Appendix G Heritage Assessment

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27 June 2019

Matthew Hanson
Beetaloo Project Manager
Origin Energy
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Dear Matthew

Aboriginal & Historic Heritage Assessment: 2018 Exploration Lease Areas

1.0 Introduction

AECOM Australia Pty Ltd (AECOM) was commissioned by Origin Energy Resources Limited (Origin) to conduct a heritage assessment of the proposed exploration lease areas known as Kyalla 117 N2-1 and Velkerri 76 S2-1 located within the Beetaloo Basin, Northern Territory.

The assessment consisted of the following:

- A 5.5-ha area around the proposed lease sites including an additional 500 m buffer to allow for future flexibility.
- A 1-ha camp pad.
- A 0.5-ha helipad at the Velkerri 76 S2-1.
- 650 m long x 8 m wide (0.52-ha) lease pad turn in to Kyalla 117 N2-1 connecting the proposed lease pad to the existing access track.
- 1,100 m long x 8 m wide (0.88-ha) lease pad turn in to Velkerri 76 S2-1 connecting the proposed lease pad to the existing access track.

This report details the results specific to the archaeological inspection of Kyalla 117 N2-1 and Velkerri 76 S2-1. A separate anthropological survey was conducted by AAPA representatives and the respective Traditional Owners.

2.0 Existing Data Sources

Information on the location of heritage sites within the study area was obtained from:

- a review of Native Title claims and Indigenous Land Use Agreements over the proposed activity areas
- a review of existing Northern Territory Heritage Register managed by the NT Heritage Branch
- a review of the Sacred Sites Register maintained by the Aboriginal Areas Protection Authority
- a review of past archaeological survey reports and assessments undertaken within the local area.

Relevant legislation is summarised in Appendix A.

2.1 Native Title

Native Title exists in parts of the determination area as detailed in Table 1.

Table 1 Native Title & ILUA Agreements

Type	Bore	Name	Summary
Native Title	Kyalla 117 N2-1	NTD21/2010 Shenandoah Pastoral Lease	Native Title exists in parts of the determination area and is held by the Kinbininggu and Bamarrngganja groups
	Velkerri 76 S2-1	NTD17/2010 Amungee Mungee Pastoral Lease	Native title exists in parts of the determination area and is held by The Karranjini group; the Bamarrnganja group

The Native Title Petroleum Exploration Agreement between Permit Holder and the NLC includes clauses for the protection of Sacred Sites, objects and sensitive areas related to Aboriginal activities in the area, including cultural, hunting and foraging activities. Site clearance will occur prior to any on ground activities. The Native Title Agreement also includes clauses for the protection of the environment and rehabilitation.

2.2 Australian Heritage Database

A search of the Australia Heritage Database identified that no statutory listed heritage places within the proposed impact areas.

2.3 NT Heritage Register

A search of the Northern Territory Heritage Register identified no heritage places or artefacts within the proposed impact areas.

2.4 Aboriginal Areas Protection Authority

AAPA clearance surveys by AAPA anthropologist and traditional owners were completed and an Authority Certificate issued to Origin for the proposed exploration works within nine exploration activity locations, including Kyalla 117 N2 and Velkerri 76 S2. The clearance certificate issued for Origin's exploration program includes:

- AAPA RA2019/41 (C2019/039) – EP117, EP76 and EP98 within Part NT Portions 701, 702, 1077, 1079, 1513, 5416, 7027 and 7026.

Origin has committed to comply with conditions as prescribed by AAPA certificate for the duration of the program.

2.5 Previous Archaeological Investigations

The majority of archaeological investigations near the study area have been predominately associated with either linear infrastructure in an alignment parallel to the Stuart Highway or natural gas exploration activities associated with the Beetaloo Basin. Of the assessments of relevance to the study area, the majority of sites identified are artefact scatters composed of raw material commonly found in the immediate area (quartz, silcrete and quartzite).

Table 2 provides a summary of previous archaeological investigations undertaken in the local area.

Table 2 Previous Archaeological Assessments in the Local Area

Researchers	Assessment Type	Locality	Key Findings
Smith, 1986	Excavation	Lake Woods	Insitu artefacts dated to 6,000 years.
Hermes, 1986	Survey	Amadeus Basin to Katherine	Large scale survey for a proposed natural gas pipeline targeting areas of major cultural sensitivity from Daly Waters to Katherine. Thirty-two sites were identified with the majority being artefact scatters associated with watercourses.
Quaternary Archaeological Surveys, 1998	Survey	Stuart Highway to Mataranka Homestead	Large scale survey for a fibre optic cable corridor. Three isolated artefacts and one historic heritage site identified.
Heritage Surveys, 1999	Survey	Daly Waters to McArthur River	Nine archaeological sites identified including rockshelters and artefact scatters.
HLA-Envirosciences Pty Ltd, 2006a, 2006b, 2006c, 2006d, 2007	Survey	Beetaloo Basin	Several archaeological sites identified across the exploration permits including artefact scatters, isolated artefacts and stone cairns.
AECOM Australia Pty Ltd, n.d., 2011, 2012a, 2012b	Survey	Beetaloo Basin	Several archaeological sites identified as part of seismic line clearance including large artefact scatters (>1 km), quarry sites and isolated artefacts.
AECOM Australia Pty Ltd, 2014	Survey	Beetaloo Basin	One isolated artefact identified as part of an exploration drilling program clearance.
AECOM Australia Pty Ltd, 2016	Survey	Beetaloo Basin	One isolated artefact identified on Newcastle Waters firebreak

3.0 Heritage Assessment

A heritage assessment involving field survey was undertaken by AECOM archaeologist, Luke Kirkwood for the proposal area on 28 to 29 August 2017. The archaeological inspection involved helicopter and pedestrian survey of the proposed exploration area and access tracks.

At arrival at each inspection target, the helicopter would make a series of passes to assist in the identification of landforms/ecological features of interest to the heritage survey. Upon landing, survey would target these areas, or in cases where no landform/ecological features were identified, general survey would be undertaken targeting areas of surface ground exposure (Figure 1 and Figure 2).

During the inspection notes were taken on landform, ground surface visibility and areas of exposure. The aim of the inspection was to identify any surface expressions of Aboriginal archaeological and cultural heritage values within the proposal area. Photographic records were taken at each proposed disturbance location.

Results of the inspection are provided in Table 3. Appendix C provides details on ground surface visibility classes and subsurface archaeological potential assessment. Plate 1 to Plate 4 present the general context shots of the proposed exploration lease area.

Table 3 Exploration Lease Area Inspection Results

Location	Easting (mE)[a]	Northing (mN)[a]	GSV[b]	GSI[c]	Surface Archaeology	Subsurface Potential	Impact Potential
Kyalla 117 N2-1	356175	8137500	Fair	High	None identified	Low	Low to No Impact
Velkerri 76 S2-1	435488	8136321	Good	High	None identified	Low	Low to No Impact

a GDA94 Zone 53; b GSV = Ground Surface Visibility; c GSI = Ground Surface Integrity

Plate 1 Kyalla 117 N2-1 general context shot

Plate 2 Kyalla 117 N2-1 aerial context shot

Plate 3 Velkerri 76 S2-1 general context shot

Plate 4 Velkerri 76 S2-1 aerial context shot

4.0 Identified Archaeological Heritage

No culturally sensitive landforms or archaeological heritage was identified during the survey of the proposed lease sites.

5.0 Key Findings and Recommendations

The key findings of this heritage assessment are:

- A review of existing heritage data and reports for the study area indicate that no previously recorded heritage sites will be impacted by the proposed works.
- AAPA clearance surveys by AAPA anthropologist and Traditional Owners have been completed and AAPA Certificate issued to Origin for their current exploration program.
- Inspection of the proposed exploration lease areas identified no archaeological heritage values (Aboriginal, historical or Macassan)

On the basis of the above findings, the following recommendations are made:

- An unexpected heritage finds stop works procedure is to be implemented for the duration of the project (Appendix D).
- Induction of staff on site is to include reference to the wider area having Indigenous heritage values and the stop works procedure.

356000

356500

8138000

8137500

Kyalla 117 N2-1

LEGEND

Survey Transects 2018

- Helicopter
- Pedestrian

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0 20 40 60 80 100 m

1:3,000 (when printed at A3)

Data Sources:
Origin Energy
Bing Virtual Earth

ORIGIN ENERGY RESOURCES LIMITED
Heritage Assessment
Kyalla 117 N2-1

PROJECT ID	60480548
CREATED BY	LK
LAST MODIFIED	24-4-2019
VERSION	1

Figure F1

435500

436000

8136500

8136000

8135500

Velkerri 76 S2-1

LEGEND

Survey Transects 2018

- Helicopter
- Pedestrian

AECOM
www.aecom.com

0 20 40 60 80 100 m

1:4,000 (when printed at A3)

Data Sources:
Origin Energy
Bing Virtual Earth

ORIGIN ENERGY RESOURCES LIMITED
Heritage Assessment
Velkerri 76 S2-1

PROJECT ID	60480548
CREATED BY	LK
LAST MODIFIED	24-4-2019
VERSION	1

Figure F2

6.0 References

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Yours faithfully

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Appendix A - Legislation

Commonwealth Legislation

Environment Protection and Biodiversity Conservation Act

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) took effect on the 16 July 2000 (NSW Department of Urban Affairs and Planning, 2000). Under section 26 of the EPBC Act it is stated that:

> *A person must not take on Commonwealth land an action that has, will have or is likely to have a significant impact on the environment.*

Under section 28 of the EPBC Act it is stated that:

> *The Commonwealth or a Commonwealth agency must not take inside or outside the Australian jurisdiction an action that has, will have or is likely to have a significant impact on the environment inside or outside the Australian jurisdiction.*

An action is defined as a project, development, undertaking, activity, series of activities, or alteration. An action will also require approval if:

> *It is undertaken on Commonwealth land and will have or is likely to have a significant impact;*
>
> *It is undertaken outside Commonwealth land and will have or is likely to have a significant impact on the environment on Commonwealth land; and*
>
> *It is undertaken by the Commonwealth and will have or is likely to have a significant impact.*

The EPBC Act defines 'environment' as both natural and cultural environments and therefore includes Aboriginal and historic heritage items. Under the Act, protected heritage items are listed on the National Heritage List (items of significance to the nation) or the Commonwealth Heritage List (items belonging to the Commonwealth or its agencies). These two lists replaced the Register of the National Estate (RNE) which is no longer a statutory list.

Aboriginal and Torres Strait Islander Heritage Protection Act 1984

The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (the ATSIHP Act) provides for the preservation and protection of places, areas and objects of particular significance to Indigenous Australians. The stated purpose of the ATSIHP Act is the 'preservation and protection from injury or desecration of areas and objects in Australia and in Australian waters, being areas and objects that are of particular significance to Aboriginals in accordance with Aboriginal tradition' (section 4).

Under the Act, 'Aboriginal tradition' is defined as "the body of traditions, observances, customs and beliefs of Aboriginals generally or of a particular community or group of Aboriginals, and includes any such traditions, observances, customs or beliefs relating to particular persons, areas, objects or relationships" (Section 3). A 'significant Aboriginal area' is an area of land or water in Australia that is of 'particular significance to Aboriginals in accordance with Aboriginal tradition' (Section 3). A 'significant Aboriginal object', on the other hand, refers to an object (including Aboriginal remains) of like significance.

For the purposes of the Act, an area or object is considered to be injured or desecrated if:

- In the case of an area:
  - it is used or treated in a manner inconsistent with Aboriginal tradition;
  - the use or significance of the area in accordance with Aboriginal tradition is adversely affected;
  - passage through, or over, or entry upon, the area by any person occurs in a manner inconsistent with
  - Aboriginal tradition;
- In the case of an object:
  - it is used or treated in a manner inconsistent with Aboriginal tradition.

The ATSIHP Act can override state and territory laws in situations where a state or territory has approved an activity, but the Commonwealth Minister prevents the activity from occurring by making a declaration to protect an area or object. However, the Minister can only make a decision after receiving a legally valid application under the ATSIHP Act and, in the case of long term protection, after considering a report on the matter. Before making a declaration to protect an area or object in a state or territory, the Commonwealth Minister must consult the appropriate Minister of that state or territory (section 13).

Native Title Act 1993

The *Native Title Act 1993* provides for the recognition and protection of native title for Indigenous peoples. The Act recognises native title for land over which native title has not been extinguished and where persons able to establish native title are able to prove continuous use, occupation or other classes of behaviour and actions consistent with a traditional cultural possession of those lands. It also makes provision for Indigenous Land Use Agreements (ILUA) to be formed.

Northern Territory Legislation

Northern Territory Aboriginal Sacred Sites Act 1989

The *Northern Territory Aboriginal Sacred Sites Act* 1989 was established to provide a system that protects sacred sites whilst providing for the development of land.

The Aboriginal Areas Protection Authority (AAPA) is a statutory authority established under the Sacred Sites Act and is responsible for overseeing the protection of sacred sites on land and sea across the whole of Australia's Northern Territory.

The Act establishes the protection of Aboriginal sacred sites through:

- Sacred site avoidance surveys and issuing authority certificates for any development proposals.
- Giving the public information about existing sacred sites through abstracts of Authority records and access to the registers the Authority maintains.
- Establishing and maintaining a Register of Sacred Sites
- Manages the rights of traditional custodians to access Sacred Sites.

The Act also establishes a range of offences and associated penalties that are aimed at protecting sacred sites. It is an offence to desecrate or disturb a site without the approval of the relevant custodians. A register of known sites exists to assist in identifying the likelihood of disturbance and potential need to obtain approval. The Act also establishes a duty-of-care to notify the AAPA of any potential disturbance to Aboriginal sacred sites.

Heritage Act 2011

The *Heritage Act 2011* provides for the protection of both natural and cultural heritage (Aboriginal, historical and Macassan heritage) within the Northern Territory. The Act establishes the Heritage Council (consisting of eleven members) and the NT Heritage Register. It sets the process by which places become heritage places and allows for interim protection of places.

It is an offence to remove or damage heritage places or objects or to mislead or obstruct heritage officers regarding the provision of requested information or entry to works, vehicles or premises that are likely to have been involved in an offence against the Heritage Act. Compliance with the requirements of the Act must be adhered to at all times.

Appendix B – AAPA Clearance Certificate

Removed from public document at AAPA request

Appendix C – Archaeological Assessment Criteria

Table C1 Ground Surface Visibility (GSV) Rating Scheme

GSV rating	Percentage GSV
No ground surface visibility	0%
Very poor	1-10%
Poor	11-30%
Fair	31-50%
Good	51-70%
Very good	71-90%
Excellent	91-100%

Table C2 Ground Surface Integrity (GSI) Rating Scheme

GSI rating	Definition
Low	Ground surface has been subjected to significant disturbance (e.g. earthworks, excavation). Little to no integrity remains.
Moderate	Ground surface has been subject to moderate disturbance (e.g. native vegetation clearance) but retains a reasonable degree of integrity.
High	An unmodified or minimally modified ground surface.

Table C3 Definitions for Subsurface Archaeological Potential

Subsurface Archaeological Potential	Definition
Low	Areas in which subsurface archaeological materials are unlikely to occur. This may be due to unfavourable environmental conditions and/or prior disturbance(s).
Moderate	Areas in which subsurface archaeological materials may occur. Reasonable environmental conditions exist though high artefact counts/densities are unlikely. Subsurface evidence likely to be the product of random discard events as opposed to repeated or extensive activity by Aboriginal people in antiquity.
High	Areas known or highly likely to contain subsurface archaeological materials. Presence of archaeological materials typically reflects optimal environmental conditions and little to no prior landscape disturbance. High artefact counts/densities are likely.

Table C4 Impact Potential Ranking for Aboriginal Objects

Impact Potential	Definition	Management Action
No Impact	Aboriginal objects will not be affected by the proposed activity.	No action required
Low Impact	Unlikely to disturb, destroy, damage or deface an Aboriginal object or objects.	No action required
Moderate Impact	Reasonable potential to disturb, destroy, damage or deface an Aboriginal object or objects.	Avoid area if possible. If avoidance not an option, test excavate area to determine nature and extent of potential archaeological deposits
High Impact	Will, or is highly likely to, disturb, destroy, damage or deface an Aboriginal object or objects.	Avoid area if possible. If avoidance not an option, test excavate area to determine nature and extent of potential archaeological deposits

Appendix D – Unexpected Heritage Finds Procedure

Integrated Gas

UNEXPECTED HERITAGE FINDS PROCEDURE

Beetaloo Asset (Northern Territory)

This documents details the Unexpected Heritage Finds Procedure for the Beetaloo Exploration Program.

Revision	Date	Description	Originator	Checked	Approved
A	31/03/2019	Unexpected Heritage Finds Procedure	Luke Kirkwood/Alana Court		
0					

Review due: 31/03/2019

THE THREE WHATS

What can go wrong?
What could cause it to go wrong?
What can I do to prevent it?

Table of contents

List of appendices

1. Purpose

The purpose of this procedure is to set out the actions to be undertaken by Origin staff and contractor if a suspected find of Aboriginal and non-Aboriginal cultural heritage is made during civil construction activities.

2. Scope

This procedure covers the requirements associated with:

- The identification of cultural heritage artefacts or areas within the Beetaloo Permit Area.
- The assessment of the risk and control measures to be taken if a suspected Indigenous and non-Indigenous cultural heritage find is discovered; including investigation, notification, recording and reporting, means of communication, measures to avoid cultural heritage and dispute resolution.

It applies to all fieldwork conducted in the Beetaloo Basin.

3. Responsibility

These personnel are responsible for the following activities:

Indigenous Community Manager	Procedure issue and maintenance
Managers / Superintendents / Supervisors	Implementation of this procedure
All Employees / Contractors	Complying with this procedure

4. Requirements

The following management measures are recommended for unexpected heritage finds and are to be included as part of daily toolbox discussions.

4.1 Action in Event of Unexpected Discovery

1. If suspected previously unrecorded cultural heritage is uncovered during project work, work in the immediate vicinity of the find must stop and the area is to be flagged off with suitable markers (star pickets, flagging or barrier mesh).
2. The project work crew may continue work at least 100 m from the site of the find (or other distance approved by the relevant Heritage specialist, providing that at all times the cultural heritage duty of care is observed.

4.2 Recording and Reporting

3. The project work crew must record the suspected find on the Appropriate Forms. This will include GPS location and should include photographs of the suspected find.
4. The project crew must not disturb the suspected find in any way; for example, touch painted art, or collect/relocate the suspected find as this may be illegal and may reduce the scientific and cultural value of the cultural heritage.
5. The immediate supervisor of the project work crew must notify the relevant Heritage Specialist for the area –
   - o Xxxx
   - o xxxx

   and advise them of the nature of the suspected find.

4.3 Measures to Avoid Harm to Aboriginal Cultural Heritage

Aboriginal finds can include the following:

- Stone artefacts (sharp edged rocks that have identifiable features demonstrating evidence of human modification. See attached information sheet)
- Scarred Trees (trees with symmetrical scars that might demonstrate evidence of removal of bark for use in coolamons, shields and huts. See attached information sheet)
- Grindstones (Large sandstone items (either fixed in bedrock or mobile) that have manmade grooves in them demonstrating use. See attached information sheet)
- Stone Axes (heavy hatchet head like stone items, typically with the leading edge sharpened. See attached information sheet)
- Bone, Shell and Charcoal (potential historical food waste dumps (also known as Middens). See attached information sheet)

Subsurface works may typically encounter shell, charcoal and bone which will appear as lens from a centimetre to several metres in depth.

Prior to surface works, civil construction team should be aware of potential for surface finds of artefacts and avoid impacts to scarred trees.

Procedure

If an object of potential Aboriginal cultural heritage value is uncovered:

1. All work to cease within 10 metres of the suspected find, and the area to be cordoned off using temporary fencing.
2. Site Supervisor is to be immediately notified who will then engage a qualified Heritage Advisor to assess the find and recommend any necessary management measures.
3. Once notified, the relevant Heritage specialists will provide further directions for managing the suspected find, in accordance with legislative requirements and the relevant Cultural Heritage Management Plans where applicable.
4. This may include flagging the discovery, deviating project work around the suspected find or relocating the work front to a new location removed from the suspected find.
5. If the find is determined to be Aboriginal heritage, the Site Supervisor or Heritage Advisor to notify the relevant Heritage Department.
6. Work is not to recommence in the vicinity of the find until direction is provided by the Heritage Department.
7. If the project work cannot deviate around the suspected find for technical or economic reasons and it is necessary to excavate, relocate, remove or harm the suspected find, it will be necessary for Origin to seek the advice and consent of the Traditional Owners for the area as to whether the suspected find is aboriginal cultural heritage, and whether Origin can excavate, relocate, remove or harm the find. If this action is required then there could be considerable delay (one day to several weeks).

4.4 Historical Cultural Heritage

Historic finds can include the following:

- Glass (Coloured glass, bottles (complete or fragmentary etc.)
- Metal (identifiable metallic objects such as cutlery, buckles, farming equipment, woodworking and metal equipment etc.)
- Ceramic (Plates, cups, ink wells, pipes, etc.)
- Wood (identifiable human manufactured wooden items)
- Stone (identifiable human manufactured stone items)
- Bone, Shell and Charcoal (potential historical food waste dumps)

Procedure

The following management measures are recommended for unexpected historic finds:

1. All work to cease within 10 metres of the suspected find, and the area to be cordoned off using temporary fencing.
2. Site Supervisor is to be immediately notified who will then engage a qualified Heritage Advisor to assess the find and recommend any necessary management measures.
3. Once notified, the relevant Heritage specialists will provide further directions for managing the suspected find, in accordance with legislative requirements and the relevant Cultural Heritage Management Plans where applicable.
4. If the find is determined to be of heritage importance, work is not to recommence in the vicinity of the find until direction is provided from the relevant Heritage Department.

4.5 Discovery of Human Remains

If any suspected human remains are discovered during any activity works, they must be initially assumed under the provisions of the relevant *Coroners Act* to be a crime scene and treated accordingly. The following procedure is to be applied:

1. All activity in the vicinity must cease and the Site Supervisor to be notified immediately.
2. The Police must be notified immediately of the discovery by the Site Supervisor or appointed supervisor in charge of the works area.
3. The remains must be left in place and protected from harm or damage with a minimum of at least a 50m buffer. It is important to use best judgement and restrict all movement in the immediate vicinity around the discovery until directed otherwise by the Police as this could contaminate a potential crime scene. Likewise do not set up temporary fencing unless directed by the Police.
4. If the appointed expert investigating the find under the relevant *Coroners Act* believes that there is reasonable grounds to believe the remains to be:
    a. a crime scene, the Police will provide direction on the management of the discovery
    b. Aboriginal ancestral remains or historical remains, the relevant Director Heritage Branch, Department of Tourism and Culture, is to be contacted on (08) 8999 5039 (Darwin office) or (08) 8951 9247 (Alice Springs office) or email heritage@nt.gov.au.

4.6 Aboriginal Heritage Awareness Training

1. Origin staff / contractors conducting project work that may have the potential to harm aboriginal or historic cultural heritage must be aware of their duty to take all reasonable and practicable measures to ensure the project work does not harm any cultural heritage.
2. In addition all Origin staff / contractors undertaking earth disturbance activities that have the potential to harm heritage sites and artefacts shall undergo Cultural Heritage Identification Training to provide them with basic knowledge on the scientific characteristics of Aboriginal heritage and artefacts.
3. Origin staff / contractors must be made aware of the conditions set out in the AAPA Certificate (AAPA C2019/014) and the obligations of all persons (who enter on, or carry out works or use land on which there is a sacred site) under Part IV of the *Northern Territory Aboriginal Sacred Sites Act 1989*.

5. Records

The following records should be kept and maintained in order to demonstrate compliance with the requirements of this procedure:

- Appropriate Forms
- Information Sheets
- Staff Training records.

6. Definitions

Archaeological places or objects e	Archaeological places or objects exist within or in the vicinity of the Origin Permit Areas. All such materials are protected under the Northern Territory Heritage Act.

Aboriginal Cultural Heritage	Has the same meaning as in the relevant Aboriginal Cultural Heritage legislation. It includes pre-settlement and post-settlement significant aboriginal areas and significant aboriginal objects.
Aboriginal Heritage Awareness Training	Training may consist of any of: • Briefings on relevant Aboriginal Cultural Heritage • Briefings on particular arrangements with aboriginal parties • Identification of aboriginal heritage artefacts • Awareness sessions run for Origin staff by traditional owner groups
Burial Sites	Possibility of burial sites located within the Permit Area. Under the Northern Territory Criminal Code it is an offence to interfere with remains of a deceased person. Northern Territory Heritage Act it is an offence to interfere withthe remains of a deceased Aboriginal person without authorization under that Act.
Cultural Heritage Duty of Care	Has the same meaning as defined in Aboriginal Cultural Heritage legislation guidelines applicable to the relevant State in which activities are occurring.
Find	Means a significant Aboriginal object or, evidence of archaeological or historic significance of Aboriginal occupation of an area or Aboriginal human remains, found in the course of undertaking an activity covered by the guidelines.
Traditional Owners	A descendant of the tribe or ethnic group that occupied a particular region before European settlement, as recognised by Australian law.

