

Annual Compliance Report Ichthys LNG Project (EPBC 2008/4208): 2018-2019

Report

Document No.: X060-AH-REP-60054
Security Classification: Unrestricted

Approved

Revision	Date	Issue Reason	Prepared	Checked	Endorsed	Approved
A	24/10/2019	Issue for Review	O. Akerman	H. Lyche	D. MacInnes	Val Ee

RECORD OF AMENDMENT

Revision	Section	Amendment
N/A	N/A	N/A

Approved

DOCUMENT DISTRIBUTION

Copy no.	Name	Hard copy	Electronic copy
00	Document Control	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
01		<input type="checkbox"/>	<input type="checkbox"/>
02		<input type="checkbox"/>	<input type="checkbox"/>
03		<input type="checkbox"/>	<input type="checkbox"/>
04		<input type="checkbox"/>	<input type="checkbox"/>
05		<input type="checkbox"/>	<input type="checkbox"/>
06		<input type="checkbox"/>	<input type="checkbox"/>
07		<input type="checkbox"/>	<input type="checkbox"/>
08		<input type="checkbox"/>	<input type="checkbox"/>
09		<input type="checkbox"/>	<input type="checkbox"/>
10		<input type="checkbox"/>	<input type="checkbox"/>


NOTICE

All information contained within this document has been classified by INPEX as [Security Classification] and must only be used in accordance with that classification. Any use contrary to this document's classification may expose the recipient and subsequent user(s) to legal action. If you are unsure of restrictions on use imposed by the classification of this document you must refer to 0000-A9-STD-60008, Sensitive Information Protection Standard or seek clarification from INPEX.

Uncontrolled when printed.

Declaration of accuracy

In making this declaration, I am aware that sections 490 and 491 of the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) make it an offence in certain circumstances to knowingly provide false or misleading information or documents. The offence is punishable on conviction by imprisonment or a fine, or both. I declare that all the information and documentation supporting this compliance report is true and correct in every particular. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this authorisation.

Signed	
Full name	Hitoshi Okawa
Position	President Director, Australia
Organisation	INPEX Operations Australia Pty Ltd, ABN 48 150 217 262
Date	24 October 2019

Approved

TABLE OF CONTENTS

1 INTRODUCTION 8

1.1 Purpose and scope 8

2 DESCRIPTION OF ACTIVITIES 11

2.1 Ichthys LNG Project overview 11

2.2 Current status of activities 12

3 COMPLIANCE WITH EPBC 2008/4208 APPROVAL CONDITIONS..... 14

3.1 Audits, reviews and exercises 14

4 REFERENCES 22

LIST OF TABLES

Table 1-1: Ichthys LNG Project details 8

Table 1-2: DEE approved plans 9

Table 3-1: Compliance status terms, acronyms and definitions..... 14

Table 3-2: Summary of audits and reviews 14

Table 3-3: EPBC 2008/4208 approval conditions compliance table 16

LIST OF FIGURES

Figure 2-1: Location of the Ichthys Field and GEP route..... 11

Figure 2-2: Ichthys LNG layout..... 13

TABLE OF APPENDICES

APPENDIX A: SUMMARY OF OPERATIONS MONITORING PROGRAM RESULTS 23

APPENDIX B: STATUS OF OFFSET PROGRAMS..... 39

Abbreviation, term or acronym	
AOC	accidentally oil contaminated
BOD	biological oxygen demand
CEMP	Ichthys Onshore LNG Facilities Construction Environmental Management Plan (Rev 2, L092-AH-PLN-10001)
COA	certificate of analysis
COS	Coastal Offset Strategy (Rev 4, X075-AH-STR-0001)
CPF	central processing facility
DEE	Department of the Environment and Energy (Commonwealth)
EC	electrical conductivity
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act (Commonwealth)</i>
EPL228	The Ichthys LNG environment protection licence issued by the NT EPA to operate the facility.
FPSO	Floating production, storage and offloading (facility)
FRP	filterable reactive phosphorus
GEP	gas export pipeline
INPEX	INPEX Operations Australia Pty Ltd.
LDMP	Liquid Discharges Management Plan
LNG	liquefied natural gas
LPG	liquified petroleum gas
Maintenance DSDMP	Maintenance Dredging and Spoil Disposal Management Plan (Rev 1, L060-AH-PLN-60010)
Nearshore OPEP	Nearshore Oil Pollution Emergency Plan (Rev 2, X060-AH-PLN-60003)
NT	Northern Territory

Abbreviation, term or acronym	
NT EPA	Northern Territory Environment Protection Authority
OEMP	Onshore Operations Environmental Management Plan (Rev 2, L060-AH-PLN-60005)
the Project	Ichthys LNG Project
the Site	Ichthys LNG, the onshore processing facility located on Bladin Point
TN	total nitrogen
TP	total phosphorus
TPH	total petroleum hydrocarbons
TRH	total recoverable hydrocarbons
TSS	total suspended solids

1 INTRODUCTION

INPEX Operations Australia Pty Ltd (INPEX) as proponent for the Ichthys LNG Project was issued with EPBC 2008/4208 on 27 June 2011. EPBC 2008/4208 was subsequently amended by variations to Conditions 1, 3, 4, 5, 7, 8, 9, 13, 15, 16 and 19 made pursuant under Section 143 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Condition 13 of EPBC 2008/4208 requires INPEX to submit a Compliance Report to the Department of the Environment and Energy (DEE) within 15 months from commencement of operation, with each subsequent report submitted within 12 months from the last date of the previous report. This is the first Compliance Report to be submitted following of commencement of operations on 27 July 2018¹.

Specific Project details are provided in Table 1-1, with an overview of the Ichthys LNG Project and status of activities described in Section 2.2.

Table 1-1: Ichthys LNG Project details

Item	Project details
EPBC number	EPBC 2008/4208
Project name	Ichthys LNG Project
Approval holder	INPEX Operations Australia Pty Ltd
Approval holder ABN	ABN 48 150 217 262
Approved action	To develop the Ichthys Field in the Browse Basin to produce liquefied natural gas, liquefied petroleum gas and condensate and including the installation and operation of offshore extraction facilities in Ichthys Field, onshore processing facilities at Bladin Point and 850-935km pipeline from Ichthys Field to Bladin Point, Northern Territory, as described in the referral (EPBC 2008/4208) and the variation to the action dated 11 May 2011.

1.1 Purpose and scope

The purpose of this Compliance Report is to meet the requirements of EPBC 2008/4208 Condition 13 (as varied 27 May 2015), which states:

The person taking the action must submit a Compliance Report detailing compliance with any plan, report, strategy, or program (however described) referred to in relation to this approval. The date of the first Compliance Report must be submitted to the Minister within 15 months from the commencement of operation with each subsequent report submitted within 12 months from the date of the previous report. The Compliance Report must be made publicly available on the person taking the action's Australian website for the operational life of the action.

¹ The Ichthys LNG Project approval (EPBC 2008/4208) defines operations as "the commencement of gas extraction and transfer from subsea wells to the floating liquefied natural gas facility and liquefied natural gas facility and liquefied natural gas tankers". The date reflected is the date the wells were first opened offshore. Onshore operations did not commence until 14 September 2018.

The Compliance Report is not required to include activities conducted within the Commonwealth Marine Area.

The person taking the action may cease complying with condition 13 if they have written agreement from the Minister.

DEE representatives have advised² that the scope of the Compliance Report is limited to the demonstration of compliance with the following EPBC 2008/4208 conditions (as varied) and their associated plans, programs or strategies:

- Condition 1 - Oil Spill Contingency Plan (as varied on 03 February 2015)
- Condition 2 - Operational and Scientific Monitoring Program
- Condition 5 - Decommissioning Management Plan (as varied on 27 May 2015)
- Condition 8 - Liquid Discharge Management Plan (as varied on 03 February 2015)
- Condition 9 - Noise Management Plan (as varied on 06 March 2014)
- Condition 10 - Dredging and Spoil Disposal Management Plan (as varied on 05 April 2013)
- Condition 11 - Offsets (Coastal Offset Strategy).

This Compliance Report addresses compliance with above conditions and associated plans, programs or strategies during the 27 July 2018 to 26 July 2019 reporting period.

As per EPBC 2008/4208 Condition 13, this report does not address activities occurring in the Commonwealth Marine Area. These activities are regulated by the National Offshore Petroleum Safety and Environment Authority under the *Offshore Petroleum and Greenhouse Gas Storage Act* and associated regulations.

1.1.1 DEE approved plans or strategies

Table 1-2, provides an overview of relevant DEE approved plans or strategies, which were in effect during the 27 July 2018 to 26 July 2019 reporting period.

Table 1-2: DEE approved plans

Title	Description
Ichthys Onshore LNG Facilities Construction Environmental Management Plan (Rev 2, L092-AH-PLN-10001)	The Onshore Construction Liquid Discharge Management Plan (EPBC 2008/4208, Condition 8) is a sub-set of the Ichthys Onshore LNG Facilities Construction Environmental Management Plan (CEMP). The CEMP describes the measures in place to mitigate the potential environmental effect of liquid discharges associated with Ichthys LNG construction and commissioning activities.
Ichthys Onshore LNG Facilities Construction Environmental Management Plan Revision 2 – Addendum 1 – Test of Firefighting System (Rev 4, L092-AH-PLN-10003)	The CEMP was submitted in accordance with EPBC 2008/4208 Condition 8 and was approved by DEE on 19 April 2017. Subsequent to this, an Addendum to the CEMP (Addendum 1) was approved by DEE on 16 March 2018.
Onshore Operations Environmental Management Plan (Rev 2, L060-AH-PLN-60005)	The Onshore Operations Liquid Discharge Management Plan (EPBC 2008/4208, Condition 8) is a sub-set of the Onshore Operations Environmental Management Plan (OEMP). The OEMP describes the measures in place to

² Email correspondence received from the DEE Compliance Monitoring Team on 30 July 2019.

Title	Description
	<p>mitigate the potential environmental effect of liquid discharges associated with onshore Ichthys LNG operations activities.</p> <p>The OEMP was submitted in accordance with EPBC 2008/4208 Condition 8 and was approved by DEE on 29 May 2018.</p>
Nearshore Oil Pollution Emergency Plan (Rev 2, X060-AH-PLN-60003)	<p>The Nearshore Oil Pollution Emergency Plan (Nearshore OPEP), describes the activities, arrangements, and framework for response to oil spills, which may occur within Northern Territory waters as a result of Ichthys LNG activities (EPBC 2008/4208, Condition 1) and the operational scientific monitoring program (EPBC 2008/4208, Condition 2), which would be implemented in the event of a spill.</p> <p>The Nearshore OPEP (Rev 1) was submitted in accordance with EPBC 2008/4208 Conditions 1 and 2 and was approved by DEE on 23 February 2017. Subsequent to this, the Nearshore OPEP was updated in October 2018 (Rev 2) to incorporate administrative amendments. These amendments did not result in a new or increased risk, and as such was submitted to DEE for information only in accordance with Condition 15.</p>
Maintenance Dredging and Spoil Disposal Management Plan (Rev 1, L060-AH-PLN-60010)	<p>The Maintenance Dredging and Spoil Disposal Management Plan (Maintenance DSDMP) describes the measures in place to mitigate impacts associated with maintenance dredging. It allows for a maximum volume of 1.5Mm³ to be dredged within an approved 5-year period.</p> <p>The Maintenance DSDMP was submitted in accordance with EPBC 2008/4208 Condition 10 and was approved by DEE on 21 June 2018.</p>
Coastal Offset Strategy (Rev 4, X075-AH-STR-0001)	<p>The Coastal Offset Strategy (COS) provides high-level details of INPEX's environmental offset programs.</p> <p>The COS (Rev 4) was submitted in accordance with EPBC 2008/4208 Condition 11 and was approved by DEE on 13 April 2012.</p>

2 DESCRIPTION OF ACTIVITIES

2.1 Ichthys LNG Project overview

The Ichthys LNG Project (the Project) is a joint venture between INPEX group companies (the Operator), major partner Total, and the Australian subsidiaries of CPC Corporation Taiwan, Tokyo Gas, Osaka Gas, Kansai Electric Power, JERA and Toho Gas. Drawing on the hydrocarbon resources of the Ichthys gas and condensate field in the Browse Basin at the western edge of the Timor Sea offshore Western Australia, the Project is expected to produce 8.9 Mt of liquefied natural gas (LNG) and 1.6 Mt of liquefied petroleum gases (LPGs) per annum, along with approximately 100 000 barrels of condensate per day at peak.). The Project has an expected operational life of at least 40 years.

