614154	7138710
A1	4	614539	7140280	A1	54	613764	7139190	A2	104	614159	7138695
A1	5	614594	7140218	A1	55	613684	7139207	A2	105	614146	7138680
A1	6	614614	7140117	A1	56	613635	7139203	A2	106	614145	7138676
A1	7	614628	7140080	A1	57	613589	7139203	A2	107	614137	7138670
A1	8	614582	7139972	A1	58	613558	7139216	A2	108	614091	7138619
A1	9	614560	7139906	A2	59	613124	7139065	A2	109	614075	7138552
A1	10	614589	7139822	A2	60	613189	7139065	A2	110	613949	7138585
A1	11	614631	7139744	A2	61	613229	7139044	A2	111	613971	7138615
A1	12	614655	7139681	A2	62	613239	7139044	A2	112	613965	7138627
A1	13	614692	7139635	A2	63	613278	7139053	A2	113	613974	7138666
A1	14	614716	7139568	A2	64	613350	7139070	A2	114	613993	7138666
A1	15	614714	7139495	A2	65	613394	7139078	A2	115	614002	7138673
A1	16	614689	7139380	A2	66	613425	7139086	A2	116	614007	7138711
A1	17	614702	7139371	A2	67	613462	7139095	A2	117	613932	7138737
A1	18	615016	7139162	A2	68	613498	7139110	A2	118	613809	7138742
A1	19	615000	7139096	A2	69	613500	7139098	A2	119	613801	7138738
A1	20	614904	7139105	A2	70	613494	7139069	A2	120	613750	7138730
A1	21	614879	7139117	A2	71	613473	7139055	A2	121	613725	7138737
A1	22	614850	7139108	A2	72	613449	7139045	A2	122	613706	7138748
A1	23	614799	7139110	A2	73	613441	7139022	A2	123	613646	7138753
A1	24	614751	7139116	A2	74	613445	7139022	A2	124	613568	7138760
A1	25	614708	7139129	A2	75	613460	7139011	A2	125	613540	7138741
A1	26	614664	7139146	A2	76	613503	7138991	A2	126	613575	7138703
A1	27	614598	7139171	A2	77	613520	7138967	A2	127	613586	7138655
A1	28	614562	7139175	A2	78	613537	7138955	A2	128	613610	7138618
A1	29	614516	7139180	A2	79	613646	7138913	A2	129	613660	7138579
A1	30	614484	7139184	A2	80	613709	7138891	A2	130	613694	7138558
A1	31	614433	7139177	A2	81	613713	7138891	A2	131	613729	7138544
A1	32	614382	7139171	A2	82	613735	7138886	A2	132	613758	7138528
A1	33	614359	7139154	A2	83	613746	7138878	A2	133	613821	7138473
A1	34	614359	7139155	A2	84	613768	7138870	A2	134	613830	7138456
A1	35	614365	7139179	A2	85	613789	7138869	A2	135	613873	7138434
A1	36	614371	7139210	A2	86	613806	7138877	A2	136	613949	7138317
A1	37	614362	7139232	A2	87	613820	7138893	A2	137	614033	7138275
A1	38	614334	7139227	A2	88	613866	7138913	A2	138	614083	7138233
A1	39	614320	7139206	A2	89	613881	7138906	A2	139	614117	7138165
A1	40	614307	7139175	A2	90	613906	7138881	A2	140	614108	7138135
A1	41	614291	7139141	A2	91	613918	7138855	A2	141	614110	7138129
A1	42	614279	7139121	A2	92	613927	7138848	A2	142	614131	7138092
A1	43	614228	7139129	A2	93	613949	7138846	A2	143	614168	7138068
A1	44	614190	7139144	A2	94	613958	7138845	A2	144	614179	7138058
A1	45	614107	7139156	A2	95	613965	7138847	A2	145	614197	7138005
A1	46	614078	7139171	A2	96	614016	7138857	A2	146	614202	7137989
A1	47	614042	7139154	A2	97	614034	7138839	A2	147	614213	7137934
A1	48	614025	7139135	A2	98	614058	7138837	A2	148	614217	7137930
A1	49	614010	7139139	A2	99	614133	7138779	A2	149	614220	7137919
A1	50	613976	7139141	A2	100	614143	7138748	A2	150	613840	7137670

Declared Area Map

Sheet 3 of 3

DAM 2018/005644

LOT on PLAN
5CP861820

Queensland Government

Notes:

Map Information:
Horizontal Datum: GDA 1994
Projection: Universal Transverse Mercator - Zone 55

Derived refernece points are provided by the Department of Natural Resources Mines and Energy and may be used to assist in locating areas delineated on this plan.