7. References

1. Aboriginal Cultural Heritage legislation applicable to the Northern Territory
2. Aboriginal Areas Protection Authority Certificate
3. OEUP-1000-PRO-NCH-002 Unexpected Aboriginal Cultural Heritage Find (Traditional Owner Representative Present)
4. OEUP-1000-GDL-NCH-001 The Discovery Management & Handling of Human Remains

8. Appendices

Appendix A Cultural Heritage Audit Checklist (OEUP-1000-FRM-NCH-003)

9. Document information and history

DOCUMENT CUSTODIAN GROUP

Title	Name/s

DOCUMENT AUTHOR

Position	Name
Heritage Consultant	Luke Kirkwood

STAKEHOLDERS AND OTHER CONTRIBUTORS

Position	Name

DOCUMENT HISTORY

Rev	Date	Changes made in document	Reviewer/s	Consolidator	Approver

Appendix A Cultural Heritage Audit Checklist

Cultural Heritage Audit Checklist
OEUP-1000-FRM-NCH-003

Purpose	To ensure the appropriate management of cultural heritage has been undertaken, recorded & maintained in accordance with Origin Energy's procedures, directives, Government statutory requirements & Cultural Heritage Management Plans.
Reference	This form should be used in conjunction with the "Unexpected Aboriginal Cultural Heritage Find (Traditional Owner Representative Not Present)" (OEUP-1000-PRO-NCH-003) and/or the "Unexpected Aboriginal Cultural Heritage Find (Traditional Owner Representative Present)" (OEUP-1000-PRO-NCH-002) procedures.
Records	This document, once completed, will be kept as a record by the Native Title & Cultural Heritage (NTCH) unit and a copy to be retained on Site.
Notes for use:	1. Form to be completed & signed by a Supervisor or a representative from a Traditional Owner group. 2. Form to be reviewed & counter signed by Cultural Heritage Team Leader.

Section 1 - Audit Checklist

Task	Requirement	Compliance Notes	Status
1.	There is evidence that in the event of a suspected find the work crew stopped work in the immediate area of the suspected find while the suspected find was investigated.		
2.	There is evidence that the Appropriate Forms have been completed in the event of a suspected find.		
3.	There is evidence that copies of the Appropriate Forms are maintained by Origin's field based Cultural Heritage Team Leader.		
4.	There is evidence that the project work crew referred any suspected finds to Origin's Heritage specialist.		
5.	There is evidence that in the event that a suspected find could not be avoided, consent to remove / relocate / harm the find was obtained in accordance with statutory requirements and any relevant Cultural Heritage Management Plans.		
6.	There is evidence that Origin staff / contractors have undertaken Heritage Awareness training and/or Heritage Identification training.		

OK - Evidence of requirement in place	NC - Non-conformance
IO - Improvement Opportunity	NA - Not applicable at this site

Section 2 - Approvals

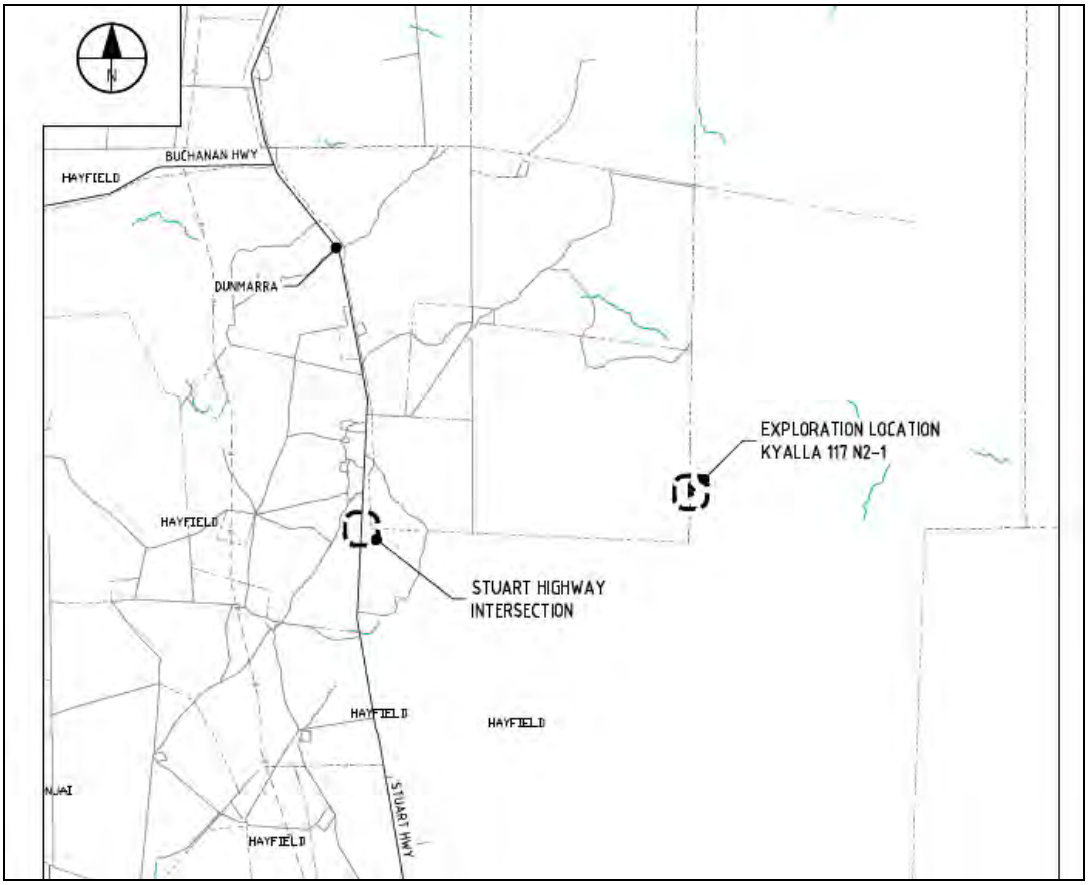
Signature: ..... Date: .....
Name: ..... Position: Supervisor and/or Traditional Owner Representative

Signature: ..... Date: .....
Name: ..... Position: Cultural Heritage Team Leader

Appendix H Trafficwerx NT Traffic Management Plan

TRAFFICWERX NT

building the future together



TRAFFIC MANAGEMENT PLAN

origin

I Chris Boyer (WZ1 #18444) declare that I have designed this Traffic Management Plan on 17/02/2019. The Traffic Management Plan prepared, subject to the variations approved, is in accordance with DIPL Provisions for traffic works within the NT Government Road Reserve and AS 1742.3—2009.

Signature: C. Boyer Date: 17/02/2019

TMP No.	Revision	Date	Author	Description
TWX190066	0	17/02/2019	CB	For submission
TWX190066	1	12/06/2019	CB	TGS 2, 3, 5, 6 & 7 updated

TABLE OF CONTENTS

GLOSSARY

AS	Australian Standard
AS/NZS	Australian and New Zealand Standard
DIPL	Department of Infrastructure, Planning & Logistics
NTG	Northern Territory Government
PCBU	Person Conducting a Business or Undertaking
PWC	Power and Water Corporation
SWMS	Safe Work Method Statement
TGS	Traffic Guidance Scheme
TMP	Traffic Management Plan
WHS	Work Health Safety

1 PURPOSE AND SCOPE

This Traffic Management Plan (TMP) has been developed for Origin Energy to carry out works associated with the Beetaloo Basin Exploration Project.

The works comprise construction of a temporary, site access road to allow project construction and support service vehicles access to the basin exploration drill sites. The access road works are located on the Stuart Highway, 64.5km South of the Hi-Way Inn, Daly Waters. The access road is on the Eastern side of the Stuart Highway, perpendicular to the road. The new access track runs to the southern boundary of Hayfield/Shenandoah Station and northern boundary of Beetaloo Station.

The works are expected to be carried out between April to October 2019, Monday to Sunday including Public Holidays 0600 – 1800.

The Contractor and Subcontractors shall complete the project with the least possible disruption to the flow of traffic. All reasonable attempts shall be made to reduce the impact on road users. The convenience of the public and of residents adjacent to any work site and the protection of persons and property shall be provided at all times. This document is designed to establish efficiencies, consistencies and good understanding of the commitment to safety.

This TMP provides the traffic management procedures to be implemented by Trafficwerx NT during the project. It has been prepared for routine construction and maintenance activities. This document addresses the minimum traffic management requirements for work activities using the diagrams attached at Appendix C. The document has been prepared in accordance with current versions of DIPL Provisions for Traffic and Australian Standard 1742.3—2009 - Manual of Uniform Traffic Control Devices.

1.1 Objectives and Strategies

The objectives of the TMP are to:

- provide for a safe environment for road workers
- provide for a safe environment for all road users
- minimise the disruption, congestion and delays to all road users.

To assist in meeting these objectives the TMP provides information on:

- the Scope of Works
- site conditions
- permissible working times
- procedures and responsibilities
- the traffic management schemes
- the Traffic Guidance Scheme (TGSs).

1.2 Project Overview

ITEM	DESCRIPTION
Project	Beetaloo Basin Exploration Project
Classification	Long – Term Works
Road Authority	DIPL – Road Operations
Local Government	Roper Gulf Regional Council and Barkly Regional Council
Client	Origin Energy
Prime Contractor	Origin Energy
Subcontractor	Arnhem Earthmoving & Mechanical
Traffic Management Subcontractor	Trafficwerx NT Pty Ltd
Scope of Works	<u>Works</u> Origin Energy are to carry out works associated with the Beetaloo Basin Exploration Project. The works comprise construction of a temporary, site access road to allow project construction & support service vehicles access to the basin exploration drill sites. The access road works are located on the Stuart Highway, 64.5km South of the Hi-Way Inn, Daly Waters. The access road is on the Eastern side of the Stuart Hwy, perpendicular to the road. The new access track runs to the southern boundary of Hayfield/Shenandoah Station and northern boundary of Beetaloo Station. <u>Traffic Management</u> Proposed traffic management for the work activities includes installation of Advance warning signage, temporary speed limit restriction and lane closure with work area delineated. Select signage and delineation of work area to remain installed as Aftercare treatment out of work hours and when the site is unattended. Variable Message Signs to be installed prior to works commencement and during the works. **TGS1 – Stuart Hwy, Beetaloo Basin Access Road, Works within 1.2m** **TGS2 – Stuart Hwy, Beetaloo Basin Access Road, Works 1.2 to 3m** **TGS3 – Stuart Hwy, Beetaloo Basin Access Road, Works greater than 3m** **TGS4 – Stuart Hwy, Beetaloo Basin Access Road, Trucks Entering** **TGS5 – Stuart Hwy, Beetaloo Basin Access Road, Works within 1.2m Aftercare** **TGS6 – Stuart Hwy, Beetaloo Basin Access Road, Works 1.2 to 3m Aftercare** **TGS7 – Stuart Hwy, Beetaloo Basin Access Road, Works greater than 3m Aftercare** Refer to the TGSs at Appendix C for details regarding traffic management to be implemented. Specific activities not covered by the attached TGSs (Appendix C) shall be addressed separately. Traffic management design and implementation is by Trafficwerx NT Pty Ltd. Suitability and/or Compliance Audits of this TMP shall not be conducted using an independent Consultant unless so directed by the Road Authority.

ITEM	DESCRIPTION
Staging of Work	Access road construction works to be undertaken as a single stage of the project
Project Date	April to October 2019
Hours/Days of Work	0600 – 1800 Monday–Sunday including Public Holidays
Duration of Work	6 months
Other Constraints	As per DIPL Provisions for Traffic and AS 1742.3—2009.

2 Project Representatives

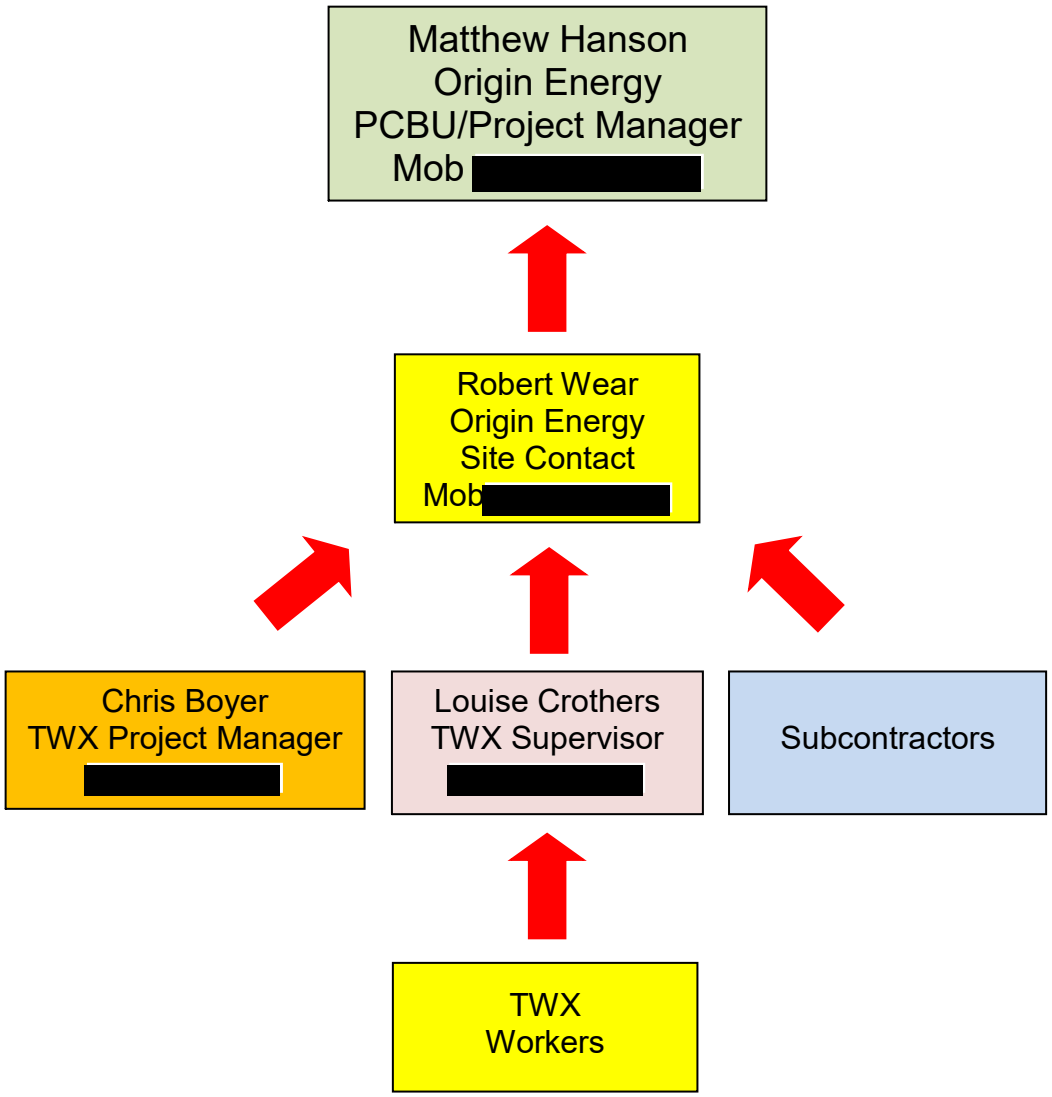
NT Road Authority	DIPL – Road Operations
Stakeholders	NT Government Department of Infrastructure, Planning & Logistics Roper Gulf Regional Council and Barkly Regional Council
Client	Origin Energy Resources Ltd 180 Anne St, Brisbane City, QLD 4000 Ph: 13 24 61
Origin Energy ***Project Manager***	Matthew Hanson [redacted] Mob: [redacted]
Origin Energy ***Construction Supervisor/Site Contact***	Robert Wear Mob: [redacted] Sat: [redacted] Email: [redacted]
Subcontractor	Arnhem Earthmoving & Mechanical Pty Ltd 10 Spencely Rd, Humpty Doo, NT 0836 Ph: 08 8988 5890
Subcontractor ***Project Manager/Site Contact***	Anthony Simpson Mob: [redacted] Email: [redacted]
Traffic Management Subcontractor	Trafficwerx NT Traffic Management PO Box 2587, Parap, NT 0804 Ph: 08 8942 2228 Fax: 08 8941 3528 Email: chris@twxnt.com.au
Trafficwerx NT ***Project Manager***	Chris Boyer Mob: [redacted] Email: chris@twxnt.com.au

Trafficwerx NT WZ1 ***Traffic management designer***	Chris Boyer WZTM 1 Reg. # 18444, exp. 21 DEC 2021 WZTM 2/3 Reg. # 12596/12597, exp. 22 MAR 2020 Mob: [redacted]

2.1 Traffic Management Administration

TMP Design	Trafficwerx NT Traffic Management PO Box 2587, Parap, NT 0804 Ph: 08 8942 2228 Fax: 08 8941 3528 Email: [redacted]
Contact Details	Chris Boyer Mob: [redacted] Email: [redacted]
Traffic Management by	Trafficwerx NT Traffic Management PO Box 2587, Parap, NT 0804 Ph: 08 8942 2228 Fax: 08 8941 3528 Email: [redacted]
TMP Site Inspection by	Chris Boyer Mob: [redacted] Email: [redacted]u Inspection completed 14 February 2019
Site Contacts	Chris Boyer WZTM 1 Reg. # 18444, exp. 21-DEC-2021 WZTM 2/3 Reg. # 12596/12597, exp. 22-MAR 2020 Mob: 0420 416 776 Louise Crothers WZTM 1 Reg. # 22878, exp. 17-JUL-2021 WZ2/3 # 14093/14094, exp. 30-JAN-2021 Mob: 0407 060 476 Cody Dyet WZ2/3 # 21416/21417 exp 1 NOV 2020 Troy McGregor WZ2/3 # 23667/23668 exp 05 DEC 2021 Stephanie May Packwood WZ2/3 # 18738/18739 exp 15 NOV 2021

2.2 Responsibility Hierarchy



2.3 Competencies

Origin Energy have engaged Trafficwerx NT to prepare this Traffic Management Plan and associated controls for the works.

The Contractor shall ensure that at all times during working hours a competent person shall be available at the site to ensure that the TMP requirements are met.

2.4 Responsibilities

All personnel engaged in the traffic management field activities shall follow the correct work practices as required by AS1742.3.

All personnel shall not commence or continue work until all signs, devices and barricades are in place and operational in accordance with the requirements of the TMP.

All personnel responsible for traffic control shall ensure that the number, type and location of signs, devices and barricades are to a standard not less than the TGS of this plan (refer Appendix C) and AS1742.3 (except where specifically detailed in this TMP with reasons for the variations). Should a situation arise that is not covered by this TMP or AS1742.3, the Road Authority Representative shall be notified.

The Road Authority Representative may direct erection, relocation or removal of signs or devices, which, in the opinion of the Road Authority Representative, are not in accordance with the TMP and do not provide sufficient safety for road users.

A Trafficwerx NT WZ2 & WZ3 holder is responsible for completion of the daily traffic diary.

2.5 Senior Management Commitments

Senior Management shall provide evidence of its commitment to the development and implementation of quality Traffic Management by the following:

- Establishing a good Quality Policy through the application of the Trafficwerx NT Quality Management System.
- Ensuring the availability of resources through Toolbox Talks and daily auditing by Trafficwerx NT personnel with WZ2 & WZ3 accreditation.
- Communicating to workers the importance of meeting statutory and regulatory requirements.

Matthew Hanson	Origin Energy PCBU/Project Manager	[redacted]
Robert Wear	Origin Energy Supervisor/Site Contact	
Anthony Simpson	Arnhem Earthmoving & Mechanical Site Supervisor	
Chris Boyer	TWX Project Manager	
Louise Crothers	TWX Supervisor	
Cody Dyet	TWX	
Troy McGregor	TWX	
Stephanie Packwood	TWX	

2.6 Responsibility for Safety at Work Sites.

Supervisory personnel carrying out construction, maintenance or other works that require the use of a traffic guidance scheme should give attention to the following:

- Be mindful of their responsibility to provide, as far as practicable, a safe work place for personnel and plant under their control, and safe and convenient travelling conditions for road users.
- Ensure that all personnel at the work area are aware of their responsibilities and that traffic controllers are appropriately trained and informed of their duties.
- Ensure that personnel under their control are at all times courteous to road users.
- Personel should not allow themselves to become distractedby provocation from menbers of the public.

2.7 Traffic Controller Training Requirements

All traffic control personnel entering a work area are required to have the minimum mandatory training requirements:

- Level 1 – Traffic Management Plan designer (WZ1) for personnel engaged in developing work zone traffic management plans
- Level 2 – Work zone traffic controller (WZ2) with stop/slow bat
- Level 3 – Work zone traffic supervisor (WZ3) for on site road work supervisors engaged in setting up and supervision of work zone traffic
- Level 4 – Escorting mobile road marking operations (WZ4)
- Current drivers licence.

2.8 Adequate Facilites

A person conducting a business or undertaking at a work place must ensure, so far as is practicable, the following:

- An adequate supply of clean drinking water to be provided for all workers - Trafficwerx NT provides as part of PPE bottled drinking water and ice.
- Access to clean toilets must be provided for all workers while at the work place - Trafficwerx NT provides staff breaks and where toilets are not in an accessible location, portaloos are provided.
- Hand washing facilities must be provided to enable workers to maintain good standards of personal hygiene - Trafficwerx NT provides staff breaks and staff are given time to access amenities and toilets. Where these facilities are not in an easily accessible location, crib and portaloos are supplied.
- Workers should be provided with access to hygienic dining facilities for eating meals and for preparing and storing food - Trafficwerx NT provides staff breaks and staff are given time to access amenities and toilets. Where these facilities are not in an easily accessible location, crib and portaloos are supplied.

3 SAFETY PLAN

All persons and organisations undertaking these works or using the roadwork site have a duty of care under statute and common law to themselves, their employees and all site users, lawfully using the site, to take all reasonable measures to prevent accident or injury.

This TMP forms part of the overall project Safety Management Plan, and provides details on how all road users considered likely to pass through, past, or around the worksite shall be safely and efficiently managed for the full duration of the site occupancy and works.

All traffic management works and control devices shall be in accordance with DIPL technical requirements for Works within the NT Government Road Reserve AND Australian Standard AS 1742.3—2009; Manual of uniform traffic control devices.

3.1 Personal Protective Equipment

All personnel entering the work site shall wear high-visibility clothing meeting the requirements of AS/NZS 4602 for Types D, N or D/N. Garments shall be worn by all personnel working in or adjacent to traffic, including traffic at work sites, in quarries and on construction haul roads. The clothing is designed to make the personnel more conspicuous and to warn road users of their presence.

The clothing shall be used as follows:

- For general use by all personnel at a works site – a Type D/N (day/night) garment.

  Note: This requirement covers the contingency that a worker may be required to work in darkness or partial darkness at the beginning or end of a day shift or may be called out unexpectedly at night.
- Where the garment is to be worn during daylight hours only – a Type D (day only) garment.
- Where the garment is to be worn during hours of darkness only – a Type N (night only) garment.

Clothing shall be properly fastened when being worn at a works site so that the entire available area of high-visibility material for each direction of observation can be seen.

3.2 Other PPE

All personnel entering the work site shall correctly wear other personal protective equipment required on a site-by-site basis (e.g. protective footwear, eye protection, safety helmet, sun protection, respiratory devices, safety harnesses, etc.) at all times whilst on the work site.

3.3 First Aid Equipment

The contractor has the primary duty under the WHS act to ensure, so far as is reasonably practicable, that workers and other persons are not exposed to health and safety risks. When undertaking a task the contractor is required to:

- Provide first aid equipment and ensure each worker at the work place has access to the equipment
- Ensure access to facilities for the administration of first aid
- Ensure that an adequate number of workers are trained to administer first aid at the work place or that workers have access to an adequate number of other people who have been trained to administer first aid.

3.4 Fatique Management Controls

The guiding principals for fatigue management include, but are not limited to, the below.

Workers should be in a fit state to undertake work by all of the following:

- Being given appropriate time to plan and prepare for a working period involving long shifts
- Presenting in a fit state for work and must be free from alcohol and drugs
- Being adequately rested before starting work
- Avoiding unfamiliar or irregular work rosters
- Being medically fit and should have regular assessments by medical practitioners
- Having access to lifestyle information and councelling where necessary to assist in presenting in a fit state for work.

3.5 STOP/SLOW Bat

A STOP/SLOW bat (R6-8/T7-1) shall be used by traffic controllers to control traffic at any temporary obstruction or hazard. For night-time operations, an illuminated wand should be used in conjunction with the bat.

3.6 Radio Communications

Portable two-way radios shall be used for communication between traffic management personnel.

Any personnel controlling construction traffic shall do so with the aid of portable two-way radios.

3.7 Mobile Phones

Traffic controllers shall not, under any circumstance, use mobile phones whilst actively controlling traffic.

Contractors and subcontractors shall observe their own company policy with regards to the use/possession of mobile phones at work sites.

3.8 Facilities Required to Prevent Slips, Trips and Falls

The worksite and its immediate surroundings shall be suitably protected and free of hazards which could result in slipping, tripping or falling by non-motorised road users. Hazards which cannot be removed shall be suitably protected to prevent injury to road users, including those with sight impairment. Where level differences are significant, suitable barriers which prevent access shall be used.

The worksite shall be kept tidy to reduce the risk to workers. Where level differences are significant, suitable barriers which prevent falls shall be installed.

3.9 End of Queue Collisions

End of queue protection shall be provided whenever a stationary queue is likely to extend to a point less than 'D' beyond the Prepare To Stop associated with the active traffic control by applying the following:

- Where the maximum queue length can be predicted in advance, the primary Prepare to Stop sign shall be located so that the distance from this sign to the end of the queue is never likely to be less than 'D'.
- A second traffic controller can be employed to shift the Prepare to Stop sign and the Roadwork Ahead sign as necessary to maintain its minimum required distance in advance of the end of queue.
- Advance warning using variable message signs should also be implemented where practicable.
- All other advance and position signs required for the work site shall be located at the distance otherwise specified from the start of the work area.

3.10 Incident/Accident Procedures

In the event of an incident or accident, whether or not involving traffic or road users, all work shall cease and traffic shall be stopped as necessary to avoid further deterioration of the situation. First Aid shall be administered as necessary, and medical assistance shall be called for if required. For life threatening injuries an ambulance shall be called on 000. A Site Accident Action Checklist is provided at Appendix A to assist the site traffic management Team Leader to record initial details and report to the WZ1 Manager.

Details of all incidents and accidents shall be reported to the site supervisor and project manager and Trafficwerx NT using the Incident/Accident Report Form at Appendix A.