The Ichthys Field covers an area of around 800 km² and drilling studies suggest that its hydrocarbon resources are 12.8 trillion cubic feet of sales gas and around 527 million barrels of condensate.

The extraction of natural gas and condensate will be carried out via a floating semi-submersible central processing facility (CPF) at the Ichthys Field. This will remove water and most of the condensate from the reservoir fluids and the separated condensate will be transferred to a floating production, storage and offloading (FPSO) facility moored approximately 3.5 km from the CPF. After further processing on the FPSO, the condensate will be exported directly from the field at an average rate of up to 85 000 barrels per day (at the start of LNG production).

The dehydrated gas and the remainder of the condensate will be compressed and exported through an approximately 890 km long gas export pipeline (GEP) to the Project's onshore processing plant at Bladin Point in Darwin Harbour in the Northern Territory (NT; see Figure 2-1).

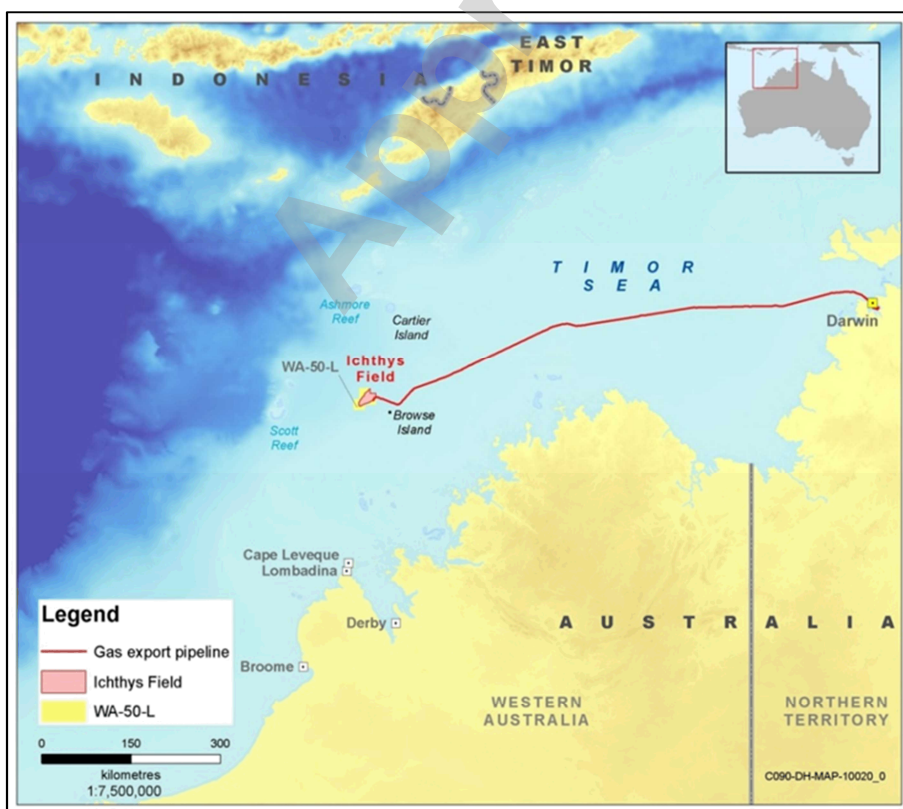


Figure 2-1: Location of the Ichthys Field and GEP route

2.2 Current status of activities

As noted in Section 1.1, this Compliance Report only applies to nearshore and onshore activities being undertaken in the Northern Territory and where an approved plan (as Conditioned under EPBC 2008/4208) was required.

During the reporting period both onshore construction and operations activities were being undertaken simultaneously at Ichthys LNG at Bladin Point. Figure 2-2, depicts the Ichthys LNG (the Site) layout. A summary of key activities undertaken during the reporting period is presented in the following sections.

2.2.1 Construction

Key construction activities undertaken during the reporting period were as follows:

- civil works comprising the construction of roads, paving and surface sealing
- operation and maintenance of temporary construction facilities and Site support
- mechanical/major equipment installations
- electrical instrumentation and communications equipment installation
- construction of permanent LNG facilities comprising the erection and construction of structures
- material surface treatment, testing, protection and preservation
- Site clean-up/rehabilitation and demobilisation including:
 - removal of any debris, litter and temporary stockpiles
 - removal of all equipment and temporary construction infrastructure
 - rehabilitation of disturbed areas not required for subsequent construction activities or for the operational phase of the Project
 - clean-up and remediation of any contaminated areas.
- hydrostatic testing comprising pressure testing with water
- pre-commissioning and commissioning activities including the checking, cleaning and testing of the installed permanent plant and equipment
- environmental monitoring activities.

2.2.2 Operations

Onshore operations activities first commenced on 14 September 2019 after introduction of gas via the GEP into Ichthys LNG occurred. On 19 June 2019 INPEX reached first steady state for LNG trains 1 and 2.

Key operations activities undertaken during the reporting period were as follows:

- activities associated with start-up of the onshore facilities (e.g. LNG Trains 1 and 2 and associated utilities)
- activities associated with handover and transition of equipment from construction to operations
- activities associated with product (LNG, LPGs and Condensate) processing, storage, loading and offtake
- activities associated with routine maintenance of the onshore facilities
- environmental monitoring activities.



The information contained on this map is confidential and for information only, and must not be communicated to other persons without the prior written consent of INPEX. Any unauthorised use of such information may expose the user and the provider of that information to legal risk. While every effort has been made to ensure the accuracy and completeness of the information presented, no guarantee is given nor responsibility taken by INPEX for any errors or omissions. INPEX accepts no liability for any use of the said information or reliance placed on it.

Figure 2-2: Ichthys LNG layout

3 COMPLIANCE WITH EPBC 2008/4208 APPROVAL CONDITIONS

As per the requirements of DoE (2014) the terms and definitions provided in Table 3-1 have been used to indicate the status of compliance with relevant EPBC 2008/4208 approval conditions.

A summary of the compliance status with relevant EPBC 2008/4208 approval conditions (refer Section 1.1), applicable timeframes and reference to evidence supporting the compliance status (as applicable) is provided in Table 3-3.

Table 3-1: Compliance status terms, acronyms and definitions

Term	Acronym	Definition
Compliant	C	"Compliance" is achieved when all the requirements of a condition have been met, including the implementation of management plans or other measures required by those conditions.
Non-compliant	NC	A designation of "non-compliance" should be given where the requirements of a condition or elements of a condition, including the implementation of management plans and other measures, have not been met.
Not applicable	NA	A designation of "not applicable" should be given where the requirements of a condition or elements of a condition fall outside of the scope of the current reporting period. For example, a condition which applies to activity that has not yet commenced.

3.1 Audits, reviews and exercises

A summary of audits and reviews, as relevant to EPBC 2008/4208 conditions, undertaken during the reporting period is provided in Table 3-2. Outcomes of audits as applicable to EPBC 2008/4208 conditions are presented in Table 3-3.

Table 3-2: Summary of audits and reviews

Audit name	Scope	Date
Annual Construction Environmental Compliance Audit (External third-party audit – ERM on behalf of NT EPA)	The audit assessed compliance with the CEMP (inclusive of Addendum 1) and the Northern Territory Environment Protection Authority (NT EPA) issued construction approval EPA7.	May 2019
Annual Operations Environmental Compliance Audit (Internal third-party audit – CDM Smith)	The audit assessed compliance with the OEMP and the Northern Territory NT EPA issued operations licence EPL228.	June 2019
Exercise Zoom Boom (Externally facilitated)	Tested field deployment capabilities for oil spill equipment in Darwin Harbour.	March 2018

Audit name	Scope	Date
Exercise Slipway (Externally facilitated)	Tested field deployment capabilities for oil spill equipment in Darwin Harbour.	October 2018
Annual review of Nearshore OPEP (Internal)	Review to ensure the Nearshore OPEP remained current and suitable for Ichthys LNG activities occurring in Darwin Harbour.	mid-2018

Approved

Table 3-3: EPBC 2008/4208 approval conditions compliance table

Condition no.	Condition	Timing	Status	Evidence/Comments
1	<p>Oil Spill Contingency Plan</p> <p>The person taking the action must develop and submit to the Minister for approval, an Oil Spill Contingency Plan that demonstrates the response preparedness of the person taking the action for any hydrocarbon spills, including the capacity to respond to a spill and mitigate the environmental impacts on the Commonwealth marine area and listed species habitat within offshore areas and Darwin Harbour. The Plan must include, but is not limited to:</p> <ol style="list-style-type: none"> Oil spill trajectory modelling for potential spills from the action. This should include consideration of a well blow out or uncontrolled release. The modelling should be specific to the characteristics of the hydrocarbons contained in the Ichthys gas field, the likely volumes released in a worst case scenario spill, and the potential time over which the oil may be released in a worst case scenario spill, including a scenario of a minimum eleven (11) week uncontained spill; A description of resources available for use in containing and minimising impacts in the event of a spill and arrangements for accessing them; A demonstrated capacity to respond to a spill at the site, including application of dispersants, if required and appropriate, and measures that can feasibly be applied within the first 12 hours of a spill occurring; Identification of sensitive areas that may be impacted by a potential spill, in particular, Browse Island, specific response measures for those areas and prioritisation of those areas during a response; Details of the insurance arrangements that have been made in respect of paying the costs associated with operational and scientific monitoring, as outlined in the Operational and Scientific Monitoring Program required under condition 2 and repairing any environmental damage arising from potential oil spills, as determined necessary from the results of the Operational and Scientific Monitoring Program; Training of staff in spill response measures and identifying roles and responsibilities of personnel during a spill response; and Procedures for reporting oil spill incidents to the Department. <p>The person taking the action must not commence drilling activities until the Oil Spill Contingency Plan is approved. The approved Oil Spill Contingency Plan must be implemented.</p>	Ongoing	Compliant	<p>The Nearshore OPEP addresses the requirements of EPBC 2008/4208 Conditions 1 and 2 and was approved by DEE on 23 February 2017. Subsequent to this, the Nearshore OPEP was updated in October 2018 to incorporate administrative amendments. These amendments did not result in a new or increased risk and as such was submitted to DEE for information only in accordance with Condition 15.</p> <p>During the reporting period there were no spill events which required activation of the Nearshore OPEP.</p> <p>Training exercises were undertaken during 2018 to test response capabilities and processes outlined in the Nearshore OPEP, these included:</p> <ul style="list-style-type: none"> Exercise Zoom-Boom (March 2018) <ul style="list-style-type: none"> A field deployment exercise, which was facilitated by Response Resource Management (INPEX's oil spill expert consultant). Exercise participants included Svitzer, Bhagwan, Darwin Port and INPEX personnel. The exercise validated INPEX's first strike capability for Darwin Harbour - deployment of zoom-boom equipment from a Svitzer tug. Exercise Slip-way (October 2018) <ul style="list-style-type: none"> A field deployment exercise, which was facilitated by Response Resource Management. Exercise participants included Bhagwan and INPEX personnel. The exercise validated INPEX's first strike capability for Darwin Harbour - deployment of zoom-boom equipment from the Bhagwan boat-ramp. <p>In addition to the exercises described above, which key response personnel participated in, the following training was also conducted during the reporting period:</p> <ul style="list-style-type: none"> Ichthys LNG Emergency Response Team were given training in the updated oil spill first arrangements, following update of the Nearshore OPEP (Rev 2). The Darwin Incident Management Team (IMT) undertook desktop refresher training where they practiced oil spill first strike arrangements for the scenario of a vessel collision at the product loading jetty. <p>No non-conformances with the capabilities described in the Nearshore OPEP were identified during the post-exercise/training learning reviews. A number of improvement opportunities were identified, which resulted in the development/update of various standard operating procedures, job hazard analyses and other tools.</p> <p>Insurance arrangements were maintained in accordance with the Insurance Plan described in the Nearshore OPEP during the reporting period.</p> <p>An annual review of the Nearshore OPEP was undertaken in mid-2018, which resulted in the following:</p> <ul style="list-style-type: none"> update to first strike equipment locations inclusion of Bhagwan as the primary first-strike contractor