Map Prepared by: NWF
Department of Natural Resources, Mines and Energy
PO Box 864, Ipswich, Qld, 4305

Map Preparation Date: 28/11/2018

Appendix B

Hydrocarbon produced water monitoring results

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EB1822215**	Page	: 1 of 7
Client	: **SENEX ENERGY LIMITED**	Laboratory	: Environmental Division Brisbane
Contact	: DUSAN PRIBILOVIC	Contact	: Customer Services EB
Address	: GPO BOX 2233 BRISBANE QLD, AUSTRALIA 4001	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3335 9000	Telephone	: +61-7-3243 7222
Project	: WSGP - Glenora Tank - GLNG Transfer Suite September 2018	Date Samples Received	: 18-Sep-2018 09:05
Order number	: 23739	Date Analysis Commenced	: 18-Sep-2018
C-O-C number	: ----	Issue Date	: 24-Sep-2018 15:12
Sampler	: Paul Boland		
Site	: ----		
Quote number	: BN/066/17 V2		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Diana Mesa	2IC Organic Chemist	Brisbane Organics, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Matt Frost	Senior Organic Chemist	Brisbane Organics, Stafford, QLD

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- It is recognised that EG020T (Total Metals) is less than EG020F (Dissolved Metals) for some samples. However, the difference is within experimental variation of the methods.
- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	Glenora Tank - GLNG Transfer	----	----	----	----
			Client sampling date / time	16-Sep-2018 14:41	----	----	----	----
Compound	CAS Number	LOR	Unit	EB1822215-001	--------	--------	--------	--------
				Result	----	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**8.99**	----	----	----	----
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	**116**	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**4460**	----	----	----	----
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	10	mg/L	**2900**	----	----	----	----
EA017: TDS (Calc)								
Total Dissolved Solids (Calc.)	----	1	mg/L	**2630**	----	----	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	**6.1**	----	----	----	----
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	**17**	----	----	----	----
EA161: Residual Alkali								
Residual Alkali	----	0.1	meq/L	**19.4**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	**192**	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**796**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**988**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	----	----	----	----
ED043: Total Oxidised Sulfur as SO4 2-								
Total Oxidised Sulfur as SO4 2-	----	1	mg/L	<1	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**924**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**5**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**1**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**1090**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**8**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.04**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Glenora Tank - GLNG Transfer	----	----	----	----
				Client sampling date / time	16-Sep-2018 14:41	----	----	----	----
Compound	CAS Number	LOR	Unit		EB1822215-001	--------	--------	--------	--------
					Result	----	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Copper	7440-50-8	0.001	mg/L		**0.002**	----	----	----	----
Manganese	7439-96-5	0.001	mg/L		<0.001	----	----	----	----
Molybdenum	7439-98-7	0.001	mg/L		**0.002**	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	----	----	----	----
Boron	7440-42-8	0.05	mg/L		**0.35**	----	----	----	----
Iron	7439-89-6	0.05	mg/L		<0.05	----	----	----	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.29**	----	----	----	----
Copper	7440-50-8	0.001	mg/L		**0.004**	----	----	----	----
Manganese	7439-96-5	0.001	mg/L		**0.005**	----	----	----	----
Molybdenum	7439-98-7	0.001	mg/L		<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	----	----	----	----
Boron	7440-42-8	0.05	mg/L		**0.36**	----	----	----	----
Iron	7439-89-6	0.05	mg/L		**0.40**	----	----	----	----
EG052F: Dissolved Silica by ICPAES									
Silicon as SiO2	14464-46-1	0.1	mg/L		**17.7**	----	----	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		**2.9**	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.08**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.02**	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.02**	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.4**	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.4**	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.02**	----	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Glenora Tank - GLNG Transfer	----	----	----	----
				Client sampling date / time	16-Sep-2018 14:41	----	----	----	----
Compound	CAS Number	LOR	Unit		EB1822215-001	--------	--------	--------	--------
					Result	----	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser - Continued									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	----	----	----	----
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		**45.8**	----	----	----	----
Total Cations	----	0.01	meq/L		**47.9**	----	----	----	----
Ionic Balance	----	0.01	%		**2.28**	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**7**	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	----	----	----	----
C10 - C14 Fraction	----	50	µg/L		<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	----	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	----	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	----	----	----	----
Toluene	108-88-3	2	µg/L		<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	----	----	----	----
^ **Total Xylenes**	----	2	µg/L		<2	----	----	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**106**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Glenora Tank - GLNG Transfer	----	----	----	----
				Client sampling date / time	16-Sep-2018 14:41	----	----	----	----
Compound	CAS Number	LOR	Unit		EB1822215-001	--------	--------	--------	--------
					Result	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates - Continued									
Toluene-D8	2037-26-5	2	%		**108**	**----**	**----**	**----**	**----**
4-Bromofluorobenzene	460-00-4	2	%		**106**	**----**	**----**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	66	138
Toluene-D8	2037-26-5	79	120
4-Bromofluorobenzene	460-00-4	74	118