Any traffic crash resulting in injury shall immediately be reported to the NT Police Service, Ambulance (Appendix B) and NT Work safe on 1800 019 115.

Any traffic crash resulting in injury shall immediately be reported to the NT Police Service, Ambulance and NT Work safe on 1800 019 115.

Notifiable accidents and incidents shall be reported to NT Work Safe by calling 1800 019 115.

Contact details for emergency services are as follows:

Emergencies	000
Police	131 444
Fire	000
Ambulance	000

Emergency Services have been notified of proposed works and have been provided with contact details for relevant personnel:

Origin Energy Site Supervisor – Robert Wear, Mob: 0467 679 003

3.10.1 Vehicle Breakdown within Site

Broken down vehicles and vehicles involved in minor non-injury causing crashes shall be temporarily moved to the verge as soon as possible after details of the crash locations have been gathered and noted. Where necessary to maintain traffic flow, vehicles shall be temporarily moved into the closed section of the work area behind the cones, providing there is no risk to vehicles and their occupants or workers. Suitable recovery systems shall be notified to facilitate prompt removal of broken down or crashed vehicles. Assistance shall be rendered to ensure the impact of the incident on the network is minimised.

Details of all incidents and accidents shall be reported to the site supervisor, project manager and Trafficwerx NT using the Incident/Accident Report Form at Appendix A.

Notifiable accidents and incidents shall be reported to NT Work Safe by calling 1800 019 115.

3.10.2 Remote and Isolated Workers

The contractor must ensure that systems are in place to eliminate or minimse WHS risks to workers engaged in remote or isolated work by implementing the following measures:

- Providing effective communication tools and devices for workers performing remote or isolated work
- Providing safe systems of work, including developing Safe Work Method Satetments, travel itineries, emergency procedures and training in the use of emergency equipment
- Providing advice, information, training, instruction or supervision that is necessary to protect all persons from risk to their health and safety, arising from isolated or remote work
- Ensuring the conditions at the workplace are monitored for the purpose of preventing illness or injury to workers.

3.10.3 Serious Injury or Fatality

In the case of serious injury or fatality occurring within the traffic control zone all work shall cease immediately, machinery and vehicles turned off and the area cleared of personnel as soon as possible. Traffic Controllers (and other personnel if necessary) shall be deployed immediately to ensure no traffic or other road users approach the area.

Emergency services shall be notified of the incident and all road workers and traffic management personnel shall preserve the scene leaving everything in situ, until direction is given by Police or NT WorkSafe.

A site specific detour route and/or road closure point shall be determined, signed and controlled by traffic management personnel and advised to Police, who shall take charge of the site upon arrival. Detour routes shall be determined so as to cater for all types of vehicles required to use them.

All site personnel shall be briefed on control procedures covering incidents and crashes that result in serious injury or fatalities.

3.10.4 Procedures for Reporting to NT WorkSafe

Under the Work Health and Safety (National Uniform Legislation) Act 2011, it is a requirement to notify NT WorkSafe if certain incidents occur at the work place.

A person conducting a business or undertaking (PCBU) is required to contact NT WorkSafe immediately after becoming aware of a notifiable incident at their workplace.

Refer to Appendix A for Trafficwerx NT Incident/Accident Form.

Notification to NT WorkSafe must be carried out by the fastest means by either:

- Calling 1800 019 112
- Completing the appropriate Incident Notification Form and:
    - Faxing it to 8999 5141
    - Emailing it to ntworksafe@nt.gov.au

3.10.5 Record of Site

Digital images that are date and time stamped are to be taken of the site prior to the commencement of works. The images are to be stored by the applicant for 6 months after the completion of works and are to be available to DIPL upon request if required.

3.10.6 High Risk Construction Work

Any persons or organisation undertaking high risk work must ensure that the SWMS are developed for all high risk construction work prior to work commencing, and that any works are carried out in accordance with the SWMS.

3.10.7 Traffic Management Review

The principal contractor for a construction project must review and as necessary revise the Traffic Management Plan to ensure that it remains up to date.

They must ensure, so as is reasonably practicable, that each person carrying out works in connection with the project is made aware of any revisions in connection with the Traffic Management Plan.

Once a revision of the TMP has been made a copy shall be sent to relevant authorities for appraisal.

3.11 Notification

The key to safe and successful traffic management planning is communication. This includes communicating with major stakeholders and other parties that may be directly affected by the works.

In accordance with the Permit to Work within the NT Government Road Reserve and Relevant Local Government Authority, all stakeholders affected by the works shall be notified prior to the commencement of operations.

Origin has made contact with affected Station Managers in the area of operations, and has been granted permission to access the site.

The traffic management subcontractor may need to notify the following agencies of any significant traffic disruption as the works require:

- Department of Infrastructure, Planning & Logistics (DIPL)
- Local Council
- Local Emergency Services
- Local Police
- Public Transport Division
- Any other agency as the work site location requires.

Other affected parties may include:

- the general public
- local residents and/or businesses.

Notification may take the form of any of the following:

- NT News advertisement
- Community notices
- Local area letter drop
- Direct contact
- Group letter/fax
- Variable Message Signs.

Variable Message Signs (VMS) shall be installed on the Stuart Hwy at both approaches to the work area, 3 days prior to works commencing and a minimum of 2 days before any changes are made to existing traffic conditions during the works.

VMS messaging shall be implemented in accordance with DIPL advice for pre works and during works.

4 GENERAL ENVIRONMENTAL CONTROLS

4.1 Site Control

The contractors shall not form any new tracks, alter any existing tracks, erect any camps, remove any trees or shrubs, cut any fences or water, sewer, power or telecommunications lines or perform other activities not specified or indicated in this TMP or the project drawings without the prior approval of the Site Supervisor.

4.2 Site Clearing

The contractors and subcontractors shall not destroy, damage, remove or clear vegetation to an extent greater than is necessary for the execution of the works. Clearing shall not be carried out without the prior written approval from the relevant authority.

4.3 Fires

The contractors and subcontractors shall not light fires under any circumstances whatsoever without the prior written approval of the relevant authority. Where fires are accidentally started, it is the responsibility of the contractor to extinguish the fire.

4.4 Waste Material

The contractors and subcontractors shall comply with the requirements of the Waste Management and Pollution Control Act. All waste materials, including green waste, food scraps and the like, construction waste, chemicals and effluent shall be removed from site and disposed of in an appropriate manner at a place that can legally accept the waste.

All refuse and waste materials shall be handled in a manner so as to confine the material completely and prevent dust emission.

4.5 Solid, Liquid and Gaseous Contaminants

The contractors and subcontractors shall take responsibility for the proper disposal of all solid, liquid and gaseous contaminants in accordance with statutory and contractual requirements, including the provisions of this section.

Liquid paint materials or other hazardous materials shall not be disposed of by flushing down any sewer, storm water system or natural waterway.

4.6 Volatile Substance Abuse Prevention Controls

Under the Volatile Substance Abuse Prevention Act, contractors must ensure the safe and responsible use of volatile substances:

- Use low aromatic fuel when and where available
- If low aromatic fuel is not available use a lockable fuel cap or diesel powered equipment
- Secure inhalants and fuel-powered equipment
- Lock up areosols, glue and other substances that may be abused
- Remove or safely dispose of all glues, paints aerosols and other inhalants when leaving the community.

4.7 Fumes

The Prime Contractor expects that vehicles shall comply with emissions regulations and shall not generate excessive fumes. Conditions shall be monitored and appropriate recovery breaks, away from the effects of the fumes, shall be provided if necessary.

4.8 Noise Control

All practical precautions shall be taken to minimise noise resulting from the work activities. Construction equipment shall be fitted with noise suppressing devices, where possible, so that noise is minimised.

4.9 Preservation of Visual Values

The visual amenity of adjacent land owners shall be maintained at all times during the works. The work site shall be kept neat and tidy at all times.

4.10 Air Quality

All emissions of smoke, dust, and other substances into the atmosphere shall be minimised in accordance with the Waste management and Pollution Control Act.

5 MANAGING ENVIRONMENTAL CONDITIONS

5.1 Weather

Works are being conducted during the day. Generally, weather is extremely hot during the day and workers need to ensure they drink enough fluids throughout the shift.

Should adverse weather conditions be encountered during the works, the following contingency plans should be activated. Any adjustments to this TMP shall be risk assessed and approved by the WZ1 planner.

5.2 Rain

In the event of rain, an on-site assessment shall be made and sign spacing and tapers may be extended by 25% to account for increased stopping distances.

All changes shall be recorded in the Daily Diary for Roadworks (Appendix A).

5.3 Flooding

In the event of the road flooding due to heavy rain and the situation is deemed unsafe, it shall be necessary to cease works and install road condition signage until conditions return to normal.

All changes shall be recorded in the Daily Diary for Roadworks (Appendix A).

5.4 Fog/Dust/Smoke

Where sight distances are significantly reduced below 1.5D by fog, dust, smoke or similar and it is deemed unsafe by the client, it may be necessary to cease works until conditions return to normal.

All changes shall be recorded in the Daily Diary for Roadworks (Appendix A).

5.5 Wind

Signage and delineation may require additional weighting, placement of sandbags or similar, for stabilisation during periods of high wind.

5.6 Lightning

Lightning strikes are a common occurrence in the Northern Territory during the wet season.

Contractors and subcontractors shall be aware of approaching storms with the potential for lightning and shall take appropriate action in preparation to cease work and stand down traffic management personnel temporarily from their duties to seek appropriate protection.

5.7 Heat and Humidity

Extremes of heat and humidity are experienced in the Northern Territory especially during the “Wet Season” between the months of October and April however there is no single factor such as a “maximum allowable temperature” which should be applied in a workplace as a “cease work” limit.

Excessive heat is expected as works are performed throughout the shift during the transition from the wet to dry/dry to wet season. Employees need to ensure that they are drinking enough fluids.

Should temperatures rise and become excessive whilst traffic management personnel are conducting operations, they should be relieved more frequently than when operating under normal conditions.

5.8 Sunglare

The visibility of a sign, vehicle mounted warning device, delineation devices, traffic controller position, etc., can be affected by the direction of the sunlight, including background conditions. Traffic control personnel shall consider the prevailing sunlight conditions when positioning traffic control devices and themselves, to minimise the adverse effects of sunglare.

All changes shall be recorded in the Daily Diary for Roadworks (Appendix A).

5.9 Shadows

Trees along the verge may cast shadows. All signs shall be regularly inspected and re-positioned as required to reduce the effects of shadows.

All changes shall be recorded in the Daily Diary for Roadworks (Appendix A).

5.10 Structures

There are no existing structures affecting sight lines or access, or which shall affect works processes.

5.11 Terrain

The road geometry of the surrounding road network at the work site location is generally straight and relatively even and does not present any impediment to traffic management requirements. There are no grades that affect deceleration or acceleration of vehicles.

5.12 Vegetation

There is existing vegetation along the roadway in the vicinity of the work area however the vegetation is well back from the road verge and should not affect sight lines of road users.

Traffic control personnel shall consider the existing vegetation when positioning traffic control devices and themselves, to ensure sight lines of road users are not obscured.

All changes shall be recorded in the Daily Diary for Roadworks (Appendix A).

5.13 Existing Traffic and Advertising Signage

There is no existing traffic and advertising signage on the road verge or near the work area that affects the works or traffic management requirements.

6 TRAFFIC ENVIRONMENT

6.1 Traffic Volume and Composition

Northern Territory Government Department of Infrastructure, Planning and Logistics, Transport and Civil Services Division Annual Traffic Report (2017) indicates that traffic volume is 551 vpd travelling on the Stuart Hwy at a point 20km North of Elliott (Refer to Appendix H).

Traffic is considered Low-volume and consequently no significant congestion is expected under normal operating circumstances.

Traffic Control and works personnel shall monitor traffic conditions throughout the works and adjust traffic control measures and works methodology where required to ensure minimal disruption to road users. All changes shall be recorded in the Daily Diary (Appendix A).

Traffic management measures have been developed with consideration of the volume of vehicles through the area including heavy vehicles, to ensure disruption to road users is minimised during the works.

6.2 Existing Speed Restrictions

The existing speed limit on the Stuart Hwy at the area of works is 130km/h.

The operating speed (85th percentile) has been estimated to be no greater than the original posted speed limit.

7 PROVISION FOR TRAFFIC

7.1 Proposed Speed Restrictions

Proposed traffic management treatment includes lane closure with active traffic control requiring temporary speed restriction to 60km/h on the Stuart Hwy (workers within 1.2m of traffic) during the works.

7.2 Lane Widths

Minimum traffic lane widths of 3.5m shall be maintained at all times.

7.3 High/Wide Loads

Traffic/Works personnel are to aid high/wide loads passing through the work area when required. This may include stopping work and moving delineation as required for safe passage through the work area.

7.4 Impact on Adjoining Network

Road users travelling on side roads in the immediate vicinity of works being conducted may experience minor delays. Works and traffic management in these areas shall be conducted so as to ensure minimal delays and congestion is experienced.

7.5 Motorised Traffic

Advance warning signage, temporary speed restriction and lane closure with active traffic control to direct road users safely past the worksite to be installed as per the TGSs and work related task (refer to Appendix C).

7.6 Non-Motorised Road Users

Consideration of other road users such as cyclists, pedestrians and the disabled shall be made at all times during the implementation of this TMP. Onsite personnel shall be instructed to watch for non-motorised road users and to render assistance as and where required to ensure their safe passage around/through the site.

The worksite and its immediate surroundings shall be suitably protected and free of hazards which could result in slipping, tripping or falling by non-motorised road users. Hazards which cannot be removed shall be suitably protected to prevent injury to road users, including those with sight impairment. Where level differences are significant, suitable barriers which prevent access shall be used.

7.7 Public Transport

Public transport is not affected by the works. The Public Transport Network Supervisor shall not require notification.

7.8 School Crossings

There is no school crossing in the vicinity of the works and as such there is no impact on the traffic management requirements or the works.

7.9 Worksite Access

All traffic control personnel shall complete site specific work induction prior to having worksite access.

Works vehicles, plant and personnel entering and leaving the worksite shall do so at designated locations to be determined on site in accordance with project procedures and safe work practices.

Observers shall be used for any personnel crossing roads. Site access requirements shall be discussed with all site personnel at the daily project Tool Box Talk meeting (Appendix A).

Works personnel are to give way to all road users and proceed with extreme caution whilst entering/exiting the worksite or crossing active traffic lanes (Appendix F).

Traffic controllers are to assist safe passage of works vehicles, plant and personnel entering and leaving the work area where required.

7.10 Existing Parking Facilities

All construction traffic not in use is to be parked out of road work zones. Parking is permitted only in designated areas on site to be outlined in the Toolbox Talk meeting prior to works commencing (Appendix A).

7.11 Access to Adjoining Developments/Properties

Access to adjoining properties shall be provided at all times during the implementation of this TMP.

7.12 Contingencies

All contractors and subcontractors are to return the roadway to normal condition in the event of inclement weather from cyclonic conditions. All work personnel are to be informed of evacuation procedures and muster points in the case of an emergency (Toolbox Talk Appendix A).

7.13 Special Events and Other Works

Whilst traffic management signage and equipment to be installed for this project is considered adequate to cater for safe guidance of road users during most special events, Traffic Controllers may be required to assist traffic flow at these times.

Other works underway in the vicinity of the site of works to be conducted under this project may impede the set-out of the proposed traffic management treatment.

If this TMP is considered inadequate or unsafe for implementation during an identified special event or in the vicinity of other works, the nominated WZ1 plan designer must be contacted. The WZ1 plan designer shall reassess the proposed traffic management and advise adjustments if required. Any variation to the TMP shall be recorded in the Daily Diary (Appendix A).

7.14 Night Work Provisions

Work is to be completed during daylight hours from 0600-1800.

7.15 Railway Sites

Work is not being conducted within a railway site location.

7.16 Unattended Worksite

Roadway aftercare treatment shall be installed out of work hours and when the site is unattended. Refer to TGSs at Appendix C regarding aftercare treatment details.

8 EMERGENCY ARRANGEMENTS

8.1 Emergency Services

Regulations require full and uninterrupted access to the site by emergency services for emergency situations. Emergency services shall have continual access to all properties and the worksite, hence no specific facilities are required.

Works personnel shall assist emergency vehicles requiring entry and/or travelling through the worksite.

Emergency services shall not be affected by the works, but shall be notified in writing as a courtesy (Appendix G).

8.2 Emergency Planning

Regulations require full and uninterrupted access to the site by emergency services for emergency situations. Emergency services shall have continual access to all properties and the worksite, hence no specific facilities are required.

Works personnel shall assist emergency vehicles requiring entry and/or travelling through the worksite.

8.3 Emergency/Hazardous Conditions

Emergency Services are to be notified where a hazard occurs that may affect road users travelling through the area. Traffic controllers may be required to reduce speed and actively control traffic until emergency services arrive, if a hazard occurs in the path of traffic.

8.4 Dangerous Goods

NT legislative requirements to be complied with when carrying dangerous goods. Records of dangerous goods carried to be kept. NTPFES (Northern Territory Police Fire & Emergency Services) informed about the movement of dangerous goods. Contractors are to provide a list of all dangerous goods to be moved to emergency services, which is to be updated on a regular basis.

For any work site that is located directly adjacent to a facility containing dangerous goods (i.e. a fuel service station), the regulations require full and un-interrupted access to the site by emergency services for emergency situations.

8.5 Damage to Services

In the event that any utilities (i.e. gas, water, electricity) services are damaged, all work shall cease immediately, machinery and vehicles turned off and the area cleared of personnel as soon as possible. Traffic Controllers (and other personnel if necessary) shall be deployed immediately to ensure no traffic or other road users approach the area. The Police Service and relevant supply authority shall be called immediately. Damage to any other services shall be treated in a similar manner except that machinery may remain operational and access may be maintained where it is safe to do so.

All site personnel shall be briefed on evacuation plans and muster area location prior to any works commencing (Toolbox Talk, Appendix A).

8.6 Failure of Services

8.6.1 Failure of Street Lighting

Not applicable to this TMP.

8.6.2 Failure of Power

Not applicable to this TMP.

8.6.3 Failure of Traffic Signals

Not applicable to this TMP.

8.6.4 Failure of Rail Crossing Signals

Not applicable to this TMP.

9 TRAFFIC CONTROL DEVICES

9.1 General

The location of all existing services, utilities and infrastructure of DIPL and other Authorities in the vicinity of the works shall be undertaken prior to any signage being installed taking steps to protect personnel, equipment, infrastructure, utilities and services that are located in the area. Report immediately any damage caused to any existing services, utilities or infrastructure to DIPL and the relevant Authority (Appendix A).

9.2 Devices in Use

Traffic Control devices shall be in accordance with the TGSs submitted for the works.

Should the use of additional or a reduced number of devices be required (not shown on the TGS) due to unforseen needs, they shall be recorded within the Daily Diary for Roadworks as a variation to the TMP, following prior approval from the WZ1 plan designer (Appendix A).

9.3 Equipment Standards

All signs shall be selected and installed in accordance with AS 1742.3—2009 and manufactured in accordance with AS 1743. Signs shall be installed with 1m lateral clearance from the travelled path with a minimum of 200mm from the lower edge of the sign to the ground. Posted signs (i.e. speed signs) shall be installed with 1m lateral clearance from the travelled path with a minimum of 1.5m from the lower edge of the sign to the ground.

All road signs are to be used with approved stands or erected on posts set into the ground, where permitted by the relevant authorities.

All signs are placed in the most advantageous position, having regard for the nature of the hazard and the warning being conveyed, to provide the maximum visual impact for approaching drivers. The Symbolic Worker sign shall also be fluorescent.

Prior to installation, all signs shall be checked for damage and cleanliness and repaired, replaced or cleaned as necessary.

Cones and bollards shall be used in accordance with the TGSs to delineate traffic flow and to provide clearance between the traffic stream and work areas. Traffic Cones shall be at least 700mm high, fluorescent red and fitted with a Class 1 retroreflective band. Alternatively fluorescent red Bollards with a Class 1 retroreflective band may be used.

All works vehicles shall be fitted with rotating flashing yellow lights in accordance with AS 1742.3–2009 clause 3.12.1.

9.4 Approach Speed

The operating speed (85th percentile) on Stuart Hwy has been estimated to be no greater than the original posted speed limit, consequently distance 'D' is derived from the posted speed limit at the location of the work area which is 130km/h.

9.5 Device Spacing

Spacing is set out in accordance with the requirements of AS1742.3–2009 and DIPL Provision for Traffic unless an identified impediment exists at the location of the works to be conducted.

Adjustments to sign and device positioning and spacing may be implemented on site as required to ensure appropriate visibility to road users. All treatment positioning adjustments that vary from those depicted in the TGSs must be approved by the project WZ1 plan designer and then recorded in the Daily Diary for Roadworks (Appendix A).

9.6 Protection of Excavations

The table below indicates AS 1742.3—2009 requirements for protection of excavations.

Protection/Delineation Adjacent to Excavations					
Speed of Traffic (km/h)	**Traffic Volume (vpd)**	**Clearance to Excavation (m)**	**Protection Required (Standard delineation = 12m device spacings, Close delineation = 4m device spacings)**		
			Depth of Excavation (mm)		
			50 to 250	**260 to 500**	**>500**
<70	All	<2.5	Standard delineation	Close delineation	Safety barrier
		2.5 to 5.0	Standard delineation	Standard delineation	Close delineation
		>5.0	None	None	None
≥70	≤1500	≤5.0	Standard delineation	Close delineation	Safety barrier
		>5.0	None	None	None
	>1500	≤6.0	Standard delineation	Close delineation	Safety barrier
		>6.0	None	None	None

All excavations are to be backfilled on completion of the days works or steel plated and/or temporary fenced whilst left unattended.

9.7 Setting Up and Dismantling

Setting up of the traffic management signage and equipment shall be carried out starting at the sign furthest from the work area moving progressively toward the work site before installing delineation devices. Dismantling shall be carried out in the reverse order. A 'shadow vehicle' with twin rotating flashing yellow lamps, in accordance with AS 1742.3—2009 clause 3.12.1, shall be used at all times to protect workers setting up and dismantling the traffic management equipment.

> *Note*: Vehicle-mounted warning devices are approved under the Northern Territory Traffic Regulations. These devices shall not be used outside the limits of the road works.

Devices no longer required shall be promptly and completely removed from road users lines of sight in the reverse order to installation.

10 TMP DOCUMENTATION REQUIREMENTS

10.1 Approvals

This Traffic Management Plan shall comply with the necessary approvals as required:

Road Authority

This TMP shall be submitted with the road authority DIPL – Road Operations pending approval.

10.2 Legal and Other Requirements

The Contractor recognises that the traffic management plan has been developed and shall be implemented with due consideration and in accordance with the following legislative, environment and industry standards where applicable:

- Work Health and Safety (National Uniform Legislation) Act and Regulations
- Traffic Act and Regulations
- Control of Roads Act
- Local Government Act
- DIPL Permit to Work
- AS 1428; Mobility and access standard for people with disabilities
- AS 1742.3; Traffic control for works on roads
- NT Environmental Protection Authority (EPA)
- Utility Providers Code of Practice (where required).

The Contractor shall ensure that the requirements of these documents and other relevant information shall be monitored and the Traffic Management Plan adjusted to meet changing requirements where necessary.

10.3 Variations to Standards and Plans

There are no variations in this TMP to the DIPL Provision for Traffic and AS 1742.3—2009 (except where expressly overridden by the Provision for Traffic).

On-site variations, if required, shall generally only be made following approval by the NT Road Authority and recorded in the Daily Diary for Roadworks (Appendix A).

Significant variations to this TMP shall not be carried out without prior consultation with the designer. However, minor adjustment to suit site and work requirements are recommended, with the changes recorded in the appropriate documentation.

In emergency situations, on-site variations shall be made and recorded in the Daily Diary, and the NT Road Authority Contact notified as soon as practicable.

Any future variations to be documented in the Daily Diary for Roadworks, TMP designer to be notified and revised Traffic Management Plan to be submitted to the NT Road Authority Contact as soon as practicable.

10.4 Audit Provisions

This TMP is in accordance with DIPL Provision for Traffic, and it should normally be subjected to a suitability audit by an independent Senior Road Safety Auditor.

Due to the nature of the works, one compliance audit shall be conducted following installation of the traffic management devices and prior to commencement of the works, in accordance with DIPL and Local Government Authority specifications.

Audit findings, recommendations and actions taken shall be documented and copies forwarded to the Project Manager.

10.5 Records

This TMP shall be discussed with all parties involved before implementation. Regular debriefs and feedback shall be encouraged by functional managers to be carried out to ensure the relevance of this TMP document to the contractor's current activities.

The Daily Diary for Roadworks and Daily Inspection Sheet shall be completed by the site Traffic Management Supervisor. All variations to the TMP/TGS, non-conformances, incidents and accidents shall be recorded. Copies of the completed report shall be forwarded to the Project Manager by the Site Supervisor.

Inspections may be carried out periodically throughout the duration of the works.

All activities on site in relation to the implementation and maintenance of this TMP shall be recorded in the Daily Dairy for Roadworks (Appendix A).

The Daily Inspection Sheet is provided at Appendix A. One sheet per report/inspection should be used, with the relevant sections completed.

11 RISK MANAGEMENT

In order to clearly understand the risks associated with the traffic environment and determine the manner in which identified hazards shall be managed, the following schedule outlines the risk management process undertaken for traffic issues associated with the work activities. The risk assessment process has been undertaken in accordance with Australian Standard AS/NZS ISO 31000—2009, Risk Management.

The risk assessment assumes the worst most likely outcome should the risk event occur. Assessment of likelihood is based on the assumption that no risk control is in place - that is, it defines the risk that would be expected to be associated with the project should no traffic management be undertaken. This is known as pure risk.

The Risk Treatments proposed are based on evaluation of the risks associated with specified events and application of the appropriate control measures necessary to bring risk levels to a point that is "As low as is reasonably practicable" (ALARP).