Condition no.	Condition	Timing	Status	Evidence/Comments
				<ul style="list-style-type: none"> update to the Incident Management Guide to provide a more accurate linkage to the Ichthys LNG Safety Case Incident Management Guide. <p>As noted above, the updated Nearshore OPEP (Rev 2) was submitted to DEE for information, in accordance with the EPBC 2008/4208 Condition 15.</p>
2.	<p>Operational and Scientific Monitoring Program</p> <p>The person taking the action must develop and submit to the Minister for approval, an Operational and Scientific Monitoring Program that will be implemented in the event of an oil spill to determine the potential extent and ecosystem consequences of such a spill, including, but not limited to:</p> <ol style="list-style-type: none"> Triggers for the initiation and termination of the Operational and Scientific Monitoring Program, including, but not limited to, spill volume, composition, extent, duration and detection of impacts; A description of the studies that will be undertaken to determine the operational response, potential extent of impacts, ecosystem consequences and potential environmental reparations required as a result of the oil spill; Details of the insurance arrangements that have been made in respect of paying the costs associated with operational and scientific monitoring, as outlined in the Operational and Scientific Monitoring Program, and repairing any environmental damage arising from potential oil spills, as determined necessary from the results of the Operational and Scientific Monitoring Program; Inclusion of sufficient baseline information on the biota and the environment that may be impacted by a potential hydrocarbon spill, to enable an assessment of the impacts of such a spill; A strategy to implement the Operational and Scientific Monitoring Program, including timelines for delivery of results and mechanisms for the timely peer review of studies; In the event of an oil spill the person taking the action must pay all costs associated with all operational and scientific monitoring undertaken in response to the spill, as outlined in the approved Operational and Scientific Monitoring Program and any environmental remediation determined necessary by the results of the approved Operational and Scientific Monitoring Program; and Provision for periodic review of the program. <p>The Operational and Scientific Monitoring Program must be submitted at least three months prior to the commencement of drilling activities.</p> <p>The person taking the action must not commence drilling activities until the Operational and Scientific Monitoring Program is approved. The approved Operational and Scientific Monitoring Program must be implemented.</p>	Ongoing	Compliant	<p>The Operational and Scientific Monitoring Program (OSMP) is incorporated into the Nearshore OPEP, which address the requirements of EPBC 2008/4208 Conditions 1 and 2 – refer above.</p> <p>During the reporting period there were no spill events which required activation of the OSMP. INPEX continues to maintain a contract with an external contractor to ensure OSMP readiness, in the event this is required to be implemented.</p>
5	<p>Decommissioning Management Plan</p> <p>The person taking the action must submit for the Minister's approval a Decommissioning Management Plan to mitigate the environmental effects of decommissioning the proposal within the Commonwealth marine area. The Decommissioning Management Plan must include a detailed risk assessment to justify leaving any infrastructure on the seafloor of the Commonwealth marine area and must be consistent with any published Commonwealth Government policy or legislation prevailing at the time. Decommissioning cannot commence until the plan is approved. The approved plan must be implemented.</p>	Prior to decommissioning activities	Not applicable	This condition was not applicable during the reporting period.
8	<p>Liquid Discharge Management Plan</p> <p>The person taking the action must submit for the Minister's approval a Liquid Discharge Management</p>	Prior to commencement	Compliant ³	<p>Construction</p> <p>The Construction Liquid Discharges Management Plan (LDMP) is a</p>

³ DEE issued an infringement notice to INPEX for breaching EPBC 2008/4208 Condition 8. INPEX is of the view that it was compliant with its approval requirements; however, recognises that DEE takes a different view. INPEX elected to not to have the matter dealt with via court proceedings and has paid the infringement.

Condition no.	Condition	Timing	Status	Evidence/Comments
	<p>Plan or plans to mitigate the environmental effects of any liquid discharge from the proposal, including sewerage and surface water runoff. The Liquid Discharge Management Plan(s) must be for the protection of the Commonwealth marine area and habitat for listed species in Darwin Harbour and must:</p> <ol style="list-style-type: none"> identify all sources of liquid discharge; describe any impacts associated with the discharge of liquids, including the cumulative impacts associated with the discharge of sewerage; clearly articulate the objectives of the plan and set measurable targets to demonstrate achievement of these; outline measures to avoid impacts; where impacts are unavoidable describe why they are unavoidable and measures to minimise impacts; demonstrate how any discharges into Darwin Harbour are consistent with the guidelines for discharges, and the water quality objectives for Darwin Harbour, developed under the National Water Quality Management Strategy; identify all regulatory requirements relating to the discharge of liquids and how these will be met; include a monitoring regime to determine achievement of objectives and success of measures used; outline reporting and auditing arrangements; and describe how the plan will apply the principles of adaptive management. <p>The plan(s) must be submitted prior to the commencement of the relevant activity to which they apply. The relevant activity may not commence until the plan is approved. Separate Liquid Discharge Management plans can be submitted for the management of liquid discharges in the Commonwealth Marine Area and Darwin Harbour. The approved plan(s) must be implemented.</p>	of construction		<p>subset of the CEMP. The CEMP was approved by DEE on 19 April 2017. Subsequent to this, an Addendum to the CEMP (Addendum 1) was approved by DEE on 16 March 2018.</p> <p>As noted in Table 3-2, an external third-party (ERM on behalf of NT EPA) audit of the CEMP (inclusive of Addendum 1) was undertaken in May 2019. No non-conformances or observations were recorded against the LDMP component of the CEMP.</p> <p>During the reporting period, the following compliance monitoring activities were undertaken in accordance with the approved plan:</p> <ul style="list-style-type: none"> monthly surface water monitoring monthly groundwater monitoring quarterly mangrove monitoring annual sediment sampling. <p>Results of monitoring programs demonstrate that liquid discharges associated with the Ichthys LNG activities have not adversely affected the declared beneficial uses or objectives for Darwin Harbour. A summary of the outcomes of each of these monitoring programs is provided in Section 4.1, 4.2 and 4.3 of the Annual Environmental Impact Monitoring Program, which can be accessed via the following link <https://www.inpex.com.au/media/3232/l290-ah-rep-11009-epa7-annual-report-2019.pdf>.</p> <p>No events resulting in a significant impact to matters of national environmental significance or habitat for listed species in Darwin Harbour, occurred during the reporting period.</p>
		Ongoing	Compliant	<p>Operations</p> <p>The Operations LDMP is a subset of the OEMP. The OEMP was approved by DEE on 29 May 2018. It is important to note that the OEMP was only activated on 07 September 2018, when offshore gas was introduced to the onshore plant. Prior to this, activities were conducted in accordance with the approved Construction LDMP (refer above).</p> <p>During the reporting period, the following compliance monitoring activities were undertaken in accordance with the approved plan:</p> <ul style="list-style-type: none"> weekly commingled treated effluent (in-pipe) monitoring quarterly groundwater quality monitoring (October 2018, January and April 2019) annual harbour sediment monitoring (June 2018) quarterly jetty outfall monitoring (July 2019).⁴ <p>In addition to the above compliance monitoring programs, prior to steady-state operations being achieved informative quarterly jetty outfall monitoring was undertaken (October 2018, January and April 2019).</p> <p>Results of monitoring programs demonstrate that liquid discharges associated with the Ichthys LNG activities have not adversely affected the declared beneficial uses or objectives for Darwin Harbour. A description of the monitoring programs and locations is provided in the OEMP (https://www.inpex.com.au/media/3208/onshore-operations-</p>

⁴ Compliance monitoring associated with the jetty outfall was triggered when steady-state operations were achieved on the 19 June 2019. Other monitoring programs were triggered at start-up, when offshore gas was first introduced into the onshore plant.

Condition no.	Condition	Timing	Status	Evidence/Comments
				<p>environmental-management-plan_rev2_25-may-2018_for-web.pdf), with a summary of the outcomes of each of these monitoring programs provided in Appendix A.</p> <p>As noted in Table 3-2, an internal audit of the OEMP, was undertaken by a third-party (CDM Smith) in June 2019. No non-conformances were recorded against the LDMP component of the OEMP. Four minor observations were made, which have since been actioned.</p> <p>During the reporting period, there were no events that resulted in any material non-compliance with the LDMP or a significant impact to matters of national environmental significance.</p>
9	<p>Noise Management Plan</p> <p>The person taking the action must submit for the Minister's approval a Noise Management Plan (or multiple plans) to avoid and mitigate the noise impacts on marine fauna associated with construction activities in Darwin Harbour or the Commonwealth marine area. The Noise Management Plan/s must be for the protection of listed species in Darwin Harbour or the Commonwealth marine area (whichever area the construction activities are to be undertaken) and must:</p> <ol style="list-style-type: none"> identify all sources of noise that may adversely impact fauna in Darwin Harbour or the Commonwealth marine area; describe any impacts associated with noise generated by pile driving and blasting; provide a schedule of expected pile driving and blasting activities; clearly articulate the objectives of the plan and set measurable targets to demonstrate achievement of these; outline measures to avoid impacts; where impacts are unavoidable describe why they are unavoidable and measures to minimise impacts; include a monitoring regime to determine achievement of objectives and success of measures used; provide for the involvement of an expert panel in the development of the plan and monitoring program required to detect and manage impacts; outline reporting and auditing arrangements; and describe how the plan will apply the principles of adaptive management. <p>In addition, the person taking the action is not permitted to undertake any blasting unless it can be demonstrated that all prudent and feasible alternatives have been ruled out and the Minister has given specific permission to allow blasting. If permission is granted the person taking the action must not undertake blasting activities for more than 28 days in total, without written approval from the Minister, and must not undertake blasting before sunrise or after sunset on any of these days.</p> <p>The plan/s must be submitted at least three months prior to the commencement of any pile driving or blasting activities to which the plan applies. Pile driving or blasting activities may not commence until the plan is approved. The approved plan must be implemented.</p>	Construction phase	Not applicable	No construction activities requiring a noise management plan occurred during the reporting period.
10	<p>Dredging and Spoil Disposal Management Plan</p> <p>The person taking the action must submit for the Minister's approval a Dredging and Spoil Disposal Management Plan (DSDMP) for the protection of inshore dolphins, marine turtles and Dugong occupying Darwin Harbour. The DSDMP must include, but is not limited to, the following:</p> <p>final methodologies for dredging including the method and timing of dredging activities;</p> <ol style="list-style-type: none"> a schedule for dredging activities; a comparison of dredging methodologies proposed based on potential impacts on dolphins, turtles and Dugongs associated with individual methods, including noise and sediment plumes; justification of the dredging option/s chosen based on best practice at the time; 	Ongoing	Compliant	<p>The Maintenance DSDMP (Rev 1, L060-AH-PLN-60010) was approved by the Department on 21 June 2018.</p> <p>The approved Maintenance DSDMP is not yet activated, as there has been no requirement for a maintenance dredging campaign since approval of the plan.</p>