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EB1825124**	Page	: 1 of 7
Client	: **SENEX ENERGY LIMITED**	Laboratory	: Environmental Division Brisbane
Contact	: DUSAN PRIBILOVIC	Contact	: Customer Services EB
Address	: GPO BOX 2233 BRISBANE QLD, AUSTRALIA 4001	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3335 9000	Telephone	: +61-7-3243 7222
Project	: WSGP - Glenora Tank - GLNG Transfer Suite October 2018	Date Samples Received	: 23-Oct-2018 09:25
Order number	: 23739	Date Analysis Commenced	: 23-Oct-2018
C-O-C number	: ----	Issue Date	: 30-Oct-2018 12:27
Sampler	: PAUL BOLAND		
Site	: ----		
Quote number	: BN/066/17 V2		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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- Surrogate Control Limits

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Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Organics, Stafford, QLD
Matt Frost	Senior Organic Chemist	Brisbane Organics, Stafford, QLD

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EB1827728**	Page	: 1 of 7
Client	: **SENEX ENERGY LIMITED**	Laboratory	: Environmental Division Brisbane
Contact	: DUSAN PRIBILOVIC	Contact	: Customer Services EB
Address	: GPO BOX 2233 BRISBANE QLD, AUSTRALIA 4001	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3335 9000	Telephone	: +61-7-3243 7222
Project	: WSGP - Glenora Tank - GLNG Transfer Suite November 2018	Date Samples Received	: 20-Nov-2018 09:30
Order number	: 23739	Date Analysis Commenced	: 20-Nov-2018
C-O-C number	: ----	Issue Date	: 27-Nov-2018 09:57
Sampler	: PAUL BOLAND		
Site	: ----		
Quote number	: BN/066/17 V2		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
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Signatories	*Position*	*Accreditation Category*
Andrew Epps	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Organics, Stafford, QLD
Mark Hallas	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Sarah Ashworth	Laboratory Manager - Brisbane	Brisbane Organics, Stafford, QLD
Tom Maloney	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Xing Lin	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

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Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

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Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- It is recognised that EG020-T (Total Metals by ICP-MS) is less than EG020-F (Dissolved Metals by ICP-MS) for sample EB1827728-001(Glenora Tank - GLNG Transfer). However, the difference is within experimental variation of the methods.
- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	Glenora Tank - GLNG Transfer	----	----	----	----
			Client sampling date / time	18-Nov-2018 10:31	----	----	----	----
Compound	CAS Number	LOR	Unit	EB1827728-001	--------	--------	--------	--------
				Result	----	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**8.95**	----	----	----	----
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	**111**	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**4690**	----	----	----	----
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	10	mg/L	**3050**	----	----	----	----
EA017: TDS (Calc)								
Total Dissolved Solids (Calc.)	----	1	mg/L	**2720**	----	----	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	**20.8**	----	----	----	----
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	**19**	----	----	----	----
EA161: Residual Alkali								
Residual Alkali	----	0.1	meq/L	**19.8**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	**183**	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**828**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**1010**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	----	----	----	----
ED043: Total Oxidised Sulfur as SO4 2-								
Total Oxidised Sulfur as SO4 2-	----	1	mg/L	<1	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**977**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**6**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**1**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**1120**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**7**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Glenora Tank - GLNG Transfer	----	----	----	----
				Client sampling date / time	18-Nov-2018 10:31	----	----	----	----
Compound	CAS Number	LOR	Unit		EB1827728-001	--------	--------	--------	--------
					Result	----	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Copper	7440-50-8	0.001	mg/L		<0.001	----	----	----	----
Manganese	7439-96-5	0.001	mg/L		**0.005**	----	----	----	----
Molybdenum	7439-98-7	0.001	mg/L		**0.001**	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	----	----	----	----
Boron	7440-42-8	0.05	mg/L		**0.42**	----	----	----	----
Iron	7439-89-6	0.05	mg/L		<0.05	----	----	----	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.25**	----	----	----	----
Copper	7440-50-8	0.001	mg/L		**0.002**	----	----	----	----
Manganese	7439-96-5	0.001	mg/L		**0.013**	----	----	----	----
Molybdenum	7439-98-7	0.001	mg/L		<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	----	----	----	----
Boron	7440-42-8	0.05	mg/L		**0.38**	----	----	----	----
Iron	7439-89-6	0.05	mg/L		**0.82**	----	----	----	----
EG052F: Dissolved Silica by ICPAES									
Silicon as SiO2	14464-46-1	0.1	mg/L		**17.0**	----	----	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		**2.9**	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.06**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		**0.02**	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.02**	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.4**	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.4**	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.02**	----	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Glenora Tank - GLNG Transfer	----	----	----	----
				Client sampling date / time	18-Nov-2018 10:31	----	----	----	----
Compound	CAS Number	LOR	Unit		EB1827728-001	--------	--------	--------	--------
					Result	----	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser - Continued									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	----	----	----	----
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		**47.7**	----	----	----	----
Total Cations	----	0.01	meq/L		**49.3**	----	----	----	----
Ionic Balance	----	0.01	%		**1.58**	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**2**	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	----	----	----	----
C10 - C14 Fraction	----	50	µg/L		<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	----	----	----	----
Toluene	108-88-3	2	µg/L		<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	----	----	----	----
^ Total Xylenes	----	2	µg/L		<2	----	----	----	----
^ Sum of BTEX	----	1	µg/L		<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**100**	----	----	----	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)				Client sample ID	**Glenora Tank - GLNG Transfer**	----	----	----	----
				Client sampling date / time	18-Nov-2018 10:31	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EB1827728-001**	--------	--------	--------	--------
					Result	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates - Continued									
Toluene-D8	2037-26-5	2	%		**104**	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		**127**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	129
Toluene-D8	2037-26-5	70	125
4-Bromofluorobenzene	460-00-4	71	129