Risk Treatments shall be based on the Hierarchy of Control. The Hierarchy of Control forms a tiered approach to the management of workplace hazards. Each control principle is listed in descending order according to its effectiveness:

- **Elimination of the hazard** e.g. divert traffic away from the work area or for hazards associated with high volumes, undertake work at times of low volumes.
- **Substitution of the hazard** e.g. undertaking drainage/service works using trenchless technology.
- **Management of the risk by Engineering Controls** e.g. placement of safety barriers, the use of physical devices that reduce speed, temporary traffic signals, reverse alarms, flashing lights, delineators, etc.
- **Management of the risk by Administrative Controls** e.g. signage, variable message boards, safe work procedures for workers around mobile plant, procedures for placement of signage under traffic, induction and communication procedures.
- **Personal Protective Equipment** e.g. use of high visibility vests.

This TMP meets the 'minimum' requirements of the DIPL Standard Specifications, Provision for Traffic; meaning there is no requirement for an external Risk Assessment to be undertaken by an independent consultant unless so directed by the NT Road Authority.

Risk analysis of the proposed works has identified a number of risk events/items that shall be managed by effective traffic management planning and the implementation of this TMP. A risk analysis table is attached at Appendix B.

All identified risks have been treated by development of this TMP. Unforseen risks arising during the works shall be treated in accordance with standard work practices and procedures where appropriate.

The highest priority risk item has been determined as contractor to conduct works within 1.2m of the traffic travel path leading to unsafe conditions for workers and road users. Proposed traffic management measures to manage this risk include installation of Advance warning signage, temporary speed limit restriction and lane closure with active traffic control. Refer to TGSs at Appendix C for traffic management scheme to be implemented to manage this risk item.

Traffic management design is by Trafficwerx NT Pty Ltd. Compliance Audits of this TMP shall not be conducted using an independent Consultant unless so directed by the Road Authority.

12 REFERENCED DOCUMENTS

- NT Traffic Act
- NT Control of Roads Act
- Workplace Health and Safety (National Uniform Legislation) Act
- Workplace Health and Safety (National Uniform Legislation) Regulations
- DIPL Technical Requirements for Works Within the NT Government Road Reserve
- Australian Standard AS 1742.3—2009; Manual of uniform traffic control devices – Traffic control for works on roads
- Australian Standard AS/NZS 4192; Illuminated flashing arrow signs
- Australian Standard AS/NZS 4602; High visibility safety garments
- Australian Standard AS/NZS ISO; 31000-2009; Risk management
- Australian Standard AS/NZS 1906.1; Retroreflective materials
- Australian Standard AS 4191; Portable traffic signals
- NT WorkSafe; All relevant bulletins
- Northern Territory Government Department of Infrastructure, Planning and Logistics, Transport and Civil Services Division Annual Traffic Report (2017)
- Traffic Guidance Scheme's (Appendix C).

13 APPENDICES

Appendix A **Trafficwerx NT Jobcard**

Appendix B **Risk Analysis Table**

Appendix C **Traffic Guidance Schemes**

Appendix D **Sign and Equipment Manifest**

Appendix E **Certificate of Currency of Public Liability Insurance**

Appendix F **Procedure for Entering/Exiting Traffic**

Appendix G **Agency Notification**

Appendix H **Traffic Volume/Composition Count Data**

Appendix I **DIPL - Temporary Access Approval**

Appendix J **Temporary Speed Limit Authorisation**

Appendix K **Project Documentation**

Appendix L **Safe Work Method Statement**

Appendix M **Traffic Control Licenses**

Appendix N **TMP Completion Checklist**

13.1 APPENDIX A Trafficwerx NT Jobcard

TEAM LEAD IS RESPONIBLE TO ENSURE THAT THE CLIENT UNDERSTANDS WHAT THEY ARE SIGNING FOR

Trafficwerx NT Jobcard

Time is charged from departure at Trafficwerx NT depot to return at Trafficwerx NT depot

Client Name: _____ Day: _____

Job Location: _____ Date: _____

Road Authority: _____

Client Start: _____ Client finish: _____

Client MUST SIGN: _____ Client MUST SIGN: _____

Client MUST PRINT NAME: _____

Permit / Approval		*Temporary Speed Limit Authorisation (TSLA)*	
Traffic Guidance Scheme's (TCD's)		*Personal Protective Equipment (PPE)*	

VEHICLE RECORDS

REGO	DRIVER	START KM	FINISH KM
TWX	To:		
	From:		

Ring name below (if any issues on site)

TEAM LEADER:	*WZ MANAGER:*

			OFFICE USE ONLY		
Traffic Controllers	**Start**	**Break**	**Finish**	**Total**	**Office Use**
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Notes:	**Government/Council/Visitor on site:** **Name of person:** **Company name:** **Phone Number:**

This is not a Tax Invoice

**PLEASE FILL IN ALL RELEVANT SECTIONS & DATE & INTIAL NON/RELEVANT SECTIONS N/A

Tool Box Talk Items

- Where implemented, all Traffic Management (TM) staff MUST attend Prime Contractor and/or site Stakeholder daily meeting/toolbox talk and/or site induction.
- All Traffic Management (TM) staff are to familiarise themselves with the Prime Contractor project/site evacuation plan and muster area location where available. Where this information is unavailable the TM Team Leader SHALL advise all site TM staff of the proposed evacuation plan and muster area location for the work site.
- TM staff SHALL have a pre-planned escape route at all times during the works and be aware of their surroundings in the work environment.
- TMP and Traffic Guidance Scheme (TGS) requirements are explained clearly to all TM staff and any TMP or TGS changes during the works are communicated to TM staff and acknowledged.
- Expected TM staff and works personnel responsibilities/duties whilst works are in place are communicated.
- Concerns over safety of the implementation of the TMP/TGS requirements during installation and pull-down of signage, devices and delineation MUST be directed to the Team Leader immediately.
- Any personal heat stress or other safety concerns MUST be directed to the Team Leader immediately.
- Any Outsider communication regarding the works or the site is to be referred to the Team Leader in the first instance and then the WZ1 Manager.
- Employees SHALL conduct themselves in a professional manner at all times - do not allow the public to provoke you.
- Employees are required to correctly wear/use required Personal Protective Equipment (PPE), i.e. steel capped footwear, high visibility day/night vests, hard hats (if required), wide-brimmed hats, radios & night wands when directing traffic during periods of poor visibility or night works, etc.

By signing the following Toolbox/Prestart Register personnel working at site acknowledge that they have read and understand the requirements of the attached TMP and were present at the Tool Box Talk meeting

****PLEASE FILL IN ALL RELEVANT SECTIONS & DATE & INTIAL NON/RELEVANT SECTIONS N/A**

DAILY PRESTART / TOOLBOX / VEHICLE PRESTART

building the future together

Date		Client	
Team Leader		Signed	
Work Site Location		Weather Conditions	☐ Dry Season ☐ Wet Season
Road Surface	☐ Dry ☐ Wet ☐ Rough	Principal Daily Prestart attended	☐ Yes ☐ No
Issues or Comments TWNT or from Principal Prestart			

Attendance Names (Note traffic cards to be readily available)

By signing below, I am fit for duty, free from alcohol and or drugs, and will abide by all TWNT, and client requirements for this project.

Name	Reason onsite	Wz 1	Wz 2	Wz 3	Signature

Vehicle Registration / ID			Kms	
Item / Vehicle Checklist	Ok proceed- Fault seek team leader advise			Comments
Vehicle fuel	☐ OK ☐ Fault ☐ N/A			
UHF (Two-way radios)	☐ OK ☐ Fault ☐ N/A			
Any vehicle exterior damage	☐ OK ☐ Fault ☐ N/A			
Horn working	☐ OK ☐ Fault ☐ N/A			
Windshield wipers / washers working	☐ OK ☐ Fault ☐ N/A			
Signal lights / lights / tail lights working	☐ OK ☐ Fault ☐ N/A			
Mirrors ok, adjustments made to suit	☐ OK ☐ Fault ☐ N/A			
First aid kit in vehicle	☐ OK ☐ Fault ☐ N/A			
Fire Extinguisher in vehicle - tested	☐ OK ☐ Fault ☐ N/A			
Flashing lights working	☐ OK ☐ Fault ☐ N/A			
Cones / Bollards on board	☐ OK ☐ Fault ☐ N/A			
Appropriate signage on board for works	☐ OK ☐ Fault ☐ N/A			

All major faults which may affect the safe operations of the equipment MUST be reported immediately to you supervisor. Equipment must NOT be operated until these faults are rectified and repair has been authorised.

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**PLEASE FILL IN ALL RELEVANT SECTIONS & DATE & INTIAL NON/RELEVANT SECTIONS N/A

TRAFFIC MANAGEMENT-DAILY INSPECTION SHEET		Date:	
Inspection Prior to Commencement of Work		**Day time Inspection During Work Hours**	
Time of Inspection:		**Time of Inspection:**	
Signs & devices appropriate for the day's activities and conditions	Satisfactory ☐ Modifications/ Repairs required ☐	Sign's & devices operating satisfactorily and seen by motorists	Satisfactory ☐ Modifications/ Repairs required ☐
Signs & devices positioned and mounted correctly	Satisfactory ☐ Modifications/ Repairs required ☐	Sign's & devices positioned and mounted correctly	Satisfactory ☐ Modifications/ Repairs required ☐
Signs & devices clean and clearly visible	Satisfactory ☐ Modifications/ Repairs required ☐	Signs & devices clean and clearly visible	Satisfactory ☐ Modifications/ Repairs required ☐
Traffic controllers correctly attired and operating correctly	Satisfactory ☐ Modifications/ Repairs required ☐	Traffic controllers correctly attired and operating correctly	Satisfactory ☐ Modifications/ Repairs required ☐
Modifications and/ or repairs completed	Yes (give details) ☐ No (if no, give reason) ☐ Not Applicable ☐	Modifications and/ or repairs completed	Yes (give details) ☐ No (if no, give reason) ☐
Notes:			

****PLEASE FILL IN ALL RELEVANT SECTIONS & DATE & INTIAL NON/RELEVANT SECTIONS N/A**

Closing Down Inspection		**Night Time Inspection During Working Hours**	
Time of Inspection:		**Time of Inspection:**	
Signs removed	Satisfactory ☐ Modifications/ Repairs required ☐	Yellow lamps operating	Satisfactory ☐ Modifications/ Repairs required ☐
Excavations correctly backfilled. If excavation backfilling is unsealed, are ROUGH SURFACE signs and cones in place	Satisfactory ☐ Modifications/ Repairs required ☐	Signs & devices positioned & mounted correctly	Satisfactory ☐ Modifications/ Repairs required ☐
Driving surfaces adequate	Satisfactory ☐ Modifications/ Repairs required ☐	Signs & devices clean and reflective	Satisfactory ☐ Modifications/ Repairs required ☐
All materials removed from medians	Satisfactory ☐ Modifications/ Repairs required ☐	Modifications and/or repairs completed	Yes (Give Details) ☐ No/Not Applicable (Give Reason) ☐
Modifications and/ or repairs completed	Yes (Give Details) ☐ No/Not Applicable (Give Reason) ☐		
Notes:			

Notes:

1. Indicate by **placing a tick in the appropriate box** for each item.
2. Items requiring **modification and/or repair are to be described** on the back of this form.
3. For all modifications that are different to the basic traffic management plan layout give details of **who authorised the changes.**
4. Sheets to be given to supervisor/manager at completion of shift.
5. If copying, ensure any notes on back of sheet are copied as well.

Signed _____ (Team lead/Supervisor) **Date** _____

**PLEASE FILL IN ALL RELEVANT SECTIONS & DATE & INTIAL NON/RELEVANT SECTIONS N/A

Daily Diary for Roadworks

Record the details of any changes made to the approved Traffic Management Plan, also state who directed/made the changes and who authorised the changes (WZ1 Accredited).

PROJECT DETAILS: _____

LOCATIONS: _____

TGS No.: _____

DATE	DETAILS OF CHANGES	CHANGE MADE BY	INSPECTION OF CHANGES (WZ1)

**PLEASE FILL IN ALL RELEVANT SECTIONS & DATE & INTIAL NON/RELEVANT SECTIONS N/A

DATE	DETAILS OF CHANGES	CHANGE MADE BY	INSPECTION OF CHANGES (WZ1)

**PLEASE FILL IN ALL RELEVANT SECTIONS & DATE & INTIAL NON/RELEVANT SECTIONS N/A

Speeding Vehicles Report Form

Record the details of any speeding vehicles sighted, also state who witnessed the event.

PROJECT DETAILS: _____

LOCATIONS: _____

TMP/TGS No.: _____ **PROJECT/JOB No.:** _____

DATE	TIME	VEHICLE DETAILS (Rego, Make, Model, Colour, etc)	WITNESSED BY	INITIALS

**PLEASE FILL IN ALL RELEVANT SECTIONS & DATE & INTIAL NON/RELEVANT SECTIONS N/A

Traffic Section Checklist

TIME DIPL CONTACTED:

Start of Shift: _____

End of Shift: _____

NAME OF DIPL CONTACT SPOKEN TO:

Start of Shift: _____

End of Shift: _____

REMAPPING REQUIRED: Yes / No

RED LIGHT CAMERA ACTION REQUIRED: Yes / No

If Yes, provide details of action taken in the space below

_____

_____

_____

_____

_____

_____

_____

_____

**PLEASE FILL IN ALL RELEVANT SECTIONS & DATE & INTIAL NON/RELEVANT SECTIONS N/A

Speed Restriction Installation Form

DATE: _____

JOB LOCATION: _____

CONTRACTOR: _____

DIPL TRACKING NUMBER:_____

SPEED REDUCED FROM _____ TO _____

SPEED RESTRICTION INSTALLED AT _____HRS

INSTALLED BY _____ WZ2/3 NUMBER: _____

TGS DESIGNER: _____ WZ1 NUMBER: _____

WORK ZONE MANAGER: _____

SPEED RESTRICTION REMOVED AT _____HRS

REMOVED BY _____ WZ2/3 NUMBER: _____

POLICE SPEED CHECK ON SITE _____ TIME: _____

****PLEASE FILL IN ALL RELEVANT SECTIONS & DATE & INTIAL NON/RELEVANT SECTIONS N/A**

Incident/Accident Report Form

To be completed by employee

Surname:		Other name(s):	
Address:		Phone no.:	
Company/Contractor:			
Date and time of hazard:			
Location of hazard:			

Indicate what part of the body was injured and the nature and cause of the injury

Part of body injured				Nature of Injury		Cause of injury			
Head	☐	Elbow L/R	☐	Abrasion	☐	Aggression	☐	Plant/Equipment	☐
Neck	☐	Lower arm L/R	☐	Anxiety	☐	Allergy	☐	Push/Pull	☐
Shoulder L/R	☐	Hand L/R	☐	Bite	☐	Animals	☐	Repetitive	☐
Chest	☐	Fingers	☐	Break	☐	Bump	☐	Slip	☐
Abdomen	☐	Upper leg L/R	☐	Bruise/Crush	☐	Chemical	☐	Splashed	☐
Upper back	☐	Knee L/R	☐	Burn	☐	Disease	☐	Trip	☐
Lower back	☐	Lower leg L/R	☐	Cut	☐	Electrical	☐	Vegetation	☐
Eye L/R	☐	Foot L/R	☐	Infection	☐	Fall	☐	Vehicle/Transport	☐
Nose	☐	Toe L/R	☐	Soft tissue	☐	Insects/Spiders	☐	Visitor	
Ear L/R	☐	Nervous System	☐	Strain		Lifting	☐		
Upper Arm L/R		Whole of body				Other Staff			
Other (please specify)				Other (please specify)		Other (please specify)			

Was any time lost as a result of this injury? ☐ Yes ☐ No

If Yes please indicate the number of hours/days lost? _____

****PLEASE FILL IN ALL RELEVANT SECTIONS & DATE & INTIAL NON/RELEVANT SECTIONS N/A**

Description of Hazard/Accident/Injury/Disease (attach further information where necessary)

_____

_____

_____

_____

_____

_____

_____

_____

_____

Registration of vehicle and make/model if required: _____

Name of Supervisor: _____ Phone: _____

Name of Witness: _____ Phone: _____

Was first aid required? Yes ☐ No ☐

If yes who was the first aider? _____

Was medical treatment required? Yes ☐ No ☐

If yes who was the treating doctor? _____

Was hospital treatment required Yes ☐ No ☐

If yes who was the treating doctor? _____

FOR STATUTORY PURPOSES PLEASE ENSURE THIS FORM IS FULLY COMPLETED AND SIGNED

Employee Signature: _____ Date: _____

EMERGENCY CONTACT NUMBERS

CONTACTS	PHONE NUMBER
POLICE	131 444
FIRE	000
AMBULANCE St John Ambulance	000
HOSPITAL Elliott Community Health Centre	8969 2060
POWER & WATER Power Water	1800 245 090
WORKSAFE NT	1800 019 115
DEPARTMENT OF INFRASTRUCTURE, PLANNING & LOGISTICS (DIPL) **(**Business Hours Only)**	8999 4402
BARKLY REGIONAL COUNCIL	8962 0000
ROPER GULF REGIONAL COUNCIL	8972 9000
DIPL TRAFFIC SECTION **(**Business Hours Only)**	8999 4402
BUREAU OF METEROLOGY Forecasts & Warnings Cyclone Warnings & Info	 8920 3826 1300 659 211
DIGITAL MOBILE SERVICE Out of area Mobile Phone Emergency Service	112
TELSTRA Cable Damage	132 203
DIAL BEFORE YOU DIG	1100
GAS APA Group - Emergencies & Gas Leaks	1800 017 000

**PLEASE FILL IN ALL RELEVANT SECTIONS & DATE & INTIAL NON/RELEVANT SECTIONS N/A

Site Accident Action Checklist

When an accident occurs at a job site, the team leader must use the procedure checklist following to deal with the matter appropriately.

Date _____ Time _____

Action Required	Done
Check for any injuries and record the number of people injured.- • No. of people injured _____	☐
Take pictures and send to WZ1 Manager.	☐
Contact WZ1 Manager and report:	☐
1. No. of people injured _____ Is additional Traffic Controller required to assist to allow Team Leader to complete accident report? Y / N	☐
2. No. of vehicles involved _____	☐
3. Did accident take place in our site? Y / N	☐
4. Is accident affecting traffic management in place Y / N	☐
5. Is traffic flow affected by the accident? Y / N	☐
6. Complete Incident/Accident Report in full.	☐

ENSURE MOTOR VEHICLE ACCIDENT SITE IS PRESERVED

13.2 APPENDIX B Risk Analysis Table

L = Likelihood **C** = Consequences **RR** = Risk Rating

Refer to notes following the table for table criteria explanation.

RISK	ROOT CAUSE	PURE RISK			RISK RESPONSE	RESIDUAL RISK		
		L	C	PR		L	C	RR
Contractor to conduct works within 1.2m of traffic travel path.	≈ Traffic speed ≈ Traffic volume ≈ Inadequate workers protection ≈ Inadequate separation from traffic	C	IV	High	Advance warning signage, temporary speed restriction and lane closure with work area delineation installed. Refer to TGSs (Appendix C)	C	III	Med
Contractor to conduct works 1.2 to 3m from nearest traffic travelled path.	≈ Traffic Speed ≈ Traffic Volume ≈ Inadequate worker protection ≈ Inadequate separation from traffic	C	IV	High	Advance warning signage and temporary speed restriction with work area delineation installed. Refer to TGSs (Appendix C)	C	II	Low
Contractor to conduct works greater than 3m from nearest traffic travelled path.	≈ Traffic Speed ≈ Traffic Volume ≈ Inadequate worker protection ≈ Inadequate separation from traffic	C	IV	High	Vehicle mounted warning device operating, Advance warning signage installed. Refer to TGSs (Appendix C)	C	II	Low
Aftercare Treatment	≈ Traffic Speed ≈ Loose Stones/Gravel	C	IV	High	Advance warning and road condition signage with delineation to be installed out of work hours and when the site is unattended as aftercare treatment. TGS (Appendix C)	C	III	Med
Plant and work vehicles accessing the work site from the roadway creating unsafe conditions leading to crashes	≈ Unclear delineation at access point ≈ Work personnel not following correct access procedure ≈ Traffic speed ≈ Poor direcrion from construction traffic ≈ Vehicles follow traffic into work zone	C	IV	High	Determine safe access points to the work site and outline safe entry/exit procedures for all personnel All truck drivers and persons requiring vehicular access/egree to/from site to abide by access and entry procedure Plant to stop and give way to all approaching traffic before proceding to enter traffic stream Suitable clearance zones provided for protection of works.	C	II	Low

RISK	ROOT CAUSE	PURE RISK			RISK RESPONSE	RESIDUAL RISK		
		L	C	PR		L	C	RR
Installation and removal of Traffic Control Devices leading to worker injury and crashes.	≈ Inadequate worker protection ≈ Traffic speed ≈ Inadequate separation from traffic	C	IV	High	Before work commences, signs and devices at the approaches to and within the work area should be set out in accordance with the traffic guidance scheme in the following sequence: (a) Advance warning signs. (b) Delineation of the work area. (e) All other required warning and regulatory signs. This operation shall be carried out, where practicable, as a frequently changing work area in accordance with Clause 4.3.4 for locations in open road areas (AS 1742.3-2009). Recovery of devices at the conclusion of work shall be done in the reverse order using the same work method as for setting out. A traffic control vehicle fitted with a vehicle mounted warning device shall “shadow” (protect) personnel whilst installing traffic control devices on the roadway. All site personnel to remain clear of the travelled path of vehicles at all times and clear of the roadway where possible.	C	III	Med
Excavations	≈ Traffic Speed ≈ Traffic volume ≈ Inadequate separation from traffic	C	IV	High	Excavations limited to between 50-250mm depth located less than 5m from traffic in >70km/h speed zone with <1500 vpd volume requires standard delineation - 12m bollard spacings. Excavations limited to between 260-500mm depth located less than 5m from traffic in >70km/h speed zone with <1500 vpd volume requires Close Delineation - 4m bollard spacings. Excavations greater than 500mm depth located less than 5m from traffic in >70km/hr speed zone with <1500 vpd volume requires Safety Barrier. Excavations greater than 50mm depth located greater than 5m from traffic in >70km/h speed zone with <1500 vpd volume requires No Delineation. All excavations to be backfilled on completion of days works or steel plated and or temporarily fenced whilst left unattended.	C	II	Low

RISK	ROOT CAUSE	PURE RISK			RISK RESPONSE	RESIDUAL RISK		
		L	C	PR		L	C	RR
Traffic flows along the road creating a hazardous work site leading to worker injury.	≈ Unclear delineation of access point. ≈ Traffic Speed ≈ Poor direction from construction traffic ≈ Vehicles follow traffic in to work zone	C	IV	High	Determine safe access points to the work site and outline safe entry and exit procedures for all personnel. All truck drivers and persons requiring vehicular access/egress to/from the site to abide by access entry procedure. Plant to stop and giveway to all approaching traffic before proceeding to enter traffic stream. Suitable clearance zones provided for protection of workers.	C	II	Low
Workers accessing road worksites leading to injury or crashes.	≈ Workers enter road areas ≈ Inadequate access provided to workers	C	IV	High	Workers to cross the road to enter a work space from the job side of the road. Workers to be instructed of this in site induction at toolbox talk.	C	II	Low
Inappropriate placement and use of temporary signs leads to confusion and crashes.	≈ Incompetent persons. ≈ Not applying approved Plans ≈ Changes to work situations	C	IV	High	Installation and removal of temporary signs shall be managed by competent personnel as required by DIPL. Site monitoring procedures to identify changes to signage requirements	C	II	Low
Pedestrians and Cyclists accessing through or across a worksite resulting in injury to pedestrians/ cyclists or workers.	≈ No separation of pedestrians or cyclists from worksite. ≈ Cyclist speeds ≈ Delineation of worksite	D	IV	High	Traffic controllers and workers onsite to assist safe passage of pedestrians and cyclists through/past the site.	D	II	Low
Parking of construction plant leading to traffic hazards.	≈ No clear procedure for parking of vehicles. ≈ No designated parking areas	C	III	Med	All construction traffic not in use to be parked out of road work zones. Parking only in designated areas on or near the site of works.	C	II	Low
Vehicle breakdown/crash causing obstruction to traffic.	≈ Operator or vehicle error ≈ Poor roadway conditions	D	IV	High	Contractor to assist where practical for access by emergency vehicles or removal and storage of affected vehicle. Contact with breakdown contractors	D	II	Low
Effects of weather.	≈ Water filling site ≈ Increases chance of accidents, reduced visibility	C	IV	High	Weather is hot, workers need to ensure that they drink enough fluids throughout the shift. Work to cease if weather prevents clear line of sight or restricts visibility and to resume when visibility is regained. Work to cease during periods of lightning.	C	II	Low

RISK	ROOT CAUSE	PURE RISK			RISK RESPONSE	RESIDUAL RISK		
		L	C	PR		L	C	RR
Working around plant and equipment.	≈ Staff not wearing correct PPE ≈ Operator not seeing staff and other plant and equipment.	C	IV	High	Ensure staff are wearing correct PPE. Site induction to reinforce safe operating procedures in Toolbox Talk prior to commencement of works (Appendix A)	C	III	Med
Signs dirty and difficult to read.	≈ Dust caused by traffic ≈ Signs muddied	C	III	Med	Daily inspections to address cleanliness of the traffic control devices. Must be cleaned as required.	C	II	Low

RISK CRITERIA

Each hazard/hazardous situation shall be assigned a risk rating which is used for prioritising hazards and quantifying the degree of risk. The risk rating is determined by using the risk assessment matrix below.

LIKELIHOOD	CONSEQUENCES				
	Insignificant **I**	Minor **II**	Moderate **III**	Major **IV**	Catastrophic **V**
A (almost certain)	L	M	H	E	E
B (likely)	L	M	H	H	E
C (possible)	A	L	M	H	E
D (unlikely)	A	L	M	H	H
E (rare)	A	A	L	M	M

Likelihood

Likelihood refers to the possibility or frequency of a hazard occurring. The organisation undertakes many routine activities that have potential to cause a WHS incident on a daily or relatively frequent basis. Other activities are conducted less routinely, and WHS incidents can also occur. The following table lists criteria that explain the five qualitative measures of likelihood.

	Likelihood	Likelihood Measures Description
A	Almost certain	The event or hazard is expected to occur in most circumstances – shall probably occur with a frequency in excess of 10 times per year.
B	Likely	The event or hazard shall probably occur in most circumstances – shall probably occur with a frequency of between 1 and 10 times per year.
C	Possible	The event or hazard might occur at some time – shall probably occur with a frequency of 0.1 to 1 times per year (i.e. once in 1 to 10 years).
D	Unlikely	The event or hazard could occur at some time – shall probably occur with a frequency of 0.01 to 0.1 times per year (i.e. once in 10 to 100 years).
E	Rare	The event or hazard may occur only in exceptional circumstances – shall probably occur with a frequency of less than 0.01 times per year (i.e. less than once in 100 years).

Note: The likelihood of an event or hazard occurring shall first be assessed over the duration of the activity (i.e. "period of exposure"). For risk assessment purposes the assessed likelihood shall then be proportioned for a "period of exposure" of one year.

Example: An activity has a duration of 6 weeks (i.e. "period of exposure" = 6 weeks). The event or hazard being considered is assessed as likely to occur once every 20 times the activity occurs (i.e. likelihood or frequency = 1 event/20 times activity occurs = 0.05 times per activity). Assessed annual likelihood or frequency = 0.05 times per activity x 52 weeks/6 weeks = 0.4 times per year. Assessed likelihood = C (i.e. Possible).

Consequence

The following table provides criteria for determining consequence to individuals or the company and its operations as a result of a WHS incident occurring.

Level	Consequence	Personal Injury/ Equipment Damage	Cost	Traffic/Network Performance	Company Reputation/ Business Relationships
I	Insignificant	First Aid required / immediate return to work. Negligible damage requiring no further action.	Nil	Short term delays. Some minor reduction in level of service (loss) at non-peak periods.	Unsubstantiated issue unnoticed by customer or regulatory authority. Process check required. Low impact, low profile. No news item.
II	Minor	Minor medical treatment, attendance by doctor. No lost time injury. Minor damage requiring minor plant or equipment repair.	Less than $5K	Delays occur during peak periods. Minor reduction in level of service. Localised impact <1 day.	Minor substantiated issue requiring customer reassurance only. Low impact, and internal inquiry only.
III	Moderate	Medical treatment required, hospitalisation. Work Safe Report. Lost time injury. Moderate damage requiring plant or equipment repair	$5K to $10K	Moderate reduction in level of service. Impacts up to a week. Impacts in immediate adjacent streets also. Some short term impact on property access (< 1hr).	Substantiated issue, short-term impact, public embarrassment, moderate news profile. Loss of customer(s) confidence requiring rectification/explanation. Query from Regulatory authority. Company internal investigation required.
IV	Major	Significant injuries, hospitalisation, temporary disability. Work Safe Report. Major damage requiring extensive plant or equipment repair	$10K to $20K	Significant reduction in level of service. Impacts up to a month. Some “rat running” during peak periods. Impact on local property access.	Substantiated issues, non-compliance with Regulatory Authority policy, high news profile, long term impact. Loss of customer(s) with short to medium-term impact. Third party inquiry.
V	Catastrophic	Death, permanent disability. Work Safe investigation. Severe damage requiring plant or equipment replacement.	Over $20K	Major reduction of loss of service over several weeks. Adverse impacts on surrounding residential/ commercial areas due to traffic overflow. May result in loss of access for extended periods.	Substantiated multiple impacts, widespread multiple news profile, long-term impact. Substantial non-compliance with Regulatory Authority requirements. Loss of customer(s) with long-term impact. Third party actions.

Risk Rating

Conducting a risk assessment results in allocation of a risk rating of extreme, high, moderate, low or accept for each hazard. Hazards with an extreme or high risk are considered to be significant, that is, they have or can have a significant impact.

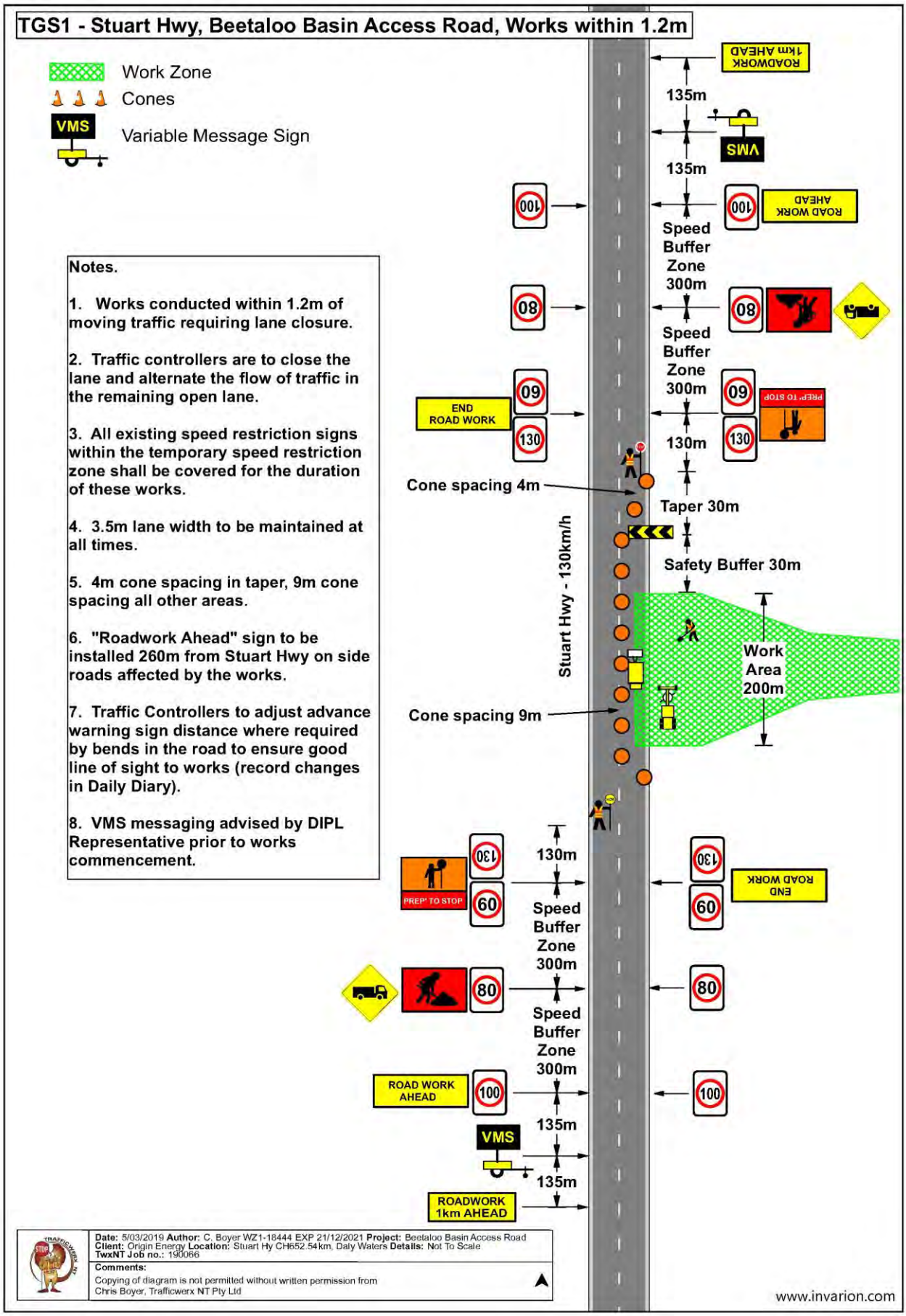
Hazards associated with a regulatory or legal requirement are also considered to be significant, regardless of the outcome of the risk analysis.

The risk rating allocated as a result of the risk assessment is described in the table following, including the required treatment to ensure they are managed appropriately.

	Risk Rating	Required Treatment
E	Extreme	Unacceptable risk. HOLD POINT. Work cannot proceed. Avoidance or elimination of risk preferred. Managing Director must review and sign-off treatment.
H	High	High priority. Treatment may look to reduce consequence or likelihood. If both are impracticable, WHS Officer/WZ1 Planner/Quality Representative approves treatment and signs off when effectively implemented.
M	Medium	Documented management procedure and prescribed risk treatment subject to review by experienced business area management staff and signed off at implementation.
L	Low	Managed in accordance with standard informal and formal work practices and monitored by affected business area staff.
A	Accept	Managed through standard informal and formal work practices.

13.3 APPENDIX C Traffic Guidance Schemes

TGS1 – Stuart Hwy, Beetaloo Basin Access Road, Works within 1.2m
TGS2 – Stuart Hwy, Beetaloo Basin Access Road, Works 1.2 to 3m
TGS3 – Stuart Hwy, Beetaloo Basin Access Road, Works greater than 3m
TGS4 – Stuart Hwy, Beetaloo Basin Access Road, Trucks Entering
TGS5 – Stuart Hwy, Beetaloo Basin Access Road, Works within 1.2m Aftercare
TGS6 – Stuart Hwy, Beetaloo Basin Access Road, Works 1.2 to 3m Aftercare
TGS7 – Stuart Hwy, Beetaloo Basin Access Road, Works greater than 3m Aftercare


TGS1 - Stuart Hwy, Beetaloo Basin Access Road, Works within 1.2m
Work Zone
Cones
VMS
Variable Message Sign
Notes.
1. Works conducted within 1.2m of moving traffic requiring lane closure.
2. Traffic controllers are to close the lane and alternate the flow of traffic in the remaining open lane.
3. All existing speed restriction signs within the temporary speed restriction zone shall be covered for the duration of these works.
4. 3.5m lane width to be maintained at all times.
5. 4m cone spacing in taper, 9m cone spacing all other areas.
6. "Roadwork Ahead" sign to be installed 260m from Stuart Hwy on side roads affected by the works.
7. Traffic Controllers to adjust advance warning sign distance where required by bends in the road to ensure good line of sight to works (record changes in Daily Diary).
8. VMS messaging advised by DIPL Representative prior to works commencement.
ROADWORK 1km AHEAD
135m
VMS
135m
100
ROAD WORK AHEAD
Speed Buffer Zone 300m
08
Speed Buffer Zone 300m
END ROAD WORK
09
130
PREP' TO STOP
130m
Cone spacing 4m
Taper 30m
Safety Buffer 30m
Stuart Hwy - 130km/h
Work Area 200m
Cone spacing 9m
PREP' TO STOP
130m
END ROAD WORK
60
Speed Buffer Zone 300m
80
Speed Buffer Zone 300m
ROAD WORK AHEAD
Speed Buffer Zone 300m
VMS
135m
135m
ROADWORK 1km AHEAD
Date: 5/03/2019 Author: C. Boyer WZ1-18444 EXP 21/12/2021 Project: Beetaloo Basin Access Road
Client: Origin Energy Location: Stuart Hy CH652.54km, Daly Waters Details: Not To Scale
TwxNT Job no.: 190066
Comments:
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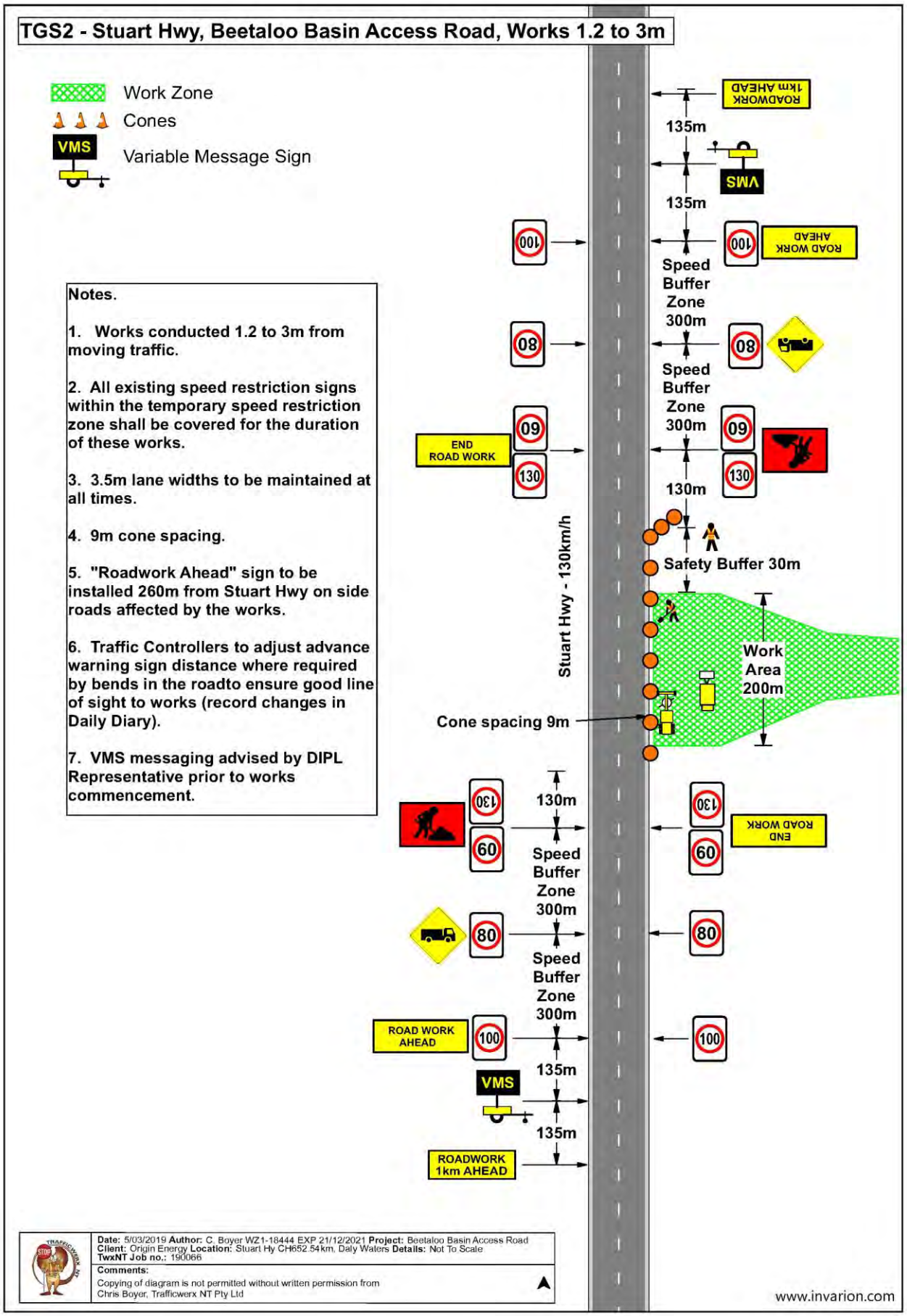
TGS2 - Stuart Hwy, Beetaloo Basin Access Road, Works 1.2 to 3m
Work Zone
Cones
VMS
Variable Message Sign
Notes.
1. Works conducted 1.2 to 3m from moving traffic.
2. All existing speed restriction signs within the temporary speed restriction zone shall be covered for the duration of these works.
3. 3.5m lane widths to be maintained at all times.
4. 9m cone spacing.
5. "Roadwork Ahead" sign to be installed 260m from Stuart Hwy on side roads affected by the works.
6. Traffic Controllers to adjust advance warning sign distance where required by bends in the roadto ensure good line of sight to works (record changes in Daily Diary).
7. VMS messaging advised by DIPL Representative prior to works commencement.
ROADWORK 1km AHEAD
135m
VMS
135m
100
ROAD WORK AHEAD
Speed Buffer Zone 300m
08
Speed Buffer Zone 300m
END ROAD WORK
09
130
130m
Safety Buffer 30m
Stuart Hwy - 130km/h
Work Area 200m
Cone spacing 9m
130m
END ROAD WORK
Speed Buffer Zone 300m
80
Speed Buffer Zone 300m
ROAD WORK AHEAD
VMS
135m
135m
ROADWORK 1km AHEAD
Date: 5/03/2019 Author: C. Boyer WZ1-18444 EXP 21/12/2021 Project: Beetaloo Basin Access Road
Client: Origin Energy Location: Stuart Hy CH652.54km, Daly Waters Details: Not To Scale
TwxNT Job no.: 190066
Comments:
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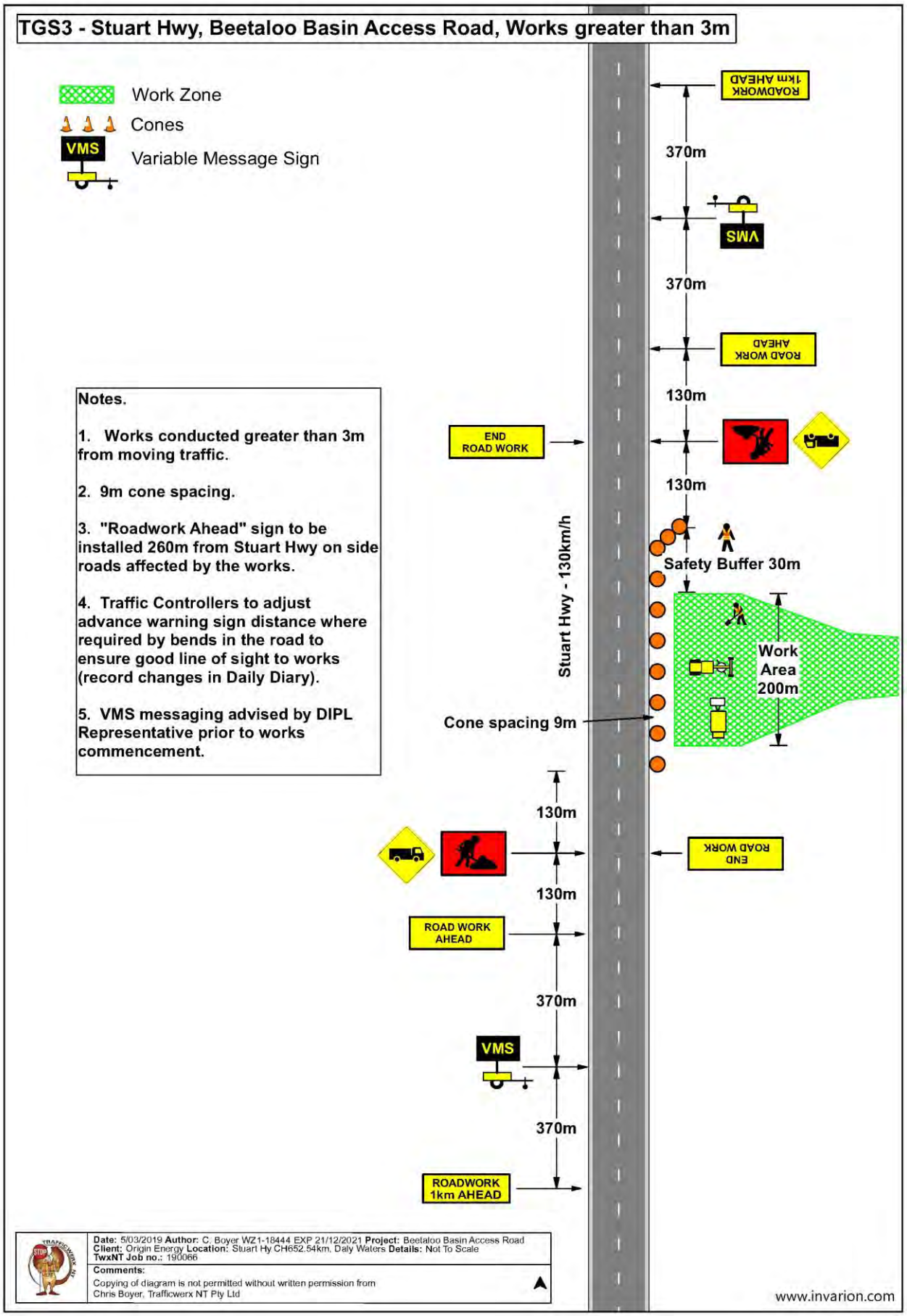
TGS3 - Stuart Hwy, Beetaloo Basin Access Road, Works greater than 3m
Work Zone
Cones
VMS
Variable Message Sign
Notes.
1. Works conducted greater than 3m from moving traffic.
2. 9m cone spacing.
3. "Roadwork Ahead" sign to be installed 260m from Stuart Hwy on side roads affected by the works.
4. Traffic Controllers to adjust advance warning sign distance where required by bends in the road to ensure good line of sight to works (record changes in Daily Diary).
5. VMS messaging advised by DIPL Representative prior to works commencement.
ROADWORK 1km AHEAD
370m
VMS
370m
ROAD WORK AHEAD
130m
END ROAD WORK
130m
Safety Buffer 30m
Stuart Hwy - 130km/h
Work Area 200m
Cone spacing 9m
130m
END ROAD WORK
130m
ROAD WORK AHEAD
370m
VMS
370m
ROADWORK 1km AHEAD
Date: 5/03/2019 Author: C. Boyer WZ1-18444 EXP 21/12/2021 Project: Beetaloo Basin Access Road
Client: Origin Energy Location: Stuart Hy CH652.54km, Daly Waters Details: Not To Scale
TwxNT Job no.: 190066
Comments:
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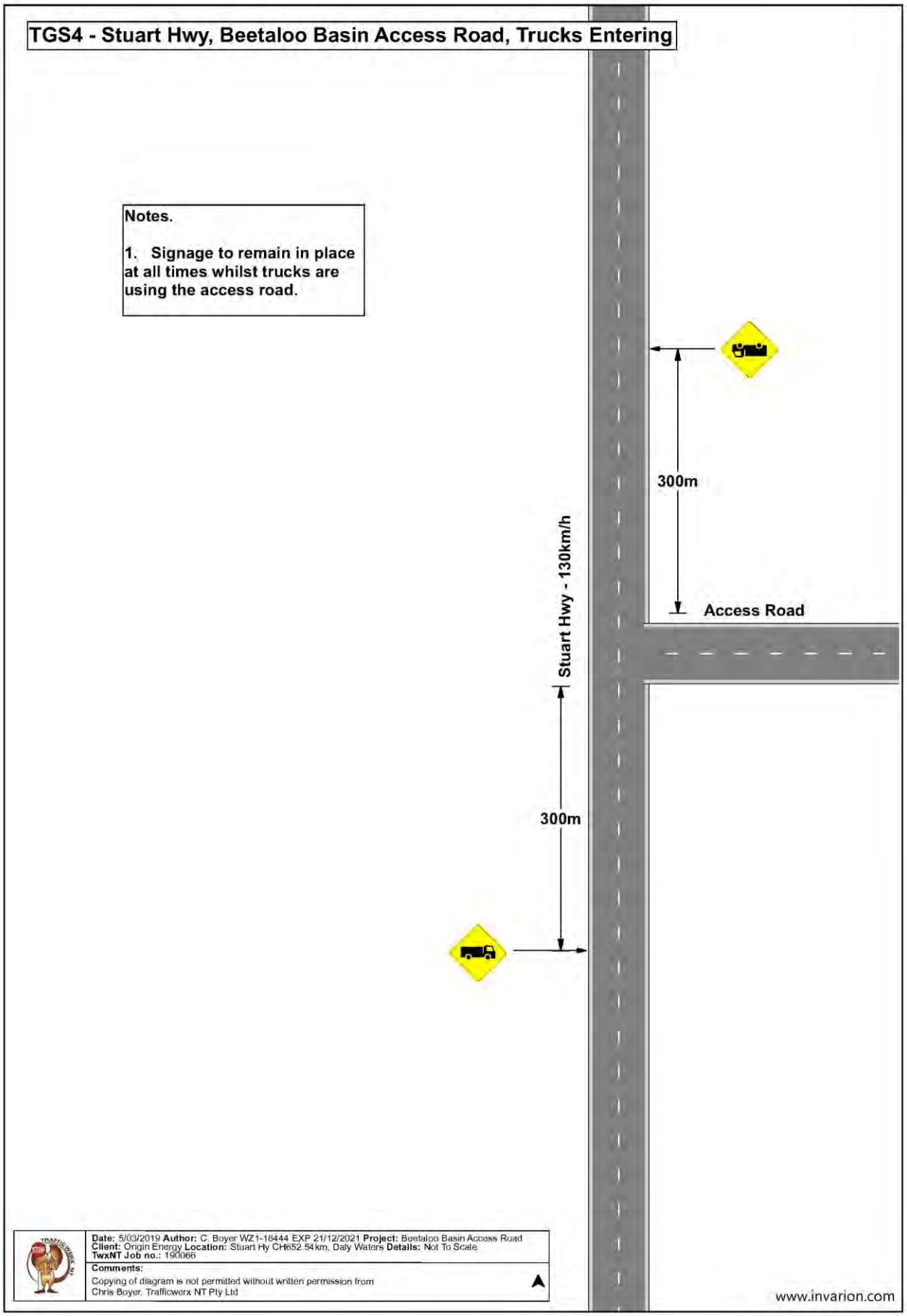
TGS4 - Stuart Hwy, Beetaloo Basin Access Road, Trucks Entering
Notes.
1. Signage to remain in place at all times whilst trucks are using the access road.
300m
Stuart Hwy - 130km/h
Access Road
300m
Date: 5/03/2019 Author: C. Boyer WZ1-18444 EXP 21/12/2021 Project: Beetaloo Basin Access Road
Client: Origin Energy Location: Stuart Hy CH652.54km, Daly Waters Details: Not To Scale
TwxNT Job no.: 190066
Comments:
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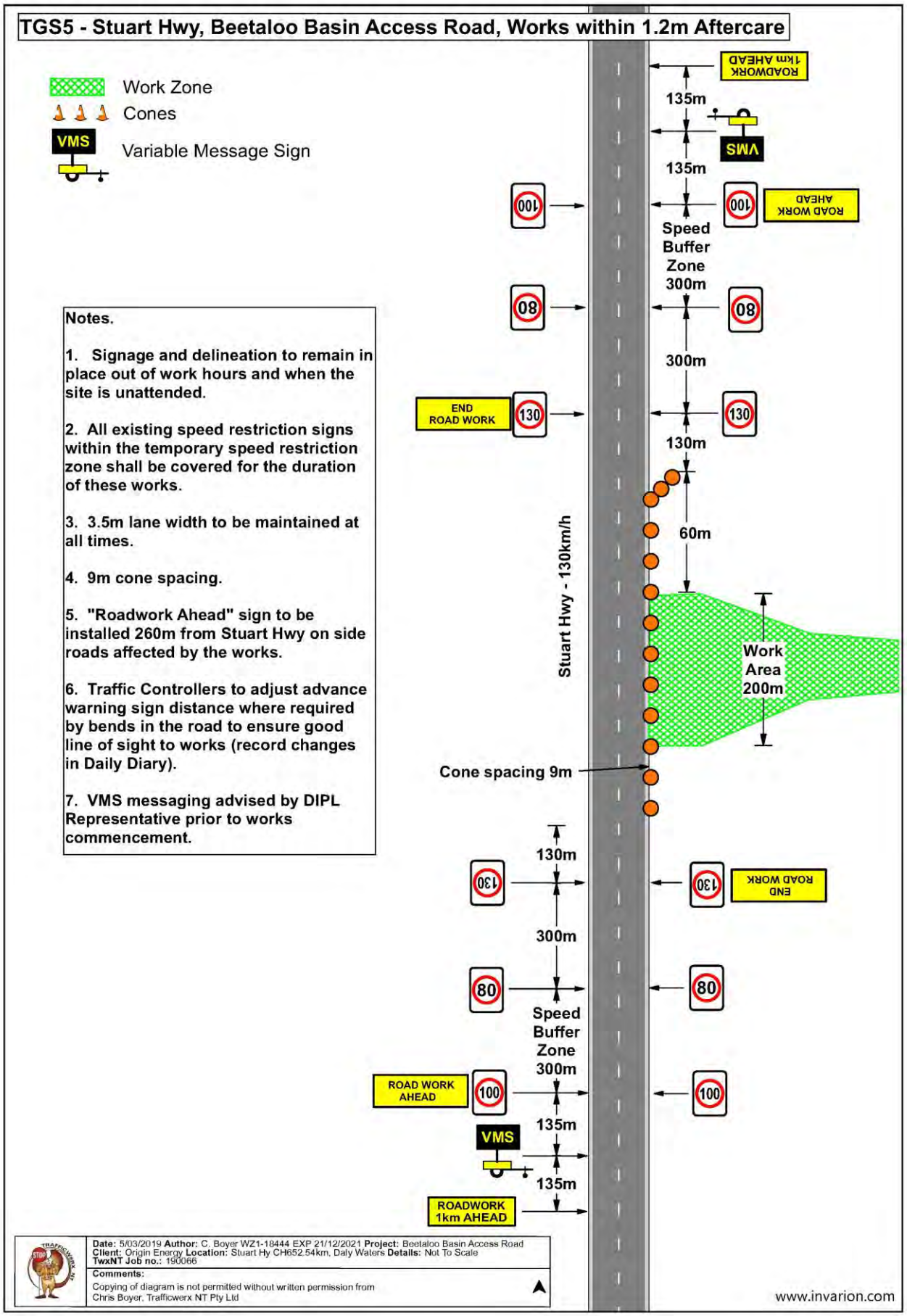
TGS5 - Stuart Hwy, Beetaloo Basin Access Road, Works within 1.2m Aftercare
Work Zone
Cones
VMS
Variable Message Sign
Notes.
1. Signage and delineation to remain in place out of work hours and when the site is unattended.
2. All existing speed restriction signs within the temporary speed restriction zone shall be covered for the duration of these works.
3. 3.5m lane width to be maintained at all times.
4. 9m cone spacing.
5. "Roadwork Ahead" sign to be installed 260m from Stuart Hwy on side roads affected by the works.
6. Traffic Controllers to adjust advance warning sign distance where required by bends in the road to ensure good line of sight to works (record changes in Daily Diary).
7. VMS messaging advised by DIPL Representative prior to works commencement.
ROADWORK 1km AHEAD
135m
VMS
135m
100
ROAD WORK AHEAD
Speed Buffer Zone 300m
08
300m
END ROAD WORK
130
130m
60m
Stuart Hwy - 130km/h
Work Area 200m
Cone spacing 9m
130m
END ROAD WORK
300m
80
Speed Buffer Zone 300m
ROAD WORK AHEAD
135m
VMS
135m
ROADWORK 1km AHEAD
Date: 5/03/2019 Author: C. Boyer WZ1-18444 EXP 21/12/2021 Project: Beetaloo Basin Access Road
Client: Origin Energy Location: Stuart Hy CH652.54km, Daly Waters Details: Not To Scale
TwxNT Job no.: 190066
Comments:
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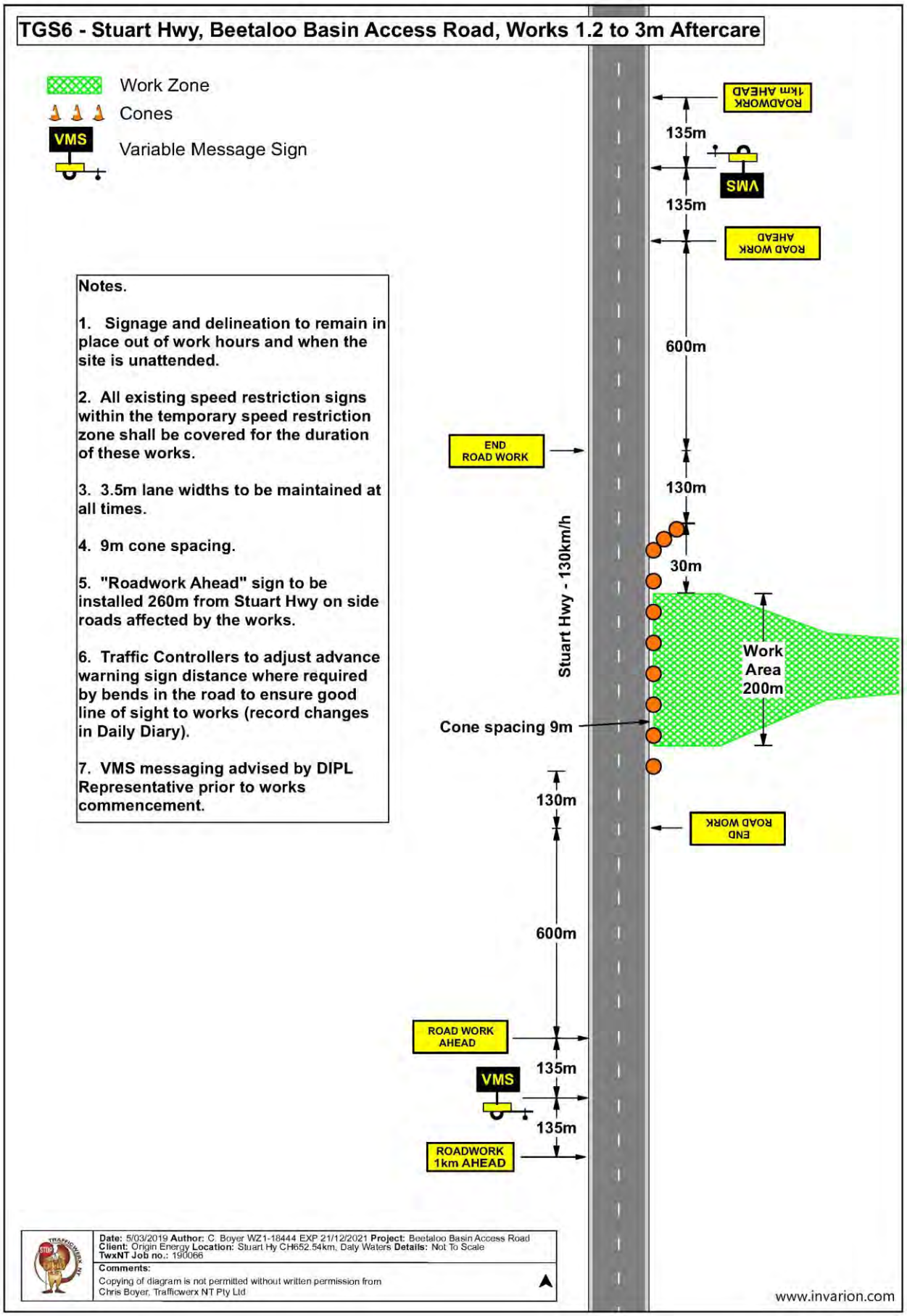
TGS6 - Stuart Hwy, Beetaloo Basin Access Road, Works 1.2 to 3m Aftercare
Work Zone
Cones
VMS
Variable Message Sign
Notes.
1. Signage and delineation to remain in place out of work hours and when the site is unattended.
2. All existing speed restriction signs within the temporary speed restriction zone shall be covered for the duration of these works.
3. 3.5m lane widths to be maintained at all times.
4. 9m cone spacing.
5. "Roadwork Ahead" sign to be installed 260m from Stuart Hwy on side roads affected by the works.
6. Traffic Controllers to adjust advance warning sign distance where required by bends in the road to ensure good line of sight to works (record changes in Daily Diary).
7. VMS messaging advised by DIPL Representative prior to works commencement.
ROADWORK 1km AHEAD
135m
VMS
135m
ROAD WORK AHEAD
600m
END ROAD WORK
130m
30m
Stuart Hwy - 130km/h
Work Area 200m
Cone spacing 9m
130m
END ROAD WORK
600m
ROAD WORK AHEAD
135m
VMS
135m
ROADWORK 1km AHEAD
Date: 5/03/2019 Author: C. Boyer WZ1-18444 EXP 21/12/2021 Project: Beetaloo Basin Access Road
Client: Origin Energy Location: Stuart Hy CH652.54km, Daly Waters Details: Not To Scale
TwxNT Job no.: 190066
Comments:
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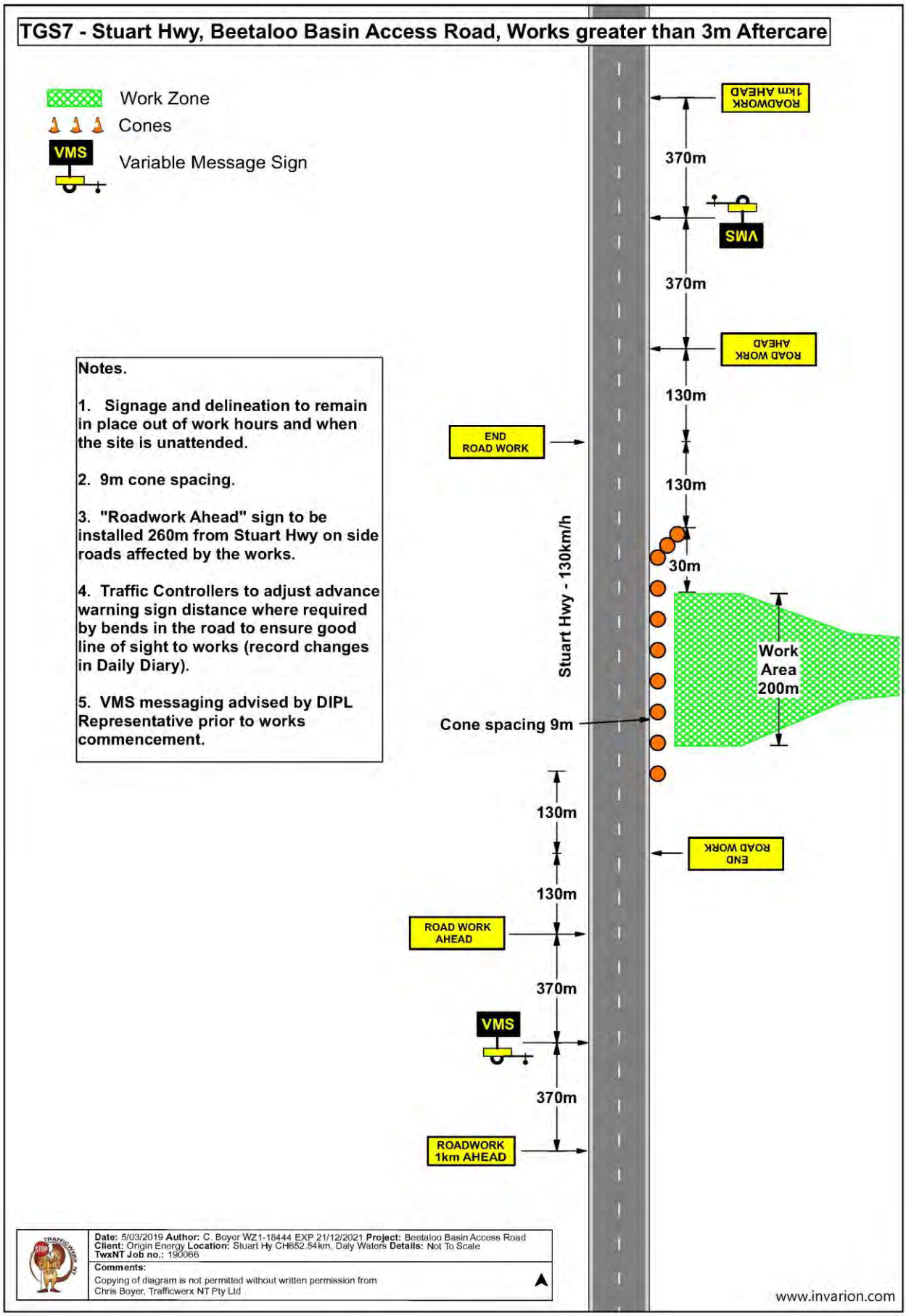
TGS7 - Stuart Hwy, Beetaloo Basin Access Road, Works greater than 3m Aftercare
Work Zone
Cones
VMS
Variable Message Sign
Notes.
1. Signage and delineation to remain in place out of work hours and when the site is unattended.
2. 9m cone spacing.
3. "Roadwork Ahead" sign to be installed 260m from Stuart Hwy on side roads affected by the works.
4. Traffic Controllers to adjust advance warning sign distance where required by bends in the road to ensure good line of sight to works (record changes in Daily Diary).
5. VMS messaging advised by DIPL Representative prior to works commencement.
ROADWORK 1km AHEAD
370m
VMS
370m
ROAD WORK AHEAD
130m
END ROAD WORK
130m
30m
Stuart Hwy - 130km/h
Work Area 200m
Cone spacing 9m
130m
END ROAD WORK
130m
ROAD WORK AHEAD
370m
VMS
370m
ROADWORK 1km AHEAD
Date: 5/03/2019 Author: C. Boyer WZ1-18444 EXP 21/12/2021 Project: Beetaloo Basin Access Road
Client: Origin Energy Location: Stuart Hy CH652.54km, Daly Waters Details: Not To Scale
TwxNT Job no.: 190066
Comments:
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13.4 APPENDIX D Sign and Equipment Manifest

TGS1 – Stuart Hwy, Beetaloo Basin Access Road, Works within 1.2m

Approach / Departure Signage	Sign Number	Size (mm)		Quantity
Roadwork Ahead	T1-1A	1800	600	2
Road Plant Ahead	T1-3-2A	1800	600	
Grader Ahead	T1-4A	900	600	
Worker (symbolic)	T1-5-1A	900	600	
Worker (symbolic)	T1-5-1B	1200	900	2
Roadwork 1km Ahead	T1-16A	1800	600	2
Roadwork Next 2km	T1-24A	1800	600	
Roadwork On Side Road	T1-25A	1800	600	
Next 2km	T1-28A	600	600	
End Roadwork	T2-16A	1800	600	2
Side Road Closed	T1-25	1800	600	
Worker (symbolic) Next 2km				

Regulatory Traffic Control Signage	Sign Number	Size (mm)		Quantity
Stop / Slow Bat	R6-8 / T7-1 A	450		2
Reduce Speed	G9-9A	1500	750	
Prepare To Stop Traffic Controller Symbolic	T1-18B	1200	900	2
Give Way	R1-2B	900	900	
No Overtaking Or Passing	R6-1A	750	900	
Signals Ahead (symbolic)	T1-30A	900	600	
Stop Here On Red Signal	R6-6A	450	750	
Traffic Controller (symbolic)	T1-4-A	900	600	
Traffic Controller (symbolic)	T1-4B	1200	900	
Blasting Area, Switch off Radio Transmitters and Mobile Phones	T4-7-A	1200	900	
End Blasting Area	T4-3-A	1800	600	

Detour Signage	Sign Number	Size (mm)		Quantity
All Traffic Turn (left arrow)	R2-14A L	600	800	
All Traffic Turn (right arrow)	R2-14A R	600	800	
Local Traffic Only	G9-40-2A	900	600	
Detour Ahead	T1-6A	1200	600	
End Detour	T2-23A	1200	600	
Two-way Traffic (symbolic)	T2-24A	900	600	
Detour (left arrow)	T5-1A L	1200	300	
Detour (right arrow)	T5-1A R	1200	300	
No Left Turn	R2-6A L	450	900	
No Right Turn	R2-6A R	450	900	

Road Condition Signage	Sign Number	Size (mm)		Quantity
Slippery (symbolic)	T3-3A	900	600	
Soft Edges	T3-6A	900	600	
Rough Surface	T3-7A	900	600	
Loose Stones (symbolic)	T3-9A	900	600	
New Work No Lines Marked	T3-11	1500	900	
No Lines Do Not Overtake Unless Safe	T3-12	1500	900	

Lane / Road Closure Signage	Sign Number	Size (mm)		Quantity
Road Closed	T2-4A	1800	300	
Road Closed Ahead		1800	600	
Road Closed 1km Ahead	T2-Q02	1800	600	
Lane Status (2 lane) (open arrows)	T2-6-1A	1200	900	
Lane Status (3 lane) (open arrows)	T2-6-2A	1800	900	
Lane Status Magnetic Overlay (T-shaped)				
Lane Status Magnetic Overlay (left arrow)				
Lane Status Magnetic Overlay (right arrow)				

Delineation / Miscellaneous Signage	Sign Number	Size (mm)		Quantity
Traffic Cone with Reflective Sleeve		700		40
Temporary Hazard Marker	T5-4A	1500	450	1
Temporary Hazard Marker	T5-5A	600	600	
Highway Bollard				
Caution Tape				

Pedestrian Control Signage	Sign Number	Size (mm)		Quantity
Pedestrians Watch Your Step	T8-1A	900	600	
Use Other Footpath	T8-3	900	600	
Pedestrians (left arrow)	T8-2A L	1200	300	
Pedestrians (right arrow)	T8-2A R	1200	300	
Footpath Closed	T8-4	900	600	

Other Roadworks Signage	Sign Number	Size (mm)		Quantity
Traffic Hazard Ahead	T1-10A	1200	900	
Traffic Accident Ahead	T1-11A	1200	900	
Water Over Road	T2-13B	1200	900	
Trucks Entering (symbolic) (left)	T2-25A L	900	600	2
Trucks Entering (symbolic) (right)	T2-25A R	900	600	
Trucks (diamond)	W5-22B	750	750	
Trucks (diamond)	W5-22C	750	750	
Side Road Junction (L/R)	W2-4	750	750	

Speed Restriction Signs	Sign Number	Size (mm)		Quantity
20 km/h	R4-80B	600	800	
40 km/h	R4-80B	600	800	
50 km/h	R4-80B	600	800	
60 km/h	R4-80B	600	800	4
70 km/h	R4-80B	600	800	
80 km/h	R4-80B	600	800	4
90 km/h	R4-80B	600	800	
100 km/h	R4-80B	600	800	4
110 km/h	R4-80B	600	800	
130 km/h	R4-80B	600	800	4
End 60 km/h	R4-12B	600	800	

Miscellaneous Equipment	Quantity
Radios (UHF)	2
Vests (High Visibility)	2
Vests (Retro-reflective Night)	
Hard Hats (Wide Brimmed)	
Traffic Control Vehicles	
Arrow Boards	
Sign Legs	18
Speed Restriction Trailers	
Speed Restriction Spikes	12
Spike Drivers	2
Fuel Cans	
Lighting Towers	
Variable Message Boards	2

13.5 APPENDIX E Certificate of Currency of Public Liability Insurance

Empower Results®

Contact Ross Hoy
t 02 9253 8265
e ross.hoy@aon.com

Origin Energy Limited
Tower 1, 100 Barangaroo Avenue
SYDNEY 2000
NEW SOUTH WALES
AUSTRALIA

Certificate of Currency

Date of Issue 27 June 2018

In our capacity as Insurance Brokers to Origin Energy Limited we hereby certify that the under mentioned insurance policy is current.

Policy Type	Public and Products Liability
Insured	1. Origin Energy Limited 2. Subsidiary and/ or controlled companies of 1. above; 3. Joint Venture Partners and/ or other companies of 1 and/ or 2. above for whom the insured has contractual responsibility to insure; and/ or 4. Other parties (including those acquired during the currency of the insurance) and as provided for herein and others as defined in the policy conditions.
Insurer	AIG Australia Limited (primary lead insurer)
Policy Number(s)	300018358
Period of Insurance	30/06/2018 - 30/06/2019
Interest Insured	Legal Liability for (a) Injury to any person; (b) Property Damage; (c) Advertising Injury, (d) Financial Loss occurring within the Territorial Limits during the Period of Insurance as a result of an Occurrence happening in connection with the Insured's Business.
Limits of Liability	Not less than AUD$20,000,000 any one Occurrence and in the annual aggregate in respect of each of Products and Pollution Liability.
Geographical Limit	Anywhere in the World excluding the United States of America (with the exception of American Samoa) and Canada where this Policy will only apply in respect of Products sent into those countries and/or travelling directors or Employees who are non resident in such countries.
Conditions	Subject to the terms and conditions of the policy

Further Information
Should you have any queries, please contact us. Our details are set out in the top right side of this document.
This certificate is a summary of cover only. Please refer to the Policy Wording and Schedule for its full terms and conditions.

Important notes

- Aon does not guarantee that the insurance outlined in this Certificate will continue to remain in force for the period referred to as the Policy may be cancelled or altered by either party to the contract, at any time, in accordance with the terms of the Policy and the Insurance Contracts act 1984 (Cth).
- Aon accepts no responsibility or liability to advise any party who may be relying on this Certificate of such alteration to or cancellation of the Policy.
- This certificate does not:
  - represent an insurance contract or confer rights to the recipient; or
  - amend, extend or alter the Policy.

Office use only: A2TO7976 1

Aon Risk Solutions Sydney
17 0004 347 20 241141

Certificate of Currency

This certificate acknowledges that the Policy referred to is in force for the period shown. Summary of cover is listed below.

This Certificate is subject to the terms, Definitions, Conditions and Exclusions of this Policy.

DATE:	4/04/2019	
POLICY NUMBER:	89 A387293 PLB	
YOU/YOUR/INSURED:	Arnhem Earthmoving & Mechanical Pty Ltd AEM NT Pty Ltd Arnhem Civil Pty Ltd Mendis Pty Ltd	
PERIOD OF INSURANCE:	From: 4.00pm on 31/03/2019 to: 4.00pm on 31/03/2020	
POLICY:	General Public and Product Liability Insurance Policy	
LIMIT OF LIABILITY:	**Public Liability:**	$20,000,000 any one Occurrence
	Products Liability:	$20,000,000 any one Occurrence and in the aggregate during any one Period of Insurance
WORDING:	QM8216-0118 (QUBE only) Steadfast General and Products Liability and agreed endorsements where applicable	
NOTING:	N/A	

Issued by: QBE Australia

Underwriter: Marlee Kleinhanss

QBE Insurance (Australia) Limited ABN 78 003 191 035. AFS Licence No. 239545
Level 5, 2 Park Street
Sydney New South Wales 2000

QM6333-0815

13.6 APPENDIX F Procedure for Entering/Exiting Traffic

TRAFFICWERX NT Pty Ltd

Trafficwerx NT Document TXD081

building the future together

Procedure for Entering/Exiting Traffic from/to the Worksite

Purpose:	To define the process for personnel operating vehicles or plant at a worksite to safely enter or exit the traffic stream from or into the worksite.
Staff Affected:	All staff All contractors and subcontractors accessing the worksite
Expected Outcomes:	Common understanding by all personnel accessing the worksite regarding the procedure for entering or exiting the worksite from or into the traffic stream. Safe movement of vehicles and plant into and out of the worksite leading to no incidents or accidents.
Definitions:	Nil
References:	Nil

Vehicles entering and exiting the traffic stream do so in an environment that is different from normal situations and as such drivers need to be mindful of the conditions that may affect the safety of these movements.

All entry and exit movements will be conducted in accordance with the Traffic Act and shall be undertaken in the manner described following.

Worksite Entry

Vehicles and plant may be required to enter the worksite at different points of access and shall do so as described following:

- At the start of the merge traffic by manoeuvring behind the delineations and by utilising the closed lanes to traverse the worksite.
- At the end of the worksite by entering the closed lanes in the prescribed manner.
- At the designated entry point established at the Tool Box Talk meeting.

As 'following' drivers would not commonly expect 'leading' vehicles to leave the roadway, their attention may be reduced. In recognition of this behaviour, drivers leaving the carriageway shall be required to undertake the following safe work practice:

1. Decelerate slowly and signal their intention by indicator to leave the traffic stream well in advance of their departure point.
2. Activate their vehicle's rotating yellow lamp(s) once a speed of 40km/h has been reached and at least 50m prior to the entry location.

Worksite Exit

Vehicles and plant entering the traffic stream from the worksite shall have the vehicle's rotating yellow lamp(s) activated prior to entering the traffic stream and must undertake the following:

1. Indicate their intention to enter the traffic stream using direction indicators.
2. Ensure there is a suitable gap from oncoming traffic to allow for a safe entry manoeuvre.
3. Accelerate while still in the delineated lane of the worksite.
4. Enter the traffic flow.
5. Turn OFF the vehicle's rotating yellow lamp(s) once a speed of 40km/h is reached.

13.7 APPENDIX G Agency Notification

Emergency Services

TRAFFICWERX NT Pty Ltd

building the future together

To: **Northern Territory Police, Fire & Emergency Services** **St John's Ambulance Service**	**From:** **Chris Boyer** **Trafficwerx NT**
Attention:	**Fax No.: 8941 3528**
Email: police.assistance@pfes.nt.gov.au feedback@stjohnnt.asn.au	**Date: 21/05/2019**
No of Pages (incl): 1	
Subject: Works within Road Reserve – Stuart Hwy, Daly Waters	

To whom it may concern,

Origin Energy are to carry out works associated with the Beetaloo Basin Exploration Project.on the Stuart Hwy, 64.5km South of the Hi-Way Inn, Daly Waters.

The works comprise construction of a temporary, site access road to allow project construction and support service vehicles access to the basin exploration drill sites. The access road is on the Eastern side of the Stuart Highway, perpendicular to the road.

The works are expected to be carried out between April to October 2019, Monday to Sunday including Public Holidays 0600 – 1800.

Traffic management for the works includes installation of Advance warning signage, temporary speed limit restriction and lane closure with work area delineated. Select signage and delineation of work area to remain installed as Aftercare treatment out of work hours and when the site is unattended. Variable Message Signs to be installed prior to works commencement and during the works.

The Site Supervisor responsible for the work zones is Robert Wear (Origin Energy). Robert shall be available to be contacted on [redacted] the event of an emergency.

We apologise for any inconvenience and imposition and require your co-operation and patience whilst these works are being conducted.

Should you have any queries or concerns regarding the above or wish to discuss any other matter, please do not hesitate to contact me on 8942 2228.

Thank you and Regards,

Chris Boyer
Trafficwerx NT

13.8 APPENDIX H Traffic Volume/Composition Count Data

Traffic Volume Data

Rural Coverage Count Stations — **Year: 2017**

Table: 4.1 AADT For Coverage Stations - 10 Year Period — **Region: Tennant Creek**

Road Name / Location	ADT Station	Direction	Units	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Stuart Highway	RTVDC020	Inbound	Veh			225	211	210	225	222	229	223	280
20km North of Elliott		Outbound	Veh			221	195	197	205	213	213	222	271
SITE NOT SURVEYED IN 2008 and 2009		Both	Veh			446	406	407	430	435	442	445	551

13.9 APPENDIX I DIPL – Temporary Access Approval

NORTHERN TERRITORY GOVERNMENT

DEPARTMENT OF
INFRASTRUCTURE, PLANNING
AND LOGISTICS

Level 3, Highway House,
Palmerston Circuit,
Palmerston NT 0831

Postal Address
PO Box 61,
Palmerston NT 0831

T 08 8924-7104
F 08 8924 7211
E DevRoads.NTG@nt.gov.au

Our ref: DDPI2005/4572-02-0062~0014
Your ref: N/A
TCSD Project No: 2018-0186

Robert Wear
Construction Superintendent
Beetaloo Exploration
Daly Waters,
Northern Territory 0852

Robert.wear@upstream.originenery.com.au

Dear Robert

Re: BARKLY REGION - NT PORTION 7027 - ACCESS TO BEETALOO EXPLORATION DRILL CAMPAIGN – STUART HIGHWAY - AECOM - ORIGIN ENERGY

ROAD AGENCY APPROVAL – 2018-0186-D2

I refer to your email correspondence of 22/03/2019 drawings detailing temporary access off Stuart Highway to NT Portion 7027.

The Transport and Civil Services Division, Department of Infrastructure, Planning and Logistics grants approval in principle for the temporary access only, subject to the following comments and conditions:

1. IFC drawings are to be issued for final approval including all traffic signage required to provide advance warning for turning trucks along the Stuart Highway.

2. Approval for the temporary access is until **23/04/2021**, after which the temporary access shall be removed and the Stuart Highway Road reserve rehabilitated and vegetated in accordance with the Department's *Roadworks Master Specification*, generally consistent with its untouched surrounds.

   Application to extend the period of the Approval must be made in writing at least 10 business days prior to the expiry of the Approval.

3. The temporary access to NT Portion 7027 shall generally be in accordance with this Department's Standard Drawings CS1842 Type 1 and CS-3005 "Rural Residential Property Access" and constructed to a sealed standard for longer term (permanent) use. The temporary access shall incorporate appropriate drainage structures if required.

4. The Developer or his Contractor **is required** to obtain a "Permit to Work within NT Government Road Reserves" prior to the commencement of any works within the Stuart Highway road reserve.

   The Application Procedure for a Permit to Work within NT Government Road Reserves is available at https://nt.gov.au/driving/management/apply-for-permit-to-work-on-a-road.

   On application for a "Permit to Work Within NT Government Road Reserves" the Developer will have to provide:
   (i) A copy of Transport and Civil Services Division, Department of Infrastructure, Planning and Logistics Approval (this letter).
   (ii) An appropriate "Work ZoneTraffic Management Plan" prepared by a competent and accredited agent, and endorsed as in accordance with "AS1742.3".

5. The Developer is required to obtain all necessary Clearances (Environmental, Sacred Sites, Heritage, Services, etc.) for the construction of infrastructure beyond the existing Stuart Highway road pavement and provide copies for verification on request.

6. The loads of all trucks entering and leaving the site of works are to be constrained in such a manner as to prevent the dropping or tracking of materials onto streets. This includes ensuring that all wheels, tracks and body surfaces are free of mud and other contaminants before entering onto the sealed road network. Where tracked material on the road pavement becomes a potential safety issue, the Developer will be obliged to sweep and clean material off the road.

7. Where clearing or excavation is required, the following works shall be carried out in accordance with the Department's standards and specifications:
   - backfilling and compaction of trenches where required
   - rectification of all disturbed areas by establishment of dryland grassing
   - all spoil is to be removed with the site to be left in a clean and tidy condition. Burning or burying of cleared vegetation within the Stuart Highway road reserve, or pushing spoil onto adjacent land, is not permitted.

Should you wish to discuss the above mentioned further, please contact Corridor Access at the Transport and Civil Services Division, Department of Infrastructure, Planning and Logistics on telephone 8924 7280.

Please quote the TCSD Project No 2018-0186-D2 in all correspondence.

Yours sincerely

Digitally signed by Mike Tait
Date: 2019.05.07 16:12:36 +09'30'

Mike Tait
A/Director, Corridor Management

Tennant Creek Office – Darcy Dunbar
Katherine Office – Phil Harris

13.10 APPENDIX J Temporary Speed Limit Authorisation

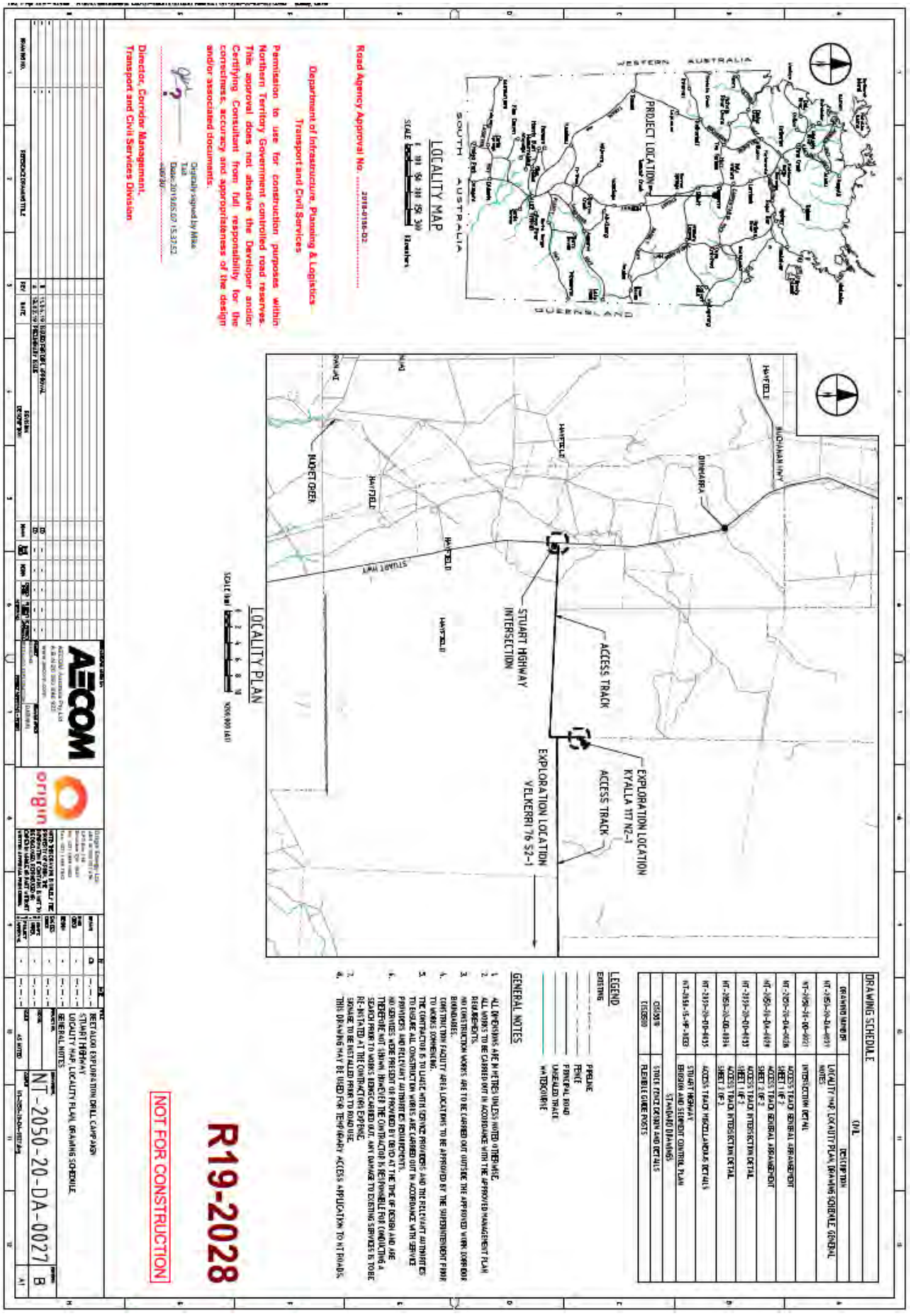
NORTHERN TERRITORY GOVERNMENT

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND LOGISTICS

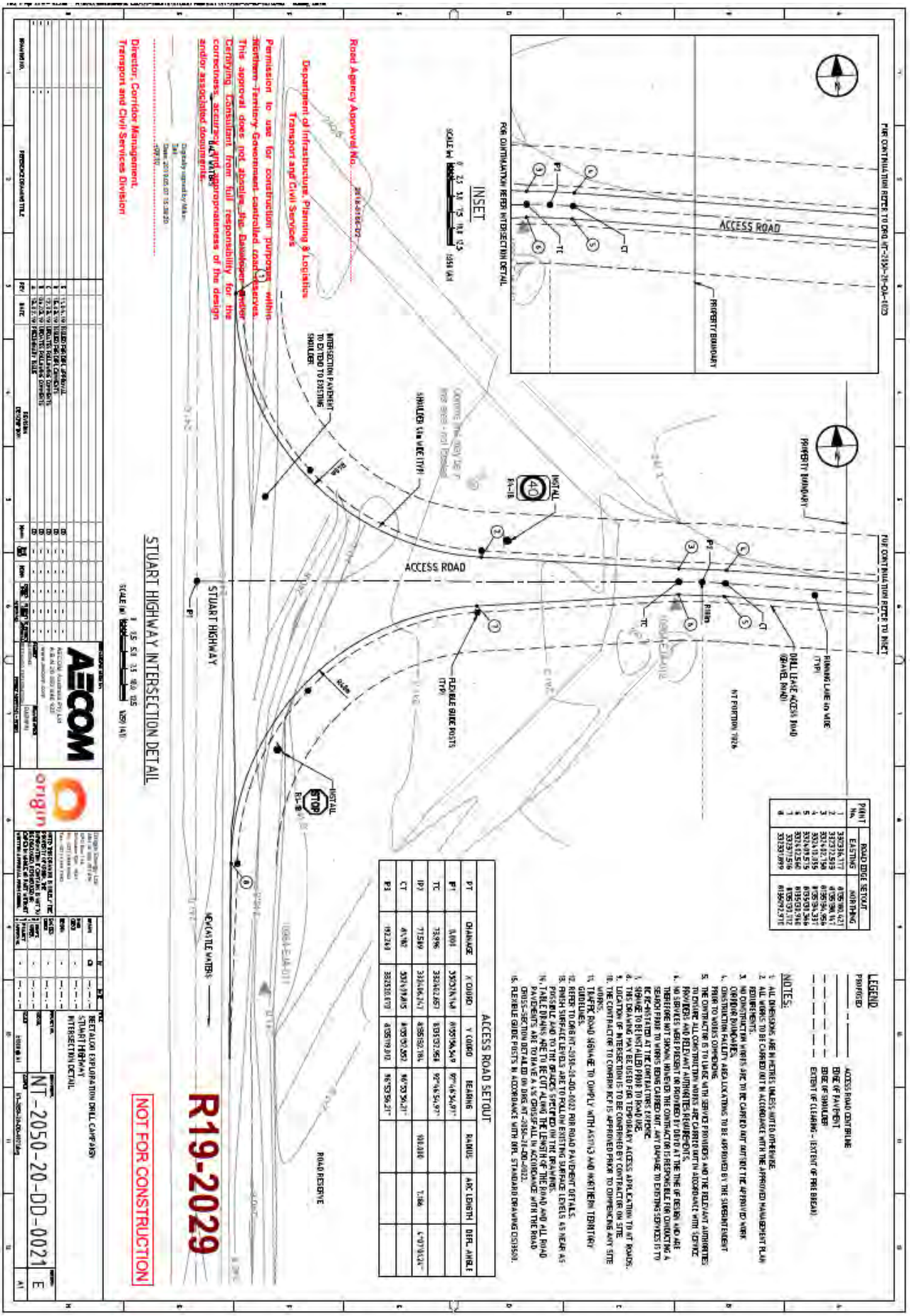
TEMPORARY SPEED LIMIT AUTHORISATION

LOCATION	Stuart Hwy CH652.54km		
FROM CH:		TO CH:	
LOCATION DESCRIPTION	Stuart Hwy 64.5km South of the Hi-Way Inn, Daly Waters		
TYPE OF WORK	Access road construction		
DURATION	**6 months**		
DATE FROM:	April 2019	DATE TO:	October 2019
Including Weekends (circle one)			
TIME	Start Shift: 0600 Hrs	Finish Shift:	1800 Hrs
	Start Shift: Hrs	Finish Shift:	Hrs
ASSOCIATED PROJECT No/Name:	Beetaloo Basin Exploration Project		
EXISTING SPEED LIMIT/s	130 KM/H	KM/H	KM/H
REQUESTED SPEED LIMIT/s	110 KM/H	80 KM/H	60 KM/H
REQUESTING PERSON	Chris Boyer WZ1 18444 Exp 21/12/2021		
REQUESTING ORGANISATION	Trafficwerx NT P/L		
DIPL AUTHORISATION (Print Name, Sign & Date)			
Name:	Signature:	Date: / /20	
Comments:			
DIPL Approving Officer to forward authorised document to: NT Police.			

13.11 APPENDIX K Project Documentation




NEWCASTLE WATERS
STUART HIGHWAY
DALY WATERS
EXISTING ACCESS/TALOUT DRAIN
ACCESS ROAD
LEGEND
EXISTING
CONTOURS
PROPOSED
ACCESS ROAD CENTERLINE
EDGE OF PAVEMENT
EDGE OF SHOULDER
EDGE OF FOOTPATH
EXTENT OF CLEARING - (EXTENT OF FREE BREAK)
NOTES:
1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. LOCATION OF INTERSECTION IS TO BE CONFIRMED BY CONTRACTOR ON SITE
3. THE CONTRACTOR IS RESPONSIBLE FOR PERMITS REQUIRED FOR CONSTRUCTION IN ROAD RESERVE AND TIE-IN TO EXISTING ROADWAY.
4. CONTRACTOR IS RESPONSIBLE TO FIND/LOCATE EXISTING SERVICES. ANY DAMAGE TO EXISTING SERVICES TO BE RE-INSTATED AT THE CONTRACTORS EXPENSE
5. TRAFFIC ROAD SIGNAGE TO COMPLY WITH AS1743 AND NORTHERN TERRITORY GUIDELINES.
6. SIGNAGE TO BE INSTALLED PRIOR TO ROAD USE.
7. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH THE APPROVED MANAGEMENT PLAN REQUIREMENTS.
8. NO CONSTRUCTION WORKS ARE TO BE CARRIED OUT OUTSIDE THE APPROVED WORK CORRIDOR BOUNDARIES.
9. CONSTRUCTION FACILITY AREA LOCATIONS TO BE APPROVED BY THE SUPERINTENDENT PRIOR TO WORKS COMMENCING.
10. NO SERVICES WERE PRESENT OR PROVIDED BY DBYD AT THE TIME OF DESIGN AND ARE THEREFOR NOT SHOWN. HOWEVER THE CONTRACTOR IS RESPONSIBLE FOR CONDUCTING A SEARCH PRIOR TO WORKS BEING CARRIED OUT.
11. THE CONTRACTOR IS TO LIAISE WITH SERVICE PROVIDERS AND THE RELEVANT AUTHORITIES TO ENSURE ALL CONSTRUCTION WORKS ARE CARRIED OUT IN ACCORDANCE WITH SERVICE PROVIDERS AND RELEVANT AUTHORITIES REQUIREMENTS.
12. THIS DRAWING MAY BE USED FOR TEMPORARY ACCESS APPLICATION TO NT ROADS.
13. REFER TO DRG NT-2050-20-DA-XXXX FOR ROAD PAVEMENT DETAILS.
14. FINISH SURFACE LEVELS ARE TO FOLLOW EXISTING SURFACE LEVELS AS NEAR AS POSSIBLE AND TO THE GRADES SPECIFIED ON THE DRAWINGS.
15. TABLE DRAINS ARE TO BE CUT ALONG THE LENGTH OF THE ROAD AND ALL ROAD PAVEMENTS ARE TO HAVE A 4% CROSSFALL IN ACCORDANCE WITH THE ROAD CROSS-SECTION DETAILED ON DRG NT-2050-20-DA-0013.
PRELIMINARY
NOT FOR CONSTRUCTION
STUART HIGHWAY INTERSECTION DETAIL
AECOM
origin
BEETALOO EXPLORATION DRILL CAMPAIGN
KYALLA 117 N2=1
DRILL PAD, ACCOMMODATION CAMP AND WATER TANK
STUART HIGHWAY INTERSECTION DETAIL
NT-2050-20-DA-XXX3
A1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FOR CONTINUATION REFER TO INSET
FOR CONTINUATION REFER INTERSECTION DETAIL
INSET
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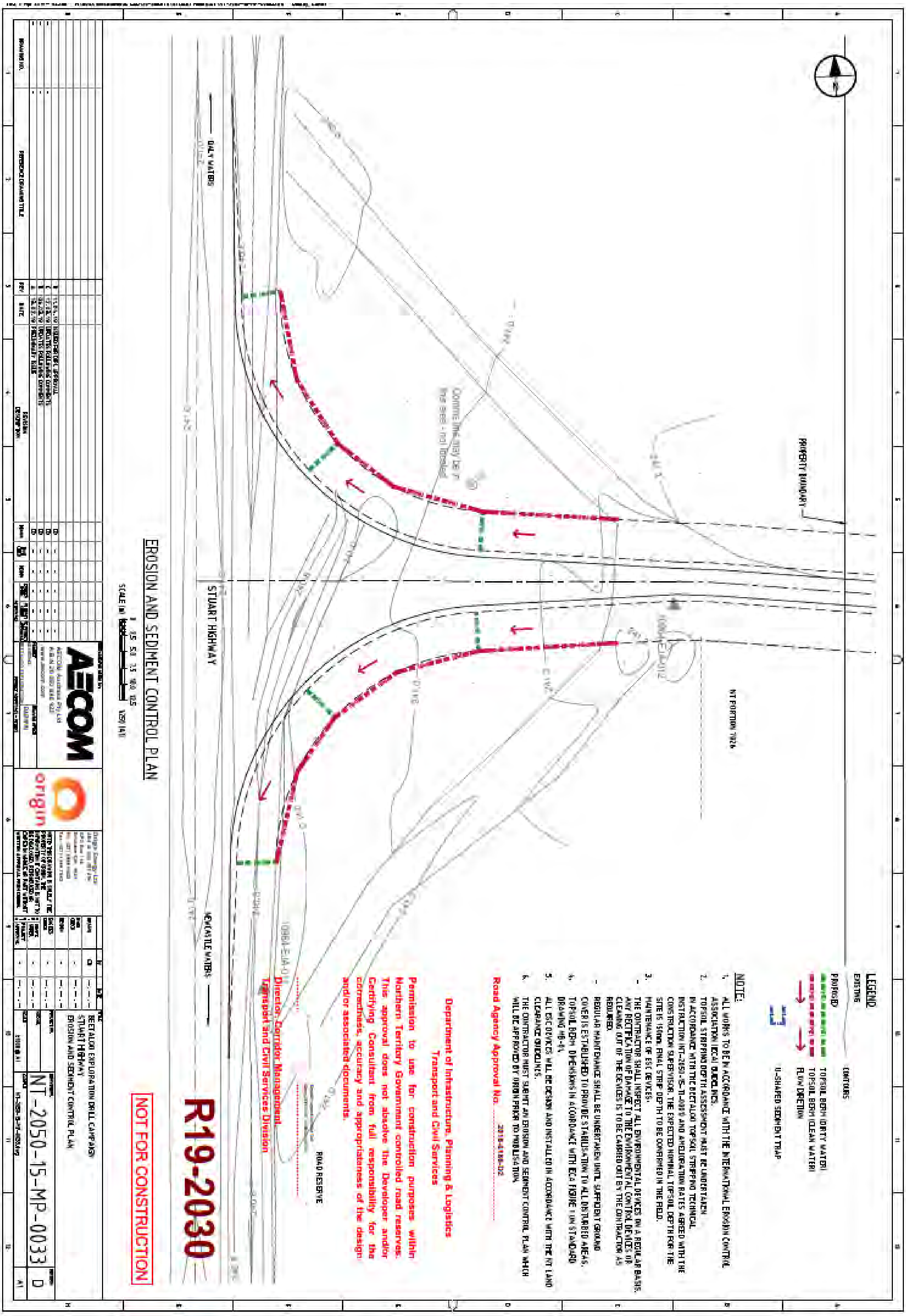
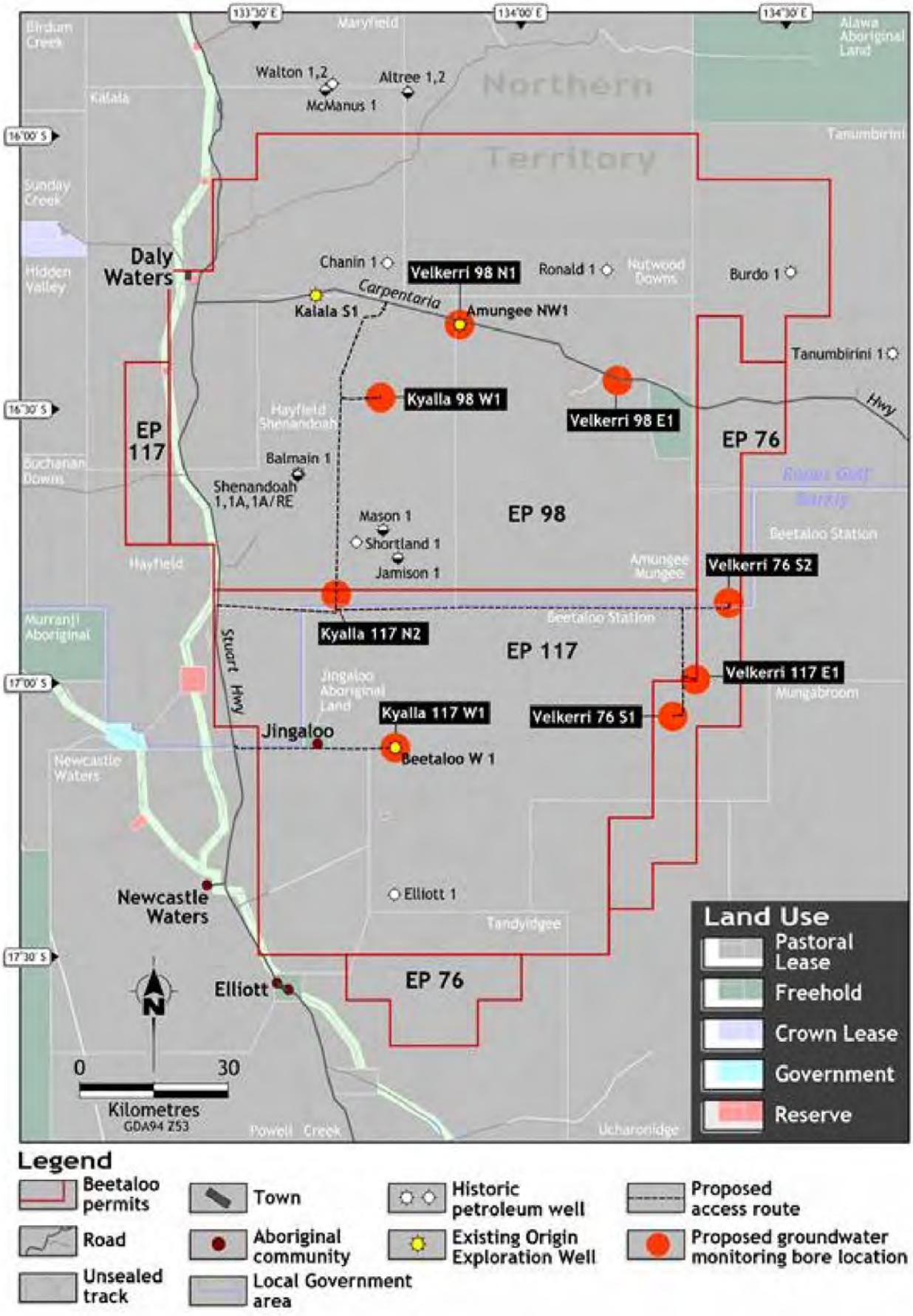
ACCESS ROAD
PROPERTY BOUNDARY
STUART HIGHWAY
DRILL LEASE ACCESS ROAD (GRAVEL ROAD)
PASSING LANE (TYP)
FLEXIBLE GUIDE POSTS (TYP)
INSTALL R1-1B
INSTALL R1-2
INTERSECTION PAVEMENT TO BE TIED TO EXISTING SHOULDER
SHOULDER SEAL WIDTH (TYP)
ROAD RESERVE
ACCESS ROAD SETOUT
PT
CHAINAGE
X COORD
Y COORD
BEARING
RADIUS
ARC LENGTH
DEFL ANGLE
LEGEND
PROPOSED
ACCESS ROAD CENTRELINE
EDGE OF PAVEMENT
EDGE OF SHOULDER
EXTENT OF CLEARING - (EXTENT OF FIRE BREAK)
NOTES:
1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH THE APPROVED MANAGEMENT PLAN REQUIREMENTS.
3. NO CONSTRUCTION WORKS ARE TO BE CARRIED OUT OUTSIDE THE APPROVED WORK CORRIDOR BOUNDARIES.
4. CONSTRUCTION FACILITY AREA LOCATIONS TO BE APPROVED BY THE SUPERINTENDENT PRIOR TO WORKS COMMENCING.
5. THE CONTRACTOR TO LIAISE WITH SERVICES PROVIDERS AND THE RELEVANT AUTHORITIES TO ENSURE ALL CONSTRUCTION WORKS ARE CARRIED OUT IN ACCORDANCE WITH SERVICE PROVIDERS AND RELEVANT AUTHORITIES REQUIREMENTS.
6. NO SERVICES WERE PRESENT OR REPORTED BY DBYD AT THE TIME OF DESIGN AND ARE THEREFORE NOT SHOWN. HOWEVER THE CONTRACTOR IS RESPONSIBLE FOR CONDUCTING A SEARCH PRIOR TO WORKS BEING CARRIED OUT. ANY DAMAGE TO EXISTING SERVICES TO BE RE-INSTATED AT THE CONTRACTORS EXPENSE.
7. SIGNAGE TO BE INSTALLED PRIOR TO ROAD USE.
8. THIS DRAWING MAY BE USED FOR TEMPORARY ACCESS APPLICATION TO NT ROADS.
9. LOCATION OF INTERSECTION IS TO BE CONFIRMED BY CONTRACTOR ON SITE
10. THE CONTRACTOR TO CONFIRM RCP IS APPROVED PRIOR TO COMMENCING ANY SITE WORKS.
11. TRAFFIC ROAD SIGNAGE TO COMPLY WITH AS1743 AND NORTHERN TERRITORY GUIDELINES.
12. REFER TO DRG NT-2050-20-DD-0022 FOR ROAD PAVEMENT DETAILS.
13. FINISH SURFACE LEVELS ARE TO FOLLOW EXISTING SURFACE LEVELS AS NEAR AS POSSIBLE AND TO THE GRADES SPECIFIED ON THE DRAWINGS.
14. TABLE DRAINS ARE TO BE CUT ALONG THE LENGTH OF THE ROAD AND ALL ROAD PAVEMENTS ARE TO HAVE A 4% CROSSFALL IN ACCORDANCE WITH THE ROAD CROSS-SECTION DETAILED ON DRG NT-2050-20-DD-0022.
15. FLEXIBLE GUIDE POSTS IN ACCORDANCE WITH DIPL STANDARD DRAWING DSI1050.
Road Agency Approval No. 2018-0186-DC
Department of Infrastructure, Planning & Logistics
Transport and Civil Services
Permission to use for construction purposes within Northern Territory Government controlled road reserves.
This approval does not absolve the Developer and/or Certifying Consultant from full responsibility for the correctness, accuracy and appropriateness of this design and/or associated documents.
Director, Corridor Management,
Transport and Civil Services Division
STUART HIGHWAY INTERSECTION DETAIL
SCALE (m) 0 2.5 5.0 7.5 10.0 12.5
1:250 (A1)
NOT FOR CONSTRUCTION
R19-2029
AECOM
origin
BEETALOO EXPLORATION DRILL CAMP AND
STUART HIGHWAY
INTERSECTION DETAIL
NT-2050-20-DD-0021
E
A1


EROSION AND SEDIMENT CONTROL PLAN
STUART HIGHWAY
DALY WATERS
NEWCASTLE WATERS
PROPERTY BOUNDARY
NT PORTION 7826
ROAD RESERVE
LEGEND
NOTE:
Department of Infrastructure, Planning & Logistics
Transport and Civil Services
Permission to use for construction purposes within Northern Territory Government controlled road reserves. This approval does not absolve the Developer and/or Certifying Consultant from full responsibility for the correctness, accuracy and appropriateness of the design and/or associated documents.
Road Agency Approval No.
Director, Corridor Management
Transport and Civil Services Division
R19-2030
NOT FOR CONSTRUCTION
AECOM
origin
BEETALOO EXPLORATION DRILL CAMPAIGN
STUART HIGHWAY
EROSION AND SEDIMENT CONTROL PLAN
NT-2050-15-MP-0033
D


133°30' E
134°00' E
134°30' E
16°00' S
16°30' S
17°00' S
17°30' S
Birdum Creek
Maryfield
Alawa Aboriginal Land
Walton 1,2
Altree 1,2
McManus 1
Kalala
Northern Territory
Tanumbirini
Sunday Creek
Daly Waters
Hidden Valley
Chanin 1
Velkerri 98 N1
Ronald 1
Nutwood Downs
Burdo 1
Carpentaria
Kalala S1
Amungee NW1
Tanumbirini 1
Kyalla 98 W1
Velkerri 98 E1
Hwy
EP 117
Hayfield Shenandoah
EP 76
Buchanan Downs
Balmain 1
Shenandoah 1,1A,1A/RE
Mason 1
EP 98
Shortland 1
Jamison 1
Beetaloo Station
Hayfield
Amungee Mungee
Velkerri 76 S2
Murranji Aboriginal
Kyalla 117 N2
Beetaloo Station
Stuart Hwy
EP 117
Jingaloo Aboriginal Land
Velkerri 117 E1
Mungabroom
Kyalla 117 W1
Velkerri 76 S1
Jingaloo
Beetaloo W 1
Newcastle Waters
Elliott 1
Tandyidgee
Newcastle Waters
Elliott
EP 76
N
0
30
Kilometres
GDA94 Z53
Powell Creek
Ucharonidge
Land Use
Pastoral Lease
Freehold
Crown Lease
Government
Reserve
Legend
Beetaloo permits
Road
Unsealed track
Town
Aboriginal community
Local Government area
Historic petroleum well
Existing Origin Exploration Well
Proposed access route
Proposed groundwater monitoring bore location

13.12 APPENDIX L Safe Work Method Statement

SAFE WORK METHOD STATEMENT	SWMS-01 Traffic Control	PH: 89 42 2228
Trafficwerx NT	6 Nylander Street Parap, NT 0820	ABN: 10 142 427 889

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This Safe Work Method Statement must be reviewed in consultation with employees for relevance for the task and approved by TWNT management prior to implementation.

TWNT Principal Contractor	YES	NO	Date of Issue
Principal Contractor		X	
Principal Contractor ABN			Contact Details
			Address
Principal Approval	☐ Yes approved for use *(approval document to attached to this SWMS)* ☐ Not approved – Principal SWMS used		
Project:		**Location**	

Activity / Task	Traffic Control			
High Risk Construction Work	Risk of a Person Falling More Than 2 Metres		Work in Telecommunication Tower	Demolition of Load Bearing Structures
	Likely to involve Disturbing Asbestos		Temporary Load –bearing support for structural alterations or repairs	Work in or near confined space
	Work in or near a shaft or trench deeper than 1.5m or a tunnel		Use of Explosives	Work on or near pressurised gas
	Work on or near chemical, fuel or refrigerant lines		Work on or near energised electrical installations or services	Work in an area that may have a contaminated or flammable atmosphere
	Tilt up or precast concrete elements	√	Work on in or adjacent to road, railway, shipping land or other traffic	√ Work in an area with movement of powered mobile plant
	Work in areas with artificial extremes of temperature		Work in or near water or other liquid that involves a risk of drowning	Diving Work
SWMS No / Rev No				
SWMS Developed by				
Persons Responsible for reviewing				
Review Timeframes	Prestart Daily☐ Weekly ☐Monthly			
Plant & Equipment required:	Traffic Signage, Stop/Slow Bats, Cones, Bollards, Traffic Vehicle, Hand Held UHF, Flashing Light			
Maintenance Checks / Service Requirements	As per manufacturers requirements, Vehicle serving			
Permits, Approvals, Licences Required	Relevant local authority permits/approvals (work on roads)			
Competencies / Tickets Required	Construction Induction White Card, WZ1, WZ2, WZ3,			

Mandatory PPE Requirements	**Other PPE Requirements**

Management Approval: SWMS approved for use, from date of issue:	Name:	Position:	Signature:

Rev 3	12/10/18

Trafficwerx NT Document

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LEGISLATIVE REQUIREMENTS				
Consulted: Regulations and Acts, Codes of Practice, Standards, Australian Standards, Industry best practice guides and other required items such as manuals.				
Legislation				
Work Place Health and Safety Act (National Uniform Legislation)	Work Health and Safety Regulations (National Uniform Legislation)	NT Return to Work Act	NT Return to Work Regulations	Managing Noise and Hearing Loss in the Workplace
Managing the Risk of Falls in the Workplace				
Australian Standards				
ISO 14001 Environmental Management Systems	AS/NZS 9001 Quality Management Systems	AS 1742.2 Manual of Uniform Traffic Control Devices – Traffic Control Devices for General Use	AS/NZS 4801 Occupational Health and Safety Management Systems	Prevention of Falls in General Construction
AS-3745 .5:2010 Planning for Emergencies in Facilities	AS/NZS 31000 Risk Management - Principles and Guidelines	AS 1742.3 Manual of Uniform Traffic Control Devices – Traffic Control for Work on Roads	AS/NZS 1336:2014 Eye Protection	AS/NZS 2210.1:2010 Safety Footwear
AS 1742.1 Manual of Uniform Traffic Control Devices – General Introduction and Index of Signs	AS/NZS 4602.1:2011 High Visibility Safety Garments	AS 1742.4 Manual of Uniform Traffic Control Devices – Speed Devices	AS 1742.10 Manual of Uniform Traffic Control Devices – Pedestrian Control and Protection	AS 1742.13 Manual of Uniform Traffic Control Devices – Local Area Traffic Management
Codes of Practice / Other Resources				
WHS Consultation, Co-Operation and Co-Ordination	First Aid in the Workplace	How to Manage Work Health and Safety Risks	Fatigue Management	Hazardous Manual Tasks 2016
NT Road Users Handbook	Managing the Work Environment and Facilities.			

		Consequences				
		Insignificant	**Minor**	**Moderate**	**Major**	**Catastrophic**
	OHS	Minor incident/first aid	Medical treatment injury/ restricted work duties/general safety breach	LTI less than 5 days minor Injury	Minor Permanent disability/ LTI greater than 5 days	Fatality/Serious permanent disability
	Environmental	Negligible reversible impact, requiring minor remediation	Minor reversible impact, requiring minor remediation	Moderate impact short term effect, moderate remediation	Serious impact with medium term effect, significant remediation	Disastrous environ impact, long term effect, major remediation
	Quality	Less than $25K in damage or cost	$25K - $50K in damage or cost	$50K - $100K in damage or cost	$100K - $150Kin damage or cost	Greater than $150K in damage or cost
LIKELIHOOD	**Almost certain** *Could occur with the failure of defences*	17 High	22 Extreme	23 Extreme	24 Extreme	25 Extreme
	Likely *Could occur with the failure of defences*	15 High	16 High	19 Extreme	20 Extreme	21 Extreme
	Possible *Involve the failure of a hard defence or multi basis defences*	9 Moderate	8 Moderate	13 High	14 High	18 Extreme
	Unlikely Involve *the failure of multiple hard defences*	4 Low	5 Low	7 Moderate	11 High	12 High
	Rare *Involve the unlikely failure of multiple hard defences*	1 Low	2 Low	3 Low	6 Moderate	10 High

LOW	*Acceptable risk, activity may proceed with current controls in place.*	HIGH	*The activity **CANNOT** proceed until additional supervision is required, use of permit systems as required and controls are to be reviewed by senior management prior to proceeding*
MODERATE	*The activity is to be reviewed by senior management prior to proceeding.*	EXTREME	*The activity **MUST NOT** proceed. **Stop** Work Immediately seek senior management assistance*

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Step	Description of Tasks	Potential Hazards	R /B *Risk with No Controls*	Control Measures: Actions to be Taken. **Hierarchy of Controls:** *E= Elimination/ Design Modification, S= Substitution, I= Isolation, Eng= Engineering, A= Administration, PPE= Personal Protective Equipment*	R / A *Risk After Control Measures*	Responsible Person/s
1	**Authorisation of Work**	Unqualified Personnel	19	➢ Licensed traffic controllers (Wz 2 / Wz 3), ➢ Current drivers licence, ➢ Valid construction induction (white card), ➢ Ensure all personnel have signed/ trained in the use of SWMS, ➢ Training to be conducted under the direct supervision of a qualified controller, (approved by DIPL) ➢ Reflective high visibility clothing worn,	3	Supervisor
		Unaware of Project Hazards / Risks	19	➢ Attend all required inductions, meetings identified by the principal contractor for the project, ➢ Identification of required UHF channel to be used ➢ Notify principal contractor of any new risks / incidents, in conjunction with TWNT supervisor	3	TWNT Supervisor Traffic Controllers
		Traffic Management Plan incorrect	19	➢ Site inspection conducted by Wz1 person to ensure correct and current plan developed, ➢ Traffic management plan (TMP) / TGS authorised by WZ1, appraised by DIPL, ➢ Competent / qualified controllers	3	TWNT Supervisor Traffic Controllers
		Incorrect equipment/signage	13	➢ Signage to be placed as per identified on TGS in conjunction with TMP, ➢ Adequate number of signage / bollards, cones, stop/slow bats, other required items onsite for implementation ➢ UHF / Hand held radios in good working order	3	TWNT Supervisor Traffic Controllers
		Traffic vehicle not equipped	13	➢ Traffic vehicle to have: ➢ Fixed or hand-held UHF available, ➢ Flashing light working, ➢ First aid kit – stocked, ➢ Vehicle prestart completed	3	TWNT Supervisor Traffic Controllers
2	**Site Mobilisation**	Traffic Management Plan not endorsed / approved for use	13	➢ Traffic management plan is to be developed by a qualified Wz1 Person, ➢ Plan is to be submitted to the NTG DIPL for appraisal, ➢ NO works is allowed to commence until plan has been appraised	3	TWNT Supervisor Traffic Controllers
		Collison with Traffic Vehicle	19	➢ Traffic vehicle to park a safe distance of roadway, ➢ Ensure that no traffic is coming from both directions prior to exiting vehicle, ➢ Ensure that traffic vehicle flashing light is operational and working	3	TWNT Supervisor Traffic Controllers

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		Incorrect location for traffic area for implementation of TGS	**19**	➢ Area to be identified onsite as per TGS, ➢ Signage to be installed as per TGS identified with correct distances between signs, bollards, and or cones used ➢ Where TGS is incorrect location, devices used – contact is to be made immediately to the supervisor, ➢ TGS to be updated by qualified WZ1 Person prior to further use	**3**	TWNT Supervisor Traffic Controllers
		Slips, Trips and Falls	**13**	➢ Visual inspection of area prior to any walking – works, ➢ Keep work areas clean, ➢ Attend daily onsite prestart inspection	**3**	TWNT Supervisor Traffic Controllers
		Other personnel	**19**	➢ Attend principal contractor prestart meeting – give notification to supervisor where a new risk or change has occurred to TGS / TMP, ➢ All TWNT personnel are required to sign onto the daily prestart, inspection, diary form, ➢ Ensure other personnel on site are made aware of the TMP at daily pre-start meeting ➢ TMP drawing to be displayed on site ➢ Any changes to TMP to be disseminated to others at pre-start meetings and displayed on site	**3**	TWNT Supervisor Traffic Controllers
3	**Emergency**	Inadequate Emergency Preparedness	**19**	➢ Notification of onsite muster point identified at induction, ➢ Emergency equipment locations identified at inductions, ➢ Emergency response to be accordance with the principal contractor plan and TMP	**3**	TWNT Supervisor Traffic Controllers
4	**Set Up Traffic Control**	Traffic Controller struck by traffic whilst marking out – setting up TGS	**19**	➢ DO not run across road, ➢ Ensure visual inspection is conducted on both lanes of traffic prior to any works, ➢ Work in the direction of traffic, ➢ TGS not set up during the rain & minimum 300 m sight distance required during the fog prior to set up TGS. ➢ Traffic controller to call on UHF Channel (Identified at Induction) when passing other vehicles throughout the worksite. ➢ Get acknowledgement from operator that it is safe to pass on site. ➢ Place signs with protection from a shadow vehicle equipped with arrow board and/or rotating amber lights visible. **Sequence of erection & removal of signs as per the AS 1742.3 2009:** ➢ Advance warning & regulatory signs ➢ All intermediate advance warning & regulatory signs & device	**3**	TWNT Supervisor Traffic Controllers

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				➢ Start of the work area ➢ Delineation of the work area or side track ➢ All other warning & regulatory signs, including termination and end of temporary speed zone signs		
		Slips, Trips, Falls – possible into traffic	13	➢ Traffic controllers are required to ensure safety shoes are worn with good grip on the soles. ➢ Keep their eye on the path and check surrounding area, e.g. working at uneven surface of ground, shoulders and/or verge ➢ Check of uneven and slippery ground conditions prior to approach	3	TWNT Supervisor Traffic Controllers
		Incorrect placement / spacing of signage	13	➢ A site inspection must be undertaken before preparing a TGS so localised specific hazards e.g. corners, hills, angle of sun, merging lanes etc are taken into consideration when designing the TGS, ➢ Traffic supervisor is to conduct a daily site inspection immediately after traffic control has been installed and rectify problems found, ➢ The position and provision for parking on the side of roads also needs to be considered when placing signs to ensure parked cars do not obscure signs to oncoming traffic.	3	TWNT Supervisor Traffic Controllers
		Pedestrians	13	➢ Traffic control to be set up as per TGS, ➢ Ensure that only authorised personnel are allowed to enter worksite, ➢ Ensure signs/traffic control devices remain appropriate to traffic conditions e.g. signs visible to all person/s, ➢ TGS to ensure that there is identified separation between works, vehicles and pedestrians	3	TWNT Supervisor Traffic Controllers
		Manual Handling	13	➢ Traffic control devices, signs are to be delivered to the work areas via the approved Traffic Control vehicle, ➢ Traffic controllers are to seek assistance from other workers to lift / carry any difficult signs e.g. oversized, ➢ Ensure that a clear path is taken towards the areas where traffic devices are to be displayed	3	TWNT Supervisor Traffic Controllers
		Traffic devices fall into path of traffic / machines	19	➢ Traffic controllers are to ensure that sign placement – distances is on accordance with the TGS ➢ All temporary signage used is to be secured via weighted sand bags, at least 1 per sign, ➢ Permanent signs should be fixed; if above is not sufficient, ➢ Ensure that signs are set up in a clear of roadway, and are secured to remain in position during wind, rain, or passing traffic,	3	TWNT Supervisor Traffic Controllers

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				➢ Daily checklists are to be completed 3 times a day – daily prior to any works, middle of day and end of day to ensure that all traffic devices are visible and in correct location		
		Signage not visible	19	➢ Signage to be used as per the Australian standards, ➢ Signage to be visible from required traffic direction, clean, and erected as per TGS	3	TWNT Supervisor Traffic Controllers
		Manual Handling Injury	13	➢ Correct body posture, ensure correct lifting technique is used (Straight back and bend knee's) ➢ Two persons lift where required ➢ Avoid twisting	3	TWNT Supervisor Traffic Controllers
		Un-serviceable Equipment	13	➢ Prestart check of all equipment for damage – report damaged equipment to supervisor ➢ Note on daily pre-start for replacement ➢ Check flashing light and reverse alarms are operational on vehicles	3	TWNT Supervisor Traffic Controllers
		Communications	13	➢ Ensure correct UHF channel to be used on this site ➢ Ensure all personal, machinery and vehicles are clear prior to start up ➢ Hand Held UHF's checked – ensure fully charged battery	3	TWNT Supervisor Traffic Controllers
		Working Near Mobile Plant	19	➢ Visual inspection of area, ➢ Inducted to project, ➢ Ensure UHF is working, ➢ Traffic controllers to wear high-vis clothing, ➢ DO NOT exit vehicle in path of any machine, ensure visual checks is conducted both ways prior to exit	3	TWNT Supervisor Traffic Controllers
		Working near crocodile habitat		➢ Visual inspection of area ➢ DO NOT enter waterway without appropriate risk controls ➢ Stay well clear of the waterway where possible or use a spotter where required ➢ Establish a plan and an escape route in the event of a crocodile sighting	3	TWNT Supervisor Traffic Controllers
6	**Night Works**	Inadequate Lighting	19	➢ Lighting is to be provided where traffic control is to be implemented to ensure clear vision to enable reading of signage requirements, ➢ All signs are to be clean and visible	3	TWNT Supervisor Traffic Controllers
		Personnel not visible	19	➢ Traffic controllers are to wear high vis clothing, ➢ Remain of roadway where possible, ➢ Be clearly seen from traffic	3	TWNT Supervisor Traffic Controllers
7		Traffic Controller struck by	19	➢ Ensure adequate protection for workers setting up traffic management	3	TWNT Supervisor

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	Installing Lane Closures	traffic / plant		➢ Positive communications – UHF ➢ Flashing amber beacon ➢ High visibility reflective clothing		Traffic Controllers
		Slips, Trips and Falls	**19**	➢ Competent personnel ➢ Ensure signage is set up as per the TMP ➢ Ensure signs are set up where they do not pose a danger to pedestrians or traffic ➢ Ensure signs are visible to on-coming traffic ➢ Ensure signs are stable – use of sand bags where required	**3**	TWNT Supervisor Traffic Controllers
8	**Controlling Traffic**	Personnel injury	**19**	➢ Ensure Stop/Slow personnel are in correct position ➢ Clear visibility to on-coming traffic ➢ Positive communications - UHF ➢ Competent personnel	**3**	Traffic Controllers
		Collison	**13**	➢ Undertake regular checks to ensure signage/barricading is not damaged or moved ➢ Ensure signs are unobstructed by vegetation etc ➢ Ensure any temporary traffic light systems are operational ➢ Document checks	**3**	Traffic Controllers
		Fatigue	**13**	➢ Ensure adequate breaks are taken ➢ Adequate personnel to cover all breaks in order to maintain TMP requirements	**3**	Traffic Controllers
		Heat/UV Exposure	**13**	➢ Adequate potable water supply ➢ Take regular breaks ➢ Where possible – a shade structure could be installed ➢ Wide/sun brims to hard hats ➢ Sun protection ➢ Sunglasses ➢ Long sleeves/pants	**3**	Traffic Controllers
		Construction traffic	**19**	➢ All construction traffic not in use to be parked out of work zone ➢ Where possible – construction traffic to be moved off the roadways as soon as possible.	**3**	Traffic Controllers

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		Detours	**13**	➢ Ensure signage complies with TMP ➢ Monitor ground conditions of detour regularly and after any rain event ➢ Where required, traffic control vehicle to lead traffic through detours to maintain reduced speed limit	**2**	Traffic Controllers
		Traffic congestion	**13**	➢ Consider stopping construction work to reduce congestion and start traffic flowing ➢ Where possible – schedule works outside heavy traffic times	**2**	Traffic Controllers
9	**TMP / TGS Changes**	Incorrect TGS used	**19**	➢ TMP /TGS changes to be conducted by a qualified Wz1 person, ➢ New changes to be submitted to NTG DIPL for approval ➢ ALL old TMP/ TGS are to be removed from use, ➢ ONLY new TMP / TGS is to be available for use, ➢ Site traffic controller to ensure the traffic devices are implemented correctly	**3**	Site Supervisor Traffic Controllers
10	**Removal of traffic control equipment**	Struck by Traffic / Mobile Plant	**19**	➢ Remove or cover unrequired overnight signage – where works are continuing the next day ➢ Where job is finished – remove signage/cones/barricading from the middle out	**3**	Site Supervisor Traffic Controllers
		Manual Handling	**13**	➢ Use correct manual handling procedures – bend knees, straight back, avoid twisting	**3**	Traffic Controllers
		Traffic Devices falling into traffic path	**19**	➢ All signage is to be secured by sand bags at least one per sign, ➢ Signage to be positioned a safe distance from live traffic, ➢ Daily inspection conducted on signage – 3 times per day, ➢ Any sign fallen down to be re-erected as per the TGS	**3**	Traffic Controllers
		Documentation	**13**	➢ Ensure all documentation pertaining to checks has been completed by relevant