Condition no.	Condition	Timing	Status	Evidence/Comments
	<p>d) mitigation measures, including measures for each type of dredge to avoid entrapment of marine turtles;</p> <p>e) methods to prevent, detect and respond to impacts on any number of marine turtles;</p> <p>f) measures that allow the alteration of dredging activities and/or implement mitigation methods in an adaptive management framework to ensure the protection of turtles, Dugongs and dolphins;</p> <p>g) the outcomes of hydrodynamic and sediment transport modelling required to predict impacts and finalise the design of the dredging campaign;</p> <p>h) contingencies to manage dredging if there is a significant departure from predicted impacts;</p> <p>i) an ecological monitoring program, which must exist either in full within the DSDMP, or as a standalone document (see Note 1 below) that is appropriately referenced in the DSDMP;</p> <p>j) the involvement of an expert panel in the development of the plan and monitoring program required to detect and manage impacts; and</p> <p>k) reporting and auditing arrangements.</p> <p>The DSDMP must be submitted at least three months prior to the commencement of dredging. Dredging for which the DSDMP has been prepared must not commence until the DSDMP is approved. The approved DSDMP must be implemented.</p> <p>Note 1: Regarding condition 10(j); if the person taking the action wishes to prepare the ecological monitoring program as a standalone document, then the ecological monitoring program must be approved in writing by the Minister. The approved ecological program must be implemented.</p>			
11	<p>Offsets</p> <p>The person taking the action must submit for the Minister's approval a Coastal Offset Strategy for the protection of listed threatened species and listed migratory species impacted by the proposal in Darwin Harbour. The Coastal Offset Strategy must include:</p> <p>a) High level details on the implementation of the following offsets outlined in the Northern Territory's letter to the Acting Secretary of the Department of Sustainability, Environment, Water, Population and Communities dated 23 May 2011, including a commitment and indicative schedule for the development of detailed sub-plans for each offset program</p> <ul style="list-style-type: none"> • Publication of data collected for the Browse Basin and Kimberley coastline; • an integrated monitoring and research program for Darwin Harbour; • habitat mapping for Darwin Harbour Region (including Bynoe Harbour); • funding of Australian Research Council Linkage projects; • conservation management of marine megafauna in the western Top End; and • research on the conservation status, distribution and habitat use of coastal dolphins. <p>b) Provision for the permanent protection of approximately 2000 ha of terrestrial vegetation and mangroves, or of an area as otherwise agreed by the Minister and provision for the management of the protected area(s) for the life of the project;</p> <p>Note 1: permanent protection can include the acquisition and inclusion of an area in the conservation estate, covenanting arrangements on private land, other formal agreements with private landholders, or permanent changes to management regimes on Crown or Aboriginal land.</p> <p>Note 2: This condition does not limit the provision of these offsets in synergy with any conditions of any other approving party.</p> <p>c) Provision for the permanent protection of marine habitat for inshore dolphins, marine turtles and Dugong that is preferably, but not necessarily, adjacent to the protected mangrove vegetation and provision for the management of the protected area(s) for the life of the project.</p> <p>Note 1: permanent protection include the acquisition and inclusion of an area in the conservation estate, covenanting arrangements on private land, other formal agreements with private landholders, or permanent changes to management regimes on Crown or Aboriginal land.</p> <p>Note 2: This condition does not limit the provision of these offsets in synergy with any conditions of any other approving party</p>	Ongoing	Compliant	<p>The COS (Rev 4) was submitted in accordance with EPBC 2008/4208 Condition 11 and was approved by DEE on 13 April 2012.</p> <p>The status of offset programs required under Condition 11a and a list of scientific reports, data and maps, which have been produced as result of execution of these programs is provided in the Appendix B.</p>

Condition no.	Condition	Timing	Status	Evidence/Comments
	The Coastal Offset Strategy must include commitments to timeframes and funding arrangements, and be made available on the proponent's website. The strategy must be submitted for approval at least three months before construction activities commence in Darwin Harbour. No construction activities may commence in Darwin Harbour until the Coastal Offset Strategy is approved.			

Approved

4 REFERENCES

Department of the Environment (DoE). 2014. *Annual Compliance Report Guidelines*. Commonwealth of Australia, Canberra, ACT.

Padovan, A.V. 2003. *Darwin Harbour water and sediment quality*. Marine and Estuarine Environments of Darwin Harbour. Proceeding of the Darwin Harbour Public Presentations, February 2003.

Simpson S.L., Batley, G.B. and Chariton, A.A. 2013. *Revision of the ANZECC/ARMCANZ Sediment Quality Guidelines*. CSIRO Land and Water Science Report 08/07. CSIRO Land and Water.

Munksgaard, N.C. 2013. *Recommendations for sampling and analysis of Darwin Harbour sediment*. Environmental Chemistry and Microbiology Unit (ECMU) Research Institute for the Environment and Livelihoods, Charles Darwin University, Darwin, NT.

Approved

APPENDIX A: SUMMARY OF OPERATIONS MONITORING PROGRAM RESULTS

A.1 Commingled treated effluent (in-pipe) monitoring

All results are reported through the INPEX onshore laboratory database systems (laboratory information management system) that produce sample Certificates of Analysis (COA) inclusive of laboratory NATA accreditation number. To enable the identification of an exceedance, the discharge limits specified in OEMP (Section 7.2.1) have been input into the laboratory information management systems. Sample results are compared to their respective discharge limits in the COA. If a result exceeds the discharge limit, it is highlighted in the COA and the onshore laboratory generate an out of specification report.

There were some exceedances of wastewater quality above discharge limits. Overall, there was generally little variability of the wastewater quality, with the majority of results below the specified discharge limits. This demonstrates the wastewater treatment system were operating effectively, and there weren't any unreported spills that impacted wastewater quality.

The jetty outfall volumetric discharge is to less than 180 m³/h. In the reporting period, 750-SC-003 flow meter was not operational from 14 September 2018 until 14 May 2019 due to a fault. During this period estimates of the volume of wastewater discharged were calculated using pump run times and pit/tank volumes (Table A1-1). The maximum flow rate during this period is dependent on the two pumps which discharge out the jetty outfall. The two pumps are 750-P-550 (treated sewage from the irrigation tank to the jetty outfall) rated at 25 m³/hr and 750-P-402-A/B (observation basin to jetty outfall) rated at 70 m³/hr. Note reject brine was directed into the accidentally oil contaminated (AOC) system and not directly discharged to the jetty. Therefore, the combined maximum rated flow was 95 m³/hr. It is noted that periods of increased flow/surge (i.e. greater than rated pump capacity) can be experienced, as maximum measured flow after 14 May 2019 was 108 m³/hr (see Figure A1-1). A new flow meter was installed on 14 May 2019 with data until the end of the reporting period shown in Figure A1-1. Based on the calculated discharge volumes and flow meter, the discharge limit wasn't exceeded for the reporting period.

Table A1-1: Calculated monthly wastewater discharge

Month	Total volume discharged (m ³)	Volume discharged (m ³ /hr) *
Sep-18	3,510	4.9
Oct-18	7,865	10.6
Nov-18	11,078	15.4
Dec-18	9,281	12.5
Jan-19	16,322	21.9
Feb-19	15,970	23.8
Mar-19	17,318	23.3
Apr-19	12,981	18.0
May-19	3,836	5.2

*total monthly volume discharged converted to hourly discharge rate

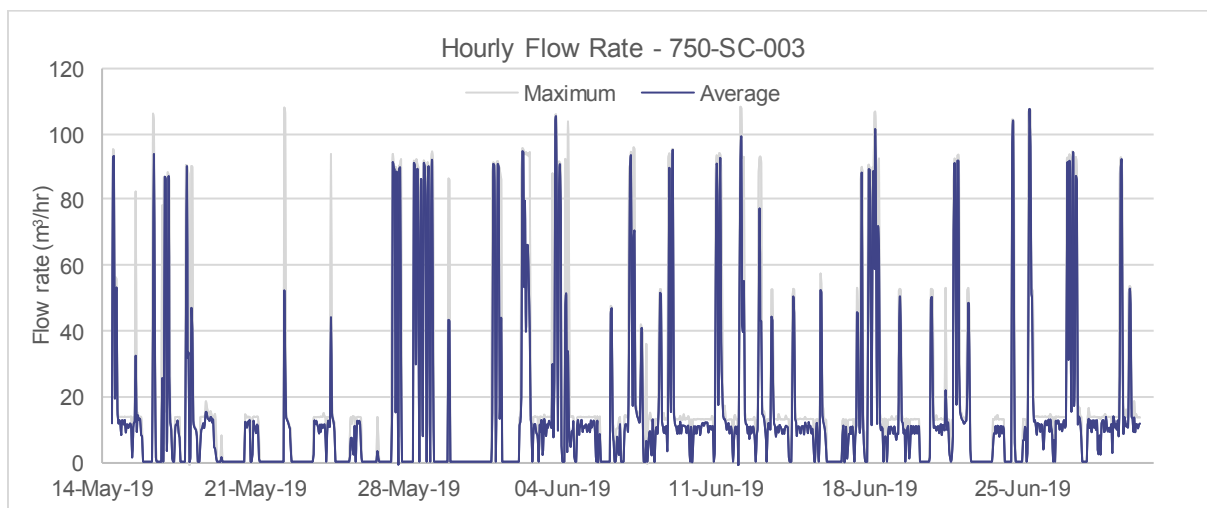


Figure A1-1: Hourly maximum and average flow rate measured by 750-SC-003 flow meter

A.1.1 Limit exceedances assessment outcomes

Throughout the reporting period there were four discharge limit exceedances. A summary table of all discharge limit exceedances including corrective action is provided in Table A1-2.

Table A1-2: Summary of commingled treated effluent sample point exceedance events

Date sampled	Parameter	Result	Limit	Cause and/or contributing factors	Corrective actions
8-Oct-18	Total phosphorus (TP)	2.2 mg P/L	2.0 mg P/L	On investigation, it was determined that at the time of sampling the reject brine was the only waste stream discharging into the jetty outfall line, and no discharge was occurring from the AOC or sewage treatment system. The reject brine from the demineralisation plant contained an anti-scalant product, high in TP (>2 mg P/L). Previous sampling on 28 September 2018 and 2 October 2018 also reported TP above the EPL228 limit, however these were considered part of the same event.	Following identification of the reject brine as the source of the exceedance, the reject brine was diverted from directly discharging to the jetty outfall line into the AOC drainage network, where the reject brine stream could commingle with additional wastewater. INPEX will continue to divert the reject brine into the AOC drainage system so the wastewater streams are commingled, and the reject brine is not directly discharged to the jetty outfall.
12-Mar-19	<i>E. coli</i>	160 cfu/100mL	100 cfu/100mL	<p>There is a possibility that the source of the <i>E. coli</i> was the sewage treatment plant, where the final treatment of <i>E. coli</i> is ultraviolet (UV) light disinfection. Through a review of SAP maintenance request notification (Notification # 10008405) and panel alarms it was identified that the UV light filter reported a low-level light alarm on 8 August 2018 which required the UV filter light bulbs to be replaced.</p> <p>Animal waste such a bird, frog or mammal being deposited in the AOC drainage network is another potential source, as there is no treatment process in the AOC for <i>E. coli</i>.</p>	Following the replacement of the UV steriliser bulb a sample was taken from the combined jetty outfall line (sample location 750-SC-003) on 19 March 2019, with pumps L-750-550-A/B (ex-observation basin) and L-750-402-A/B (ex-irrigation tank) both running which reported a <i>E. coli</i> level of <2 cfu/100mL on 22 March 2019. The investigation did not determine the exact cause of the exceedance of <i>E. coli</i> , due to the two wastewater streams discharging into the combine jetty outfall at the time of sampling. Either animal waste could have entered into the AOC system or the more credible scenario is that the UV filters on the sewage treatment plant were faulty and did not disinfect the treated sewage wastewater stream.
30-Apr-19	<i>E. coli</i>	300 cfu/100mL	100 cfu/100mL	The investigation found that the most probable cause of the elevated <i>E. coli</i> levels was due to contamination within the AOC treatment system. This was determined by undertaking extensive sampling from various locations	To prevent reoccurrence of the event, chlorine shock dosing of the system occurred between 18 to 20 May 2019, this resulted in the successful disinfection of <i>E. coli</i> from within the

Date sampled	Parameter	Result	Limit	Cause and/or contributing factors	Corrective actions
				within both the sewage and AOC treatment plants, AOC post dissolved air flotation (750-SC-001), AOC post walnut shell filter (750-SC-002), treated sewage post UV (750-SC-009) and treated sewage post irrigation tank (750-SC-004).	AOC treatment packages.
16-May-19	Total Nitrogen (TN)	11 mg N/L	10 mg N/L	<p>The investigation identified the potential cause of the total nitrogen exceedance was likely due to poor performance of the permanent sewage treatment plant (STP), because of missed regular manual sugar dosing to maintain the plant's health. In the week prior to the exceedance, the required sugar dosing did not occur over the weekend and potentially on night shift.</p> <p>Due to the closure of the project's temporary STP, the sugar dosing requirement at the permanent STP may have increased; however, as there is no regular influent testing this was not detected. Subsequent sampling conducted on 22 May 2019 reported TN above the EPL228 limit, this result was considered part of the same event.</p>	A permanent sugar dosing system has been installed and routine sugar dosing into the sewage treatment plant has been re-established and the rate of sugar dosing has increased to deal with the additional wastewater volumes.

A.2 Jetty outfall monitoring

Impact and reference site results for the three informative surveys and one compliance survey undertaken in the reporting period are summarised in Table A2-1. Results for all parameters in all surveys show little variability between impact and control, indicating the commingled treated effluent being discharged had no discernible influence on samples collected. As such, discharges have not adversely affected the declared beneficial uses or objective for Darwin Harbour.

A.2.1 Trigger assessment outcomes

Results for the compliance survey showed little variability between impact and control with all parameters below their respective trigger values. As such, no trigger exceedances were reported for compliance survey 1.

Approved

Table A2-1: Average impact and reference site sample results for informative surveys 1, 2 and 3 and compliance survey 1

Parameter	Unit	Informative						Compliance	
		Survey 1		Survey 2		Survey 3		Survey 1	
		Impact	Reference	Impact	Reference	Impact	Reference	Impact	Reference
pH	pH units	8.00	7.90	8.00	7.95	8.17	8.17	8.00	8.00
EC	µS/cm	53900	54115	44487	48035	56467	51515	53603	53670
Temperature	°C	30.31	30.36	29.43	29.60	30.24	30.25	25.78	25.79
Turbidity	NTU	2.3	2.1	4.3	4.6	1.7	1.4	1.87	1.95
Dissolved oxygen	%	93	93	94	92	99	99	97	98
Visual clarity & colour	n/a	No change	No change	No change	No change	No change	No change	No change	No change
Surface films	n/a	None	None	None	None	None	None	None	None
TPH as oil and grease	mg/L	13	7	<5	<5	<5	<5	<5	<5
	n/a	None	None	None	None	None	None	None	None
TPH/TRH	µg/L	<50	<50	<50	<50	<50	<50	<50	<50
TSS	mg/L	2	5	2	5	<1	<1	2	2
Ammonia	µg N/L	7	5	7	8	3	<3	<3	<3
TN	µg N/L	160	135	137	135	127	125	110	95

Parameter	Unit	Informative						Compliance	
TP	µg P/L	23	22	20	19	18	18	19	18
FRP	µg P/L	8	7	8	7	5	5	8	7
Cadmium [#]	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium [#]	µg/L	0.5	0.2	0.4	0.5	0.2	0.2	0.2	0.2
Copper [#]	µg/L	0.5	0.4	0.6	0.7	0.4	0.4	0.5	0.6
Lead [#]	µg/L	0.2	0.2	0.3	0.9	0.1	0.6	0.2	0.1
Mercury [#]	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel [#]	µg/L	1.3	0.5	0.5	0.4	0.4	0.4	0.5	0.4
Silver [#]	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc [#]	µg/L	1	<1	2	3	<1	2	1	1
Enterococci	cfu/100mL	<10	<10	-*	-*	10	10	<10	<10

*Enterococci not measured in Survey 2 due to a mistake on laboratory chain of custody

[#]analysed for total metals

A.3 Harbour sediment quality monitoring

Metal and metalloid results for harbour sediment quality are presented in Table A3-1. Three arsenic trigger exceedances were recorded; one impact site and two control sites. High levels of arsenic are known to naturally occur in Darwin Harbour and are considered a reflection of local geology rather than anthropogenic activities (Padovan 2003). Further, as the trigger exceedances were reported at both impact and control sites, elevated levels of arsenic were not attributed to Ichthys LNG operations.

All impact and control locations were below the laboratory LOR for BTEX and PAH (Table A3-2), with the exception of PAH at impact site I2 (10 µg/kg) and I3 (5 µg/kg), which were well below the guideline value (10,000 µg/kg). All sampling locations had at least one result above the LOR for TPH, within the fraction range of C15 – C36. However, none of the results exceeded the guideline value of (280 mg/kg). The presence of TPH in all samples likely indicates the presence of non-petrogenic hydrocarbons of biological origin (e.g. vegetable/animal oils and greases, humic and fatty acids). Non-petrogenic hydrocarbons of biological origin are known to occur in Darwin Harbour with 63 of 171 mangrove sediment samples analysed during the construction phase returning positive results for TPH. Fifty-nine of these samples were reanalysed following silica gel clean-up, with 57 of the samples subsequently returning a result below LOR, thus indicating the presence of non-petrogenic hydrocarbons.

Table A3-3 provides a summary of the particle size distribution for impact and control sites. Impact sites contain a higher proportion of fines (i.e. silts and clays <63 µm) compared to control sites. It is important to consider this difference when comparing impact and control site data as fine particles such as clay and silt are more likely to absorb organic and heavy metal contaminants (Simpson et al. 2013). To address this difference, metals should be normalised to aluminium (Munksgaard 2013) and organics to TOC (Simpson et al. 2013), as done for potential trigger exceedances in this survey.

Overall, there were no changes to harbour sediment quality associated with Ichthys LNG activities. As such, discharges have not adversely affected the declared beneficial uses or objective for Darwin Harbour.

Table A3-1: Harbour sediment quality survey metal and metalloid results.

Site ¹	Aluminium (Al)	Antimony (Sb)	Arsenic (As) ²	Cadmium (Cd)	Chromium (Cr)	Copper (Cu)	Lead (Pb)	Nickel (Ni)	Zinc (Zn)	Mercury (Hg)
Guideline values	NA	2	20	1.5	80	65	50	21	200	0.15
Background level	NA	NA	16.0	0.071	17.5	4.7	8.8	8.7	21.4	NA
I1	8750	<0.50	9.4	<0.1	20.1	4.3	6.1	6.1	15.8	0.03
I2	11700	<0.50	10.2	<0.1	27.9	6.0	7.8	8.2	21.6	0.03
I3	8250	<0.50	7.8	<0.1	20.1	4.2	5.8	6.0	15.5	0.01
I4	10300	<0.50	10.0	<0.1	25.0	5.5	7.7	7.3	21.2	0.01
I5	8050	<0.50	7.3	<0.1	18.9	4.1	5.2	5.4	15.3	<0.01
I6	11500	<0.50	8.9	<0.1	26.6	5.8	7.5	7.8	21.5	0.01
I7	12700	<0.50	9.6	<0.1	29.4	6.3	8.0	8.8	23.4	0.01
I8-1	9740	<0.50	8.7	<0.1	23.2	5.2	6.8	6.9	19.4	0.01
I8-2	9120	<0.50	8.8	<0.1	22.5	5.0	6.7	6.7	18.6	0.01
I8-3	11400	<0.50	10.6	<0.1	26.4	5.9	8.1	7.9	21.6	0.01
I9	6850	<0.50	6.7	<0.1	16.5	3.6	4.6	4.8	13.5	<0.01
I10	8630	<0.50	7.6	<0.1	21.0	4.5	6.0	6.3	16.9	<0.01
I11	10600	<0.50	10.1	<0.1	24.7	5.3	7.3	7.5	20.2	0.01
I12	7250	<0.50	7.4	<0.1	17.6	4.2	5.3	5.5	14.3	<0.01
I13-a	7150	<0.50	9.6	<0.1	20.2	8.1	5.8	8.0	20.1	<0.01
I13-b	7100	<0.50	11.6	<0.1	21.1	7.1	6.2	7.6	17.6	0.01
I13-c	12000	<2.00	15.0	0.2	28.0	12.0	10.0	13.0	32.0	0.01
I14	6800	<0.50	25.3 (37.2)	<0.1	48.1	4.6	7.6	5.7	13.7	<0.01
I15	10000	<0.50	11.0	<0.1	24.2	6.0	7.2	7.7	19.6	0.01
I16	3540	<0.50	13.6	<0.1	9.6	1.7	3.2	2.6	6.8	<0.01
C1-1	4120	<0.50	17.4	<0.1	18.5	2.7	5.4	3.2	7.6	<0.01
C1-2	4710	<0.50	10.7	<0.1	14.0	3.2	3.9	3.8	9.7	<0.01
C1-3	4260	<0.50	13.8	<0.1	13.8	2.5	3.8	3.3	9.0	0.01
C2	7940	<0.50	12.6	<0.1	22.2	6.0	6.9	6.7	18.8	0.01
C3	4400	<0.50	58.0 (132)	<0.1	28.8	1.5	6.7	3.0	6.5	<0.01
C4	3930	<0.50	23.9 (60.8)	<0.1	44.0	2.0	4.3	2.3	5.5	<0.01

¹ C = Control Site, I = Impact site

² Bold values indicate trigger exceedance and results in brackets have been normalised for aluminium concentrations as per Munksgaard (2013).

Table A3-2: Harbour sediment quality survey organic results

Site ¹	TOC (%)	TPH (mg/kg)	BTEX (mg/kg)	Total PAH (µg/kg)
Guideline values	n/a	280	n/a	10,000
Background level	n/a	n/a	n/a	n/a
I1	0.66	114	<0.2	<4
I2	0.88	140	<0.2	10
I3	1.10	81	<0.2	5
I4	0.63	90	<0.2	<5
I5	0.66	55	<0.2	<4
I6	0.63	66	<0.2	<5
I7	0.65	61	<0.2	<5
I8-1	0.60	76	<0.2	<5
I8-2	0.73	59	<0.2	<4
I8-3	0.72	60	<0.2	<5
I9	0.66	44	<0.2	<4
I10	0.59	46	<0.2	<4
I11	0.59	62	<0.2	<4
I12	0.61	50	<0.2	<4
I13-a	0.45	48	<0.2	<4
I13-b	0.36	49	<0.2	<4
I13-c	0.80	<100	<25	<5
I14	0.28	39	<0.2	<4
I15	0.66	90	<0.2	<4
I16	0.28	76	<0.2	<4
C1-1	0.34	42	<0.2	<4
C1-2	0.43	48	<0.2	<4
C1-3	0.40	54	<0.2	<4
C2	0.59	61	<0.2	<4
C3	0.08	24	<0.2	<4
C4	0.20	35	<0.2	<4

¹ C = Control Site, I = Impact site

Table A3-3: Harbour sediment quality survey average particle size distribution

Sites	Clay (<4 µm)	Silt (4-63 µm)	Sand (63-2,000 µm)	Gravel (>2,000 µm)
Impact	10.4%	58.6%	29.7%	1.3%
Control	5.5%	33.9%	48.8%	11.9%

A.3.1 Trigger assessment outcomes

A potential arsenic trigger exceedance was reported for impact site I14. However, given the arsenic exceedance was limited to one impact site and was also recorded at two control sites, the exceedance is unlikely to be attributable to Project activities. In addition, high levels of arsenic are known to naturally occur in Darwin Harbour and are considered a reflection of local geology rather than anthropogenic activities (Padovan 2003). As such, no further investigation was undertaken.

A.4 Groundwater monitoring

Four quarterly groundwater surveys were completed in the reporting period. A high-level summary of groundwater results and trends is provided below. Note presentation of groundwater data trends include data collected during the construction phase.

A.4.1 Physio-chemical

Physio-chemical monitoring results measured during the reporting period are consistent with those from the construction period. Ichthys LNG is located on low-lying peninsula connected to the mainland by a small isthmus. Most of the groundwater wells are located around the perimeter of Ichthys LNG and are saline with average electrical conductivity of 35,000 to 40,000 $\mu\text{S}/\text{cm}$ (Figure A4-1). Groundwater is also acidic to neutral with average pH typically between 5.0 and 5.5 (Figure A4-2).

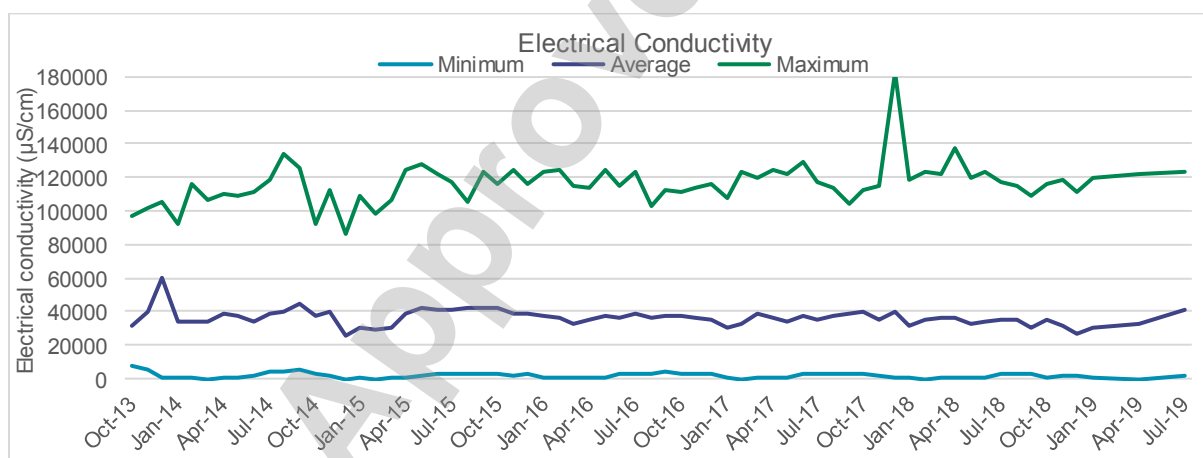


Figure A4-1: Average, minimum and maximum electrical conductivity for Ichthys LNG groundwater wells

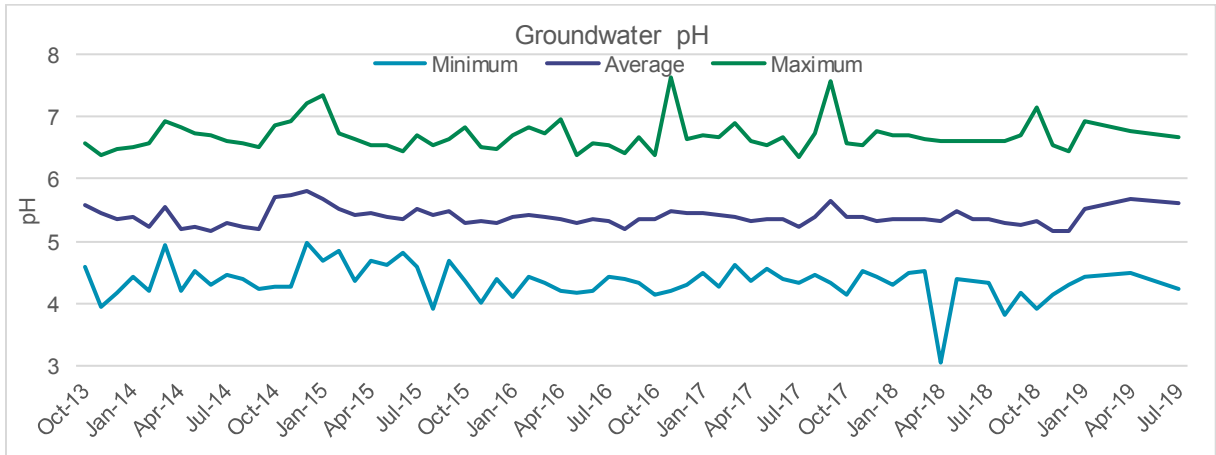


Figure A4-2: Average, minimum and maximum pH for Ichthys LNG groundwater wells

A.4.2 Nutrients

Nutrient monitoring results measured during the reporting period were generally consistent with those from the construction period. Nutrient concentrations are known to vary inter-annually and seasonally (see Figure A4-3 and Figure A4-4). Nutrients can also be highly variable between groundwater wells (Figure A4-5).

During the reporting period ammonia was the nutrient that had the greatest number of trigger exceedances and had a strong seasonal trend, whereby concentrations increase during the dry season and typically decrease in the wet season (Figure A4-3). Interannual variability is likely to be associated with natural factors such as rainfall; both the total rainfall and timing of rain (e.g. early in the season or late in the season). The 2018/2019 wet season rainfall was well below average and the driest wet season since construction of Ichthys LNG began. The dry and late onset of the 2018/2019 wet season has likely contributed to the concentrations and subsequently the number of ammonia exceedances recorded during the reporting period.

Overall the variations in nutrient concentrations measured are considered to be the result of natural variations and not attributable to Ichthys LNG activities.

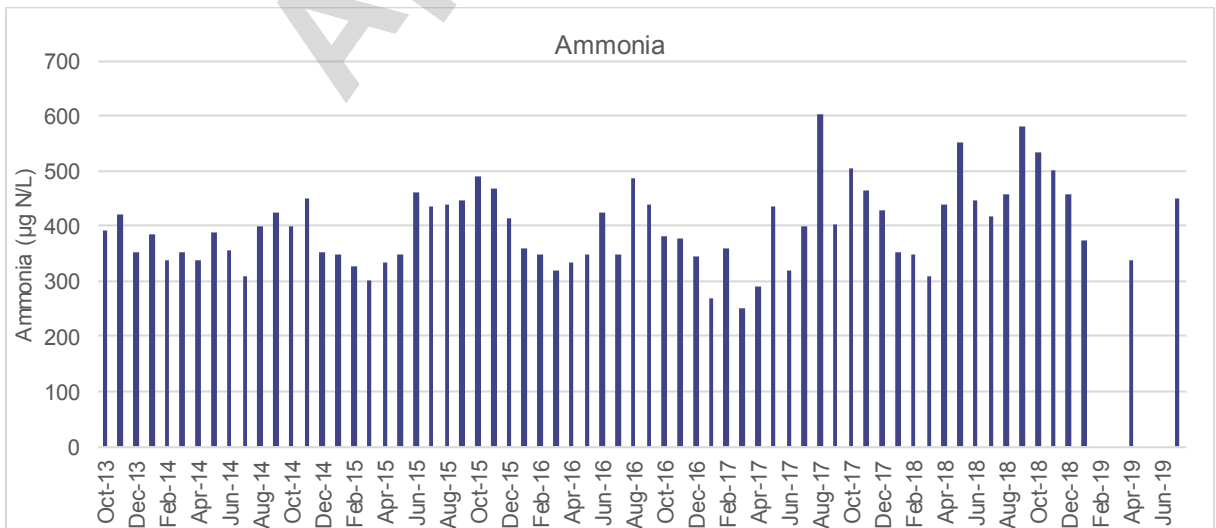


Figure A4-3: Average ammonia concentrations for all groundwater wells

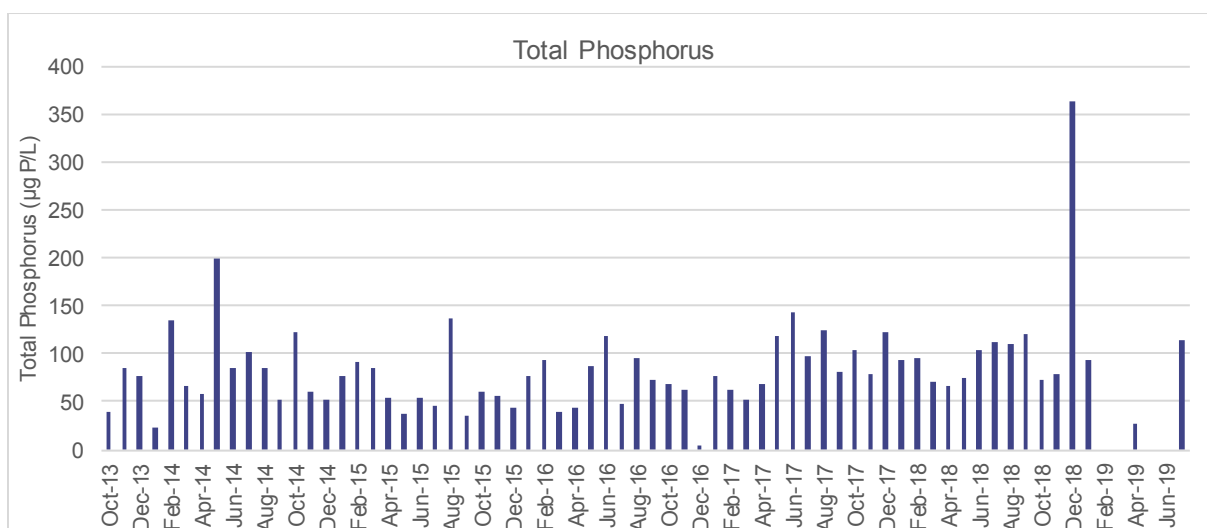


Figure A4-4: Average total phosphorus concentrations for all groundwater wells

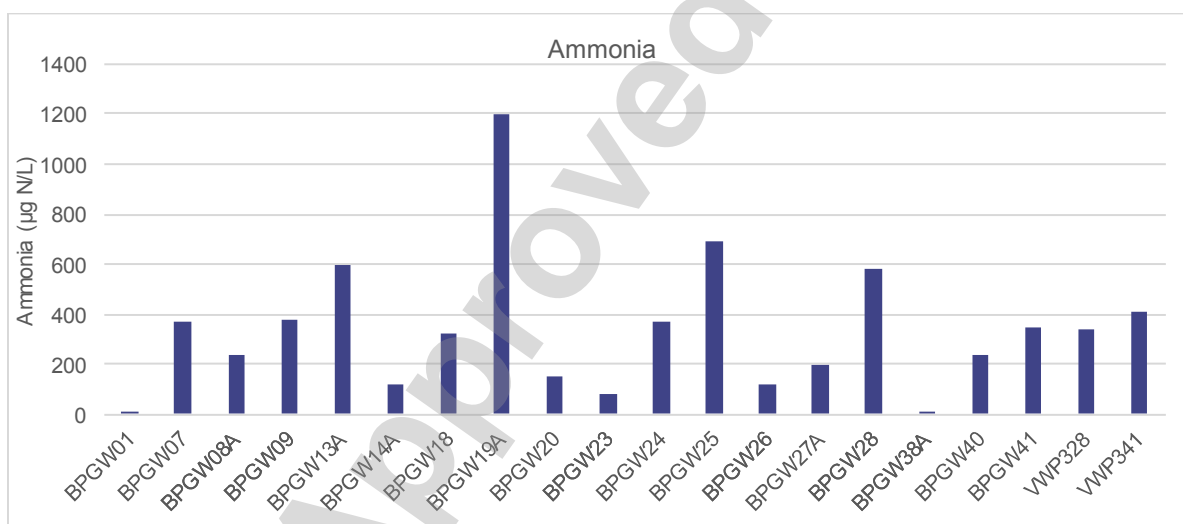


Figure A4-5: Groundwater survey 3 ammonia concentrations

A.4.3 Metals and metalloids

Groundwater metal concentrations measured during the reporting period were generally consistent with those from the construction period. Similar to nutrients, metal concentrations are known to vary inter-annually and seasonally (see Figure A4-6 for an example). Metals can also be highly variable between groundwater wells (see Figure A4-7 for an example).

During the reporting period zinc was the metal that had the greatest number of trigger exceedances and has a strong seasonal trend, whereby concentrations typically increase during the dry season and typically decrease in the wet season following the onset of wet season rainfalls (see Figure A4-8 for example of seasonality at a well). Interannual variability is likely to be associated with natural factors such as rainfall; both the total rainfall and timing of rain (e.g. early in the season or late in the season). The 2018/2019 wet season rainfall was well below average and the driest wet season since construction of Ichthys LNG began. The dry and late onset of the 2018/2019 wet season has likely contributed to the concentrations and subsequently the number of zinc exceedances recorded during the reporting period.

Overall the variations in metal and metalloid concentrations measured are considered to be the result of natural variations and not attributable to Ichthys LNG activities.

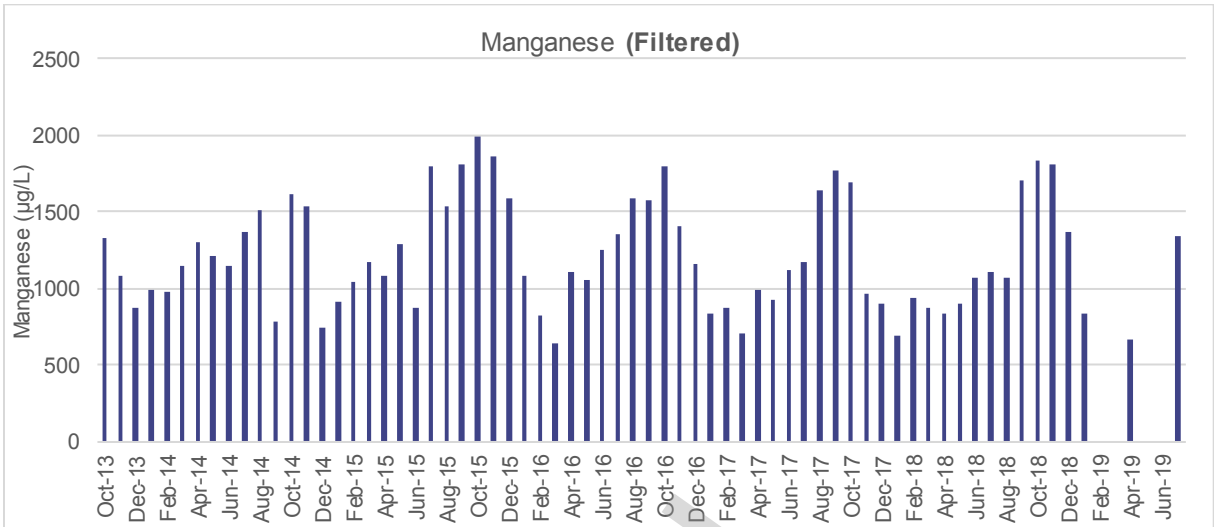


Figure A4-6: Average manganese concentrations for all groundwater wells

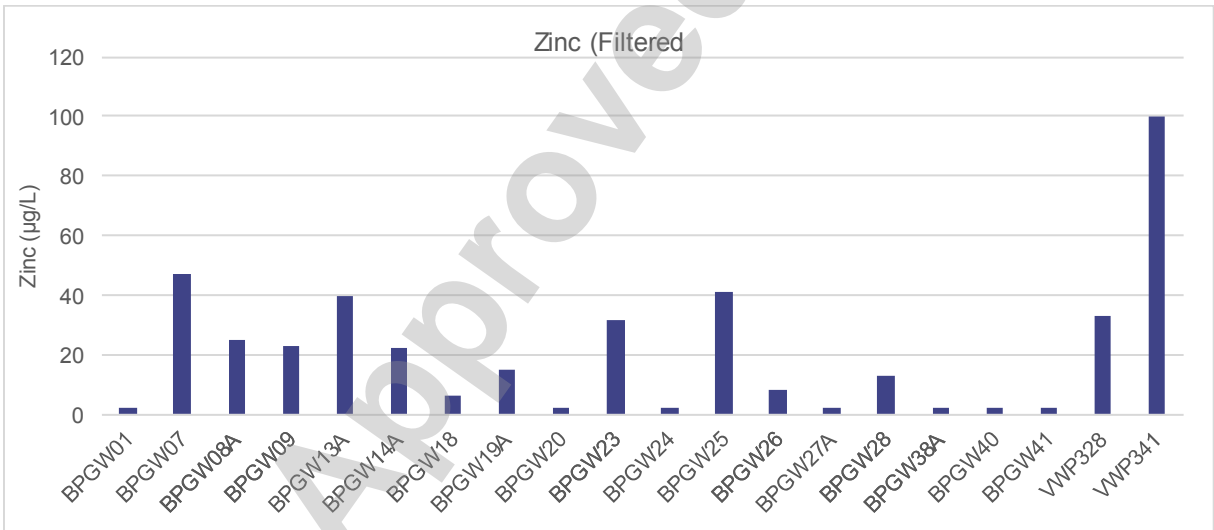


Figure A4-7: Groundwater survey 3 zinc concentrations

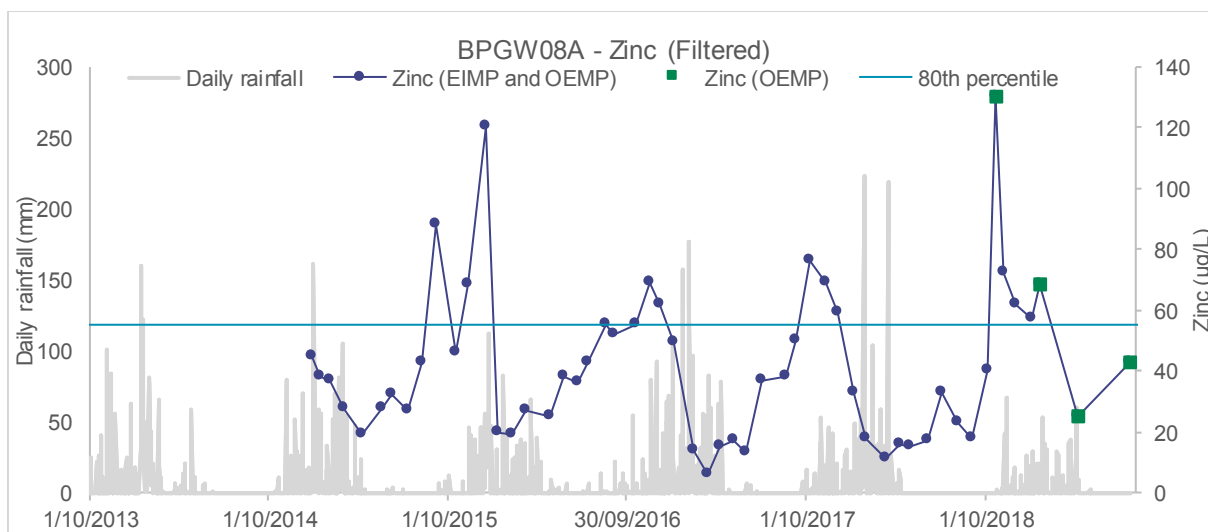


Figure A4-8: Groundwater well BPGW08A zinc (filtered) concentrations with daily rainfall

A.4.4 Hydrocarbons

No hydrocarbons (benzene, ethylbenzene, toluene, xylenes or TRH) were observed in any of the samples from any of the wells during the reporting period.

A.4.5 Microbiological

Faecal coliforms (total) and biological oxygen demand (BOD) have been recorded at both groundwater wells closest to the Ichthys LNG wastewater treatment facility (Table A4-1). However, no *E. coli* has been detected indicating the observed levels of faecal coliforms (total) and BOD are not attributable to Ichthys LNG activities.

Table A4-1: Microbiological results for the reporting period

Well	Date	<i>E. coli</i> (mpn/100mL)	Faecal coliform (total) (mpn/100mL)	BOD (mg/L)
BPGW19A	Survey 1	<1	20	5
	Survey 2	<1	4	<1
	Survey 3	<1	>2400	40
	Survey 4	<1	<1	2
BPGW27A	Survey 1	<1	<1	<1
	Survey 2	<1	125	<2
	Survey 3	<1	47	36
	Survey 4	<1	<1	<1

A.4.6 Trigger assessment outcomes

In accordance with the receiving environment adaptive management process outlined in Section 7.5 of the OEMP, groundwater trigger exceedances were investigated. A summary of the number of trigger exceedances by survey is provided in Table A4-2.

Investigation for all trigger exceedances using multiple lines of evidence concluded that the reported trigger exceedances were likely natural (e.g. represent seasonal trends and natural variability) and no further evaluation or management response was required.

Table A4-2: Summary of groundwater trigger exceedances

Date	Month	Physio-chemical	Nutrients	Metals	Total
Survey 1	October	10	32	49	91
Survey 2	January	3	34	12	49
Survey 3	April	4	16	12	32
Survey 4	July	4	25	30	59

Approved

APPENDIX B: STATUS OF OFFSET PROGRAMS

The status of offset programs required under Condition 11a is provided in the Table B-1. Further, a list of scientific reports, data and maps, which have been produced as result of execution of Condition 11a offset programs is provided in Table B-2. Where these reports have been made publicly available, a link has been provided in the table.

Table B-1: Status of offset programs required under EPBC 2008/4208 Condition 11a

Program title	Status
Publication of Kimberley research	Completed October 2014.
Darwin Harbour integrated marine monitoring and research program	Commenced in November 2014 and is ongoing.
Habitat mapping for Darwin region (including Bynoe Harbour)	Completed June 2018.
Supporting two Australian Research Council Linkage Projects	Completed July 2015.
Conservation management of marine megafauna in the western Top End	Currently in discussions with NT Government to better align the objectives of this program with NTG key priorities.
Conservation status of coastal dolphins in the Northern Territory	Completed June 2017.
Long-Term Monitoring of Coastal Dolphins in Darwin Harbour and the Abundance and Distribution of Dugongs in the Northern Territory	Commenced in July 2015 and is ongoing.

Table B-2: Scientific reports, data and maps associated with Condition 11a offset programs

Name of program	Name of sub-program/project	Name of report	Date of report	Link
Publication of data collected for the Browse Basin and Kimberley coastline				
		Ecological studies of the Bonaparte Archipelago and Browse Basin		https://www.inpex.com.au/media/2528/ecological-studies-of-the-bonaparte-archipelago-and-browse-basin-v7-web.pdf
An integrated monitoring and research program for Darwin Harbour				
Program 1 - Integrated Marine Monitoring & Research Program (IMMRP)	Mangrove monitoring	Development of an integrated long-term mangrove monitoring program for Darwin Harbour. Sub-project B: Development of methodology to map mangrove forest extent using satellite sensors.	2018/19	https://www.territorystories.nt.gov.au/
Program 1 - Integrated Marine Monitoring & Research Program (IMMRP)	Pressure Pilot Program	Developing an integrated long-term monitoring program for Darwin Harbour. Anthropogenic pressure project: Development of pressure indicators for Darwin Harbour	2018/19	https://www.territorystories.nt.gov.au/jspui/handle/10070/754527
Program 1 - Integrated Marine Monitoring & Research Program (IMMRP)	Water quality	Developing an integrated long-term monitoring program for Darwin Harbour. Water Quality Pilot Project WP2: Intra-annual water quality variability.	2018/19	https://www.territorystories.nt.gov.au/jspui/handle/10070/754337
Program 1 - Integrated Marine Monitoring & Research Program (IMMRP)	Water quality	Developing an integrated long-term monitoring program for Darwin	2018/19	https://www.territorystories.nt.gov.au/jspui/handle/10070/754526

Name of program	Name of sub-program/project	Name of report	Date of report	Link
		Harbour. Water Quality Pilot Project WP1: Neap tide trial.		
Program 1 - Integrated Marine Monitoring & Research Program (IMMRP)	Water quality	Development of an integrated long-term mangrove monitoring program for Darwin Harbour. Sub-project B: Mangrove community mapping – Charles Point to Gunn Point 2016	2018/19	https://www.territorystories.nt.gov.au/
Program 1 - Integrated Marine Monitoring & Research Program (IMMRP)	Sediment Quality	Sediment Quality Pilot Project Plan	2018/19	https://www.territorystories.nt.gov.au/
Program 1 - Integrated Marine Monitoring & Research Program (IMMRP)	Mangrove Monitoring	Development of a long-term sediments monitoring program for Darwin Harbour: A final report on the Rod Surface Elevation Table – Marker Horizon Pilot project MP2	2017/18	https://www.territorystories.nt.gov.au/jspui/handle/10070/754646
Program 1 - Integrated Marine Monitoring & Research Program (IMMRP)	Water quality	Developing quantitative PCR assays to target microbial nitrogen cycle genes: A new tool to monitor ecosystem function in sediment,	2017/18	https://www.territorystories.nt.gov.au/
Program 1 - Integrated Marine Monitoring & Research Program (IMMRP)	Water quality	Water Quality Pilot Project Plan	2017/18	https://www.territorystories.nt.gov.au/
Program 1 - Integrated Marine Monitoring & Research Program (IMMRP)	Mangrove Monitoring	Mangrove Monitoring Pilot Project Plan	2017/18	https://www.territorystories.nt.gov.au/
Program 1 - Integrated Marine Monitoring & Research Program (IMMRP)	Pressure Pilot Program	Pressure Monitoring Pilot Project Plan	2017/18	https://www.territorystories.nt.gov.au/

Name of program	Name of sub-program/project	Name of report	Date of report	Link
Program 1 - Integrated Marine Monitoring & Research Program (IMMRP)	Mangrove Monitoring	Darwin Harbour mangrove sediment: metal and arsenic dynamics.	2016	https://www.territorystories.nt.gov.au/jspui/handle/10070/754532
Program 1 - Integrated Marine Monitoring & Research Program (IMMRP)	Project Execution Plan (W1)	A risk assessment of water quality pollution of Darwin Harbour using modelled catchment impacts on water quality.	2016	https://www.territorystories.nt.gov.au/jspui/handle/10070/754530
Program 1 - Integrated Marine Monitoring & Research Program (IMMRP)	Project Execution Plan (W2)	Interim turbidity water quality objectives for dry season neap tide conditions in Darwin Harbour.	2016	https://www.territorystories.nt.gov.au/jspui/handle/10070/754529
Program 1 - Integrated Marine Monitoring & Research Program (IMMRP)	Project Execution Plan (M6)	Review of research and monitoring of Darwin Harbour's mangrove environment for the development of a long-term monitoring program.	2016	https://www.territorystories.nt.gov.au/jspui/handle/10070/754531
Program 1 - Integrated Marine Monitoring & Research Program (IMMRP)	Project Execution Plan (M7)	Darwin Harbour Integrated Mangrove Monitoring & Research Program: Data collation project.	2016	Link available soon
Program 1 - Integrated Marine Monitoring & Research Program (IMMRP)	Project Execution Plan (M9)	Rod Surface Elevation Table Marker Horizon (RSET-MH) Handbook	2016	Link available soon
Program 1 - Integrated Marine Monitoring & Research Program (IMMRP)	Project Execution Plan (W3)	Optimising water quality monitoring using continuous flow monitoring.	2016	Link available soon
Program 1 - Integrated Marine Monitoring & Research Program (IMMRP)	Project Execution Plan (M6)	Addendum Sediment mass accumulation	2016	Link available soon

Name of program	Name of sub-program/project	Name of report	Date of report	Link
Program 1 - Integrated Marine Monitoring & Research Program (IMMRP)	Project Execution Plan (W4)	Monitoring and assessments of boundary fluxes in Darwin harbour	2016	Link available soon
Research on the conservation status of coastal dolphins				
Program 2 - Conservation Status of Coastal Dolphins in the Northern Territory	Conservation Status of Coastal Dolphins in the Northern Territory - Chopper survey	Conservation status of coastal dolphins in the Northern Territory: Chopper survey report, October 2015	2015	http://hdl.handle.net/10070/259636
Program 2 - Conservation Status of Coastal Dolphins in the Northern Territory	Conservation status of coastal dolphins in the Northern Territory	Conservation status of coastal dolphins in the Northern Territory	2017	http://hdl.handle.net/10070/297463
Program 2 - Conservation Status of Coastal Dolphins in the Northern Territory	Conservation Status of Coastal Dolphins in the Northern Territory - Marine Megafauna Sea Ranger workshop	Marine Megafauna Sea Ranger workshop. Conservation status of Coastal Dolphins in the Northern Territory	2017	http://hdl.handle.net/10070/267232 https://vimeo.com/223744712 Password: searangers
Research on the distribution and habitat use of coastal dolphins and dugongs				
Program 6 - Long-term monitoring of coastal dolphins in Darwin Harbour and the abundance and distribution of dugongs in the Northern Territory	The distribution and abundance of Dugong and other marine megafauna in the Gulf of Carpentaria, Northern Territory	The distribution and abundance of Dugong and other marine megafauna in the Gulf of Carpentaria, Northern Territory, November 2014	2014	http://hdl.handle.net/10070/258093

Name of program	Name of sub-program/project	Name of report	Date of report	Link
Program 6 - Long-term monitoring of coastal dolphins in Darwin Harbour and the abundance and distribution of dugongs in the Northern Territory	Northern Territory Dugong Aerial Surveys	Northern Territory Dugong Aerial Survey 2015: Ranger Group Summary Report	2015	http://hdl.handle.net/10070/259635
Program 6 - Long-term monitoring of coastal dolphins in Darwin Harbour and the abundance and distribution of dugongs in the Northern Territory	The distribution and abundance of Dugong and other marine megafauna in the Northern Territory	The distribution and abundance of Dugong and other marine megafauna in the Northern Territory, November 2015	2015	http://hdl.handle.net/10070/265115
Program 6 - Long-term monitoring of coastal dolphins in Darwin Harbour and the abundance and distribution of dugongs in the Northern Territory	Darwin Region Coastal Dolphin Monitoring Program- 2016 Progress Report	Darwin Region Coastal Dolphin Monitoring: October 2016 surveys	2016	http://hdl.handle.net/10070/277126
Program 6 - Long-term monitoring of coastal dolphins in Darwin Harbour and the abundance and distribution of dugongs in the Northern Territory	Darwin Region - Coastal Dolphin Monitoring - 2017 Progress Report	Darwin Region - Coastal Dolphin Monitoring Progress Report - October 2017 surveys	2017	http://hdl.handle.net/10070/305351
Program 6 - Long-term monitoring of coastal dolphins in Darwin Harbour and the abundance and distribution of dugongs in the Northern Territory	Darwin Region Coastal Dolphin Monitoring Program- 2018 Progress Report	Darwin region coastal dolphin monitoring program -2018 Progress Report	2018	http://hdl.handle.net/10070/754066
Program 6 - Long-term monitoring of coastal dolphins in Darwin Harbour and the abundance and distribution of dugongs in the Northern Territory	The distribution and abundance of Dugong and other marine megafauna in the Northern Territory	Film: li-Maramaranja - Dugong Hunters of Excellence	2019	https://vimeo.com/318652234 Password: dugong

Name of program	Name of sub-program/project	Name of report	Date of report	Link
Habitat mapping for Darwin Harbour Region (including Bynoe Harbour)				
Program 3 - Habitat Mapping for Darwin Region (Including Bynoe Harbour)	Habitat Mapping for Darwin Region (Including Bynoe Harbour)	Outer Darwin Harbour Marine Survey 2015: GA0351/SOL6187 Post-survey report	2015	http://dx.doi.org/10.11636/Record.2016.008
Program 3 - Habitat Mapping for Darwin Region (Including Bynoe Harbour)	Habitat Mapping for Darwin Region (Including Bynoe Harbour)	Bynoe Harbour Marine Survey 2016: GA4452/SOL6432 Post-survey report	2016	http://dx.doi.org/10.11636/Record.2017.004
Program 3 - Habitat Mapping for Darwin Region (Including Bynoe Harbour)	Habitat Mapping for Darwin Region (Including Bynoe Harbour)	Outer Darwin Harbour Shallow Water Sediment Survey 2016: GA0356 - Post-survey report	2016	http://dx.doi.org/10.11636/Record.2017.006
Program 3 - Habitat Mapping for Darwin Region (Including Bynoe Harbour)	Habitat Mapping for Darwin Region (Including Bynoe Harbour)	Benthic sediment surveys of inner Darwin Harbour and shallow water areas in and around Bynoe Harbour (2017) GA0358 and GA0359 – Post-survey report	2017	http://dx.doi.org/10.11636/Record.2018.052
Program 3 - Habitat Mapping for Darwin Region (Including Bynoe Harbour)	Habitat Mapping for Darwin Region (Including Bynoe Harbour)	Final Report Seabed Characteristics - <i>Final draft in progress</i>	2019	Link available soon
Program 3 - Habitat Mapping for Darwin Region (Including Bynoe Harbour)	Habitat Mapping for Darwin Region	Final Report Characterising Abiotic Patterns - <i>Final draft in progress</i>	2019	Link available soon

Name of program	Name of sub-program/project	Name of report	Date of report	Link
	(Including Bynoe Harbour)			
Program 3 - Habitat Mapping for Darwin Region (Including Bynoe Harbour)	Habitat Mapping for Darwin Region (Including Bynoe Harbour)	Final Report Characterising Seafloor Communities - <i>Final draft in progress</i>	2019	Link available soon

Approved

Document Endorsement and Approvals

This page has been automatically generated and appended to this document by the INPEX Australia Document Management System (DMS). This page contains key events related to this document that are listed in the tables below and the information is unable to be manually edited.

Document Identification

Document Number	Revision	Security Classification	Date
X060-AH-REP-60054	0	Unrestricted	25/10/2019

Document Revision History

Revision	Date and Time	Issue Reason
A	24/10/2019 10:45	Approve with Endorsement

Delegation of Authority

From Name	To Name	Date and Time	Action
Name		Title	

Electronic Endorsement and Approval

Electronic approval of this document complies with the issued INPEX Electronic Approval Standard (0000-A9-STD-60011) and records evidence that the applicable person has either endorsed and/or approved the content contained within this document. The reviewers of this document are recorded in the DMS.

Name	Title	Date and Time	Action
Dawn MacInnes	Environmental Manager HSEQ Environment	24/10/2019 11:02	Endorsed
Valarie Ee	General Manager HSE	25/10/2019 17:12	Approved