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- It is recognised that EG020-T (Total Metals by ICP-MS) is less than EG020-F (Dissolved Metals by ICP-MS) for sample EB1825124-001. However, the difference is within experimental variation of the methods.
- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	Glenora Tank - GLNG Transfer	----	----	----	----
			Client sampling date / time	21-Oct-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EB1825124-001	--------	--------	--------	--------
				Result	----	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**8.91**	----	----	----	----
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	**100**	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**4480**	----	----	----	----
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	10	mg/L	**2910**	----	----	----	----
EA017: TDS (Calc)								
Total Dissolved Solids (Calc.)	----	1	mg/L	**2590**	----	----	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	**7.5**	----	----	----	----
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	**19**	----	----	----	----
EA161: Residual Alkali								
Residual Alkali	----	0.1	meq/L	**17.2**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	**153**	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**728**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**881**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	----	----	----	----
ED043: Total Oxidised Sulfur as SO4 2-								
Total Oxidised Sulfur as SO4 2-	----	1	mg/L	<1	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**1030**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**6**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**1**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**1010**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**7**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Glenora Tank - GLNG Transfer	----	----	----	----
				Client sampling date / time	21-Oct-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EB1825124-001	--------	--------	--------	--------
					Result	----	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Copper	7440-50-8	0.001	mg/L		<0.001	----	----	----	----
Manganese	7439-96-5	0.001	mg/L		<0.001	----	----	----	----
Molybdenum	7439-98-7	0.001	mg/L		**0.001**	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	----	----	----	----
Boron	7440-42-8	0.05	mg/L		**0.36**	----	----	----	----
Iron	7439-89-6	0.05	mg/L		<0.05	----	----	----	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.15**	----	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	----	----	----	----
Manganese	7439-96-5	0.001	mg/L		**0.008**	----	----	----	----
Molybdenum	7439-98-7	0.001	mg/L		<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	----	----	----	----
Boron	7440-42-8	0.05	mg/L		**0.32**	----	----	----	----
Iron	7439-89-6	0.05	mg/L		**0.48**	----	----	----	----
EG052F: Dissolved Silica by ICPAES									
Silicon as SiO2	14464-46-1	0.1	mg/L		**17.5**	----	----	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		**2.7**	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.19**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.4**	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.4**	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.01**	----	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Glenora Tank - GLNG Transfer	----	----	----	----
				Client sampling date / time	21-Oct-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EB1825124-001	--------	--------	--------	--------
					Result	----	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser - Continued									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	----	----	----	----
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		**46.6**	----	----	----	----
Total Cations	----	0.01	meq/L		**44.5**	----	----	----	----
Ionic Balance	----	0.01	%		**2.37**	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**5**	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	----	----	----	----
C10 - C14 Fraction	----	50	µg/L		<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	----	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	----	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	----	----	----	----
Toluene	108-88-3	2	µg/L		<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	----	----	----	----
^ **Total Xylenes**	----	2	µg/L		<2	----	----	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**113**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Glenora Tank - GLNG Transfer	----	----	----	----
				Client sampling date / time	21-Oct-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EB1825124-001	--------	--------	--------	--------
					Result	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates - Continued									
Toluene-D8	2037-26-5	2	%		**96.2**	**----**	**----**	**----**	**----**
4-Bromofluorobenzene	460-00-4	2	%		**98.2**	**----**	**----**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	66	138
Toluene-D8	2037-26-5	79	120
4-Bromofluorobenzene	460-00-4	74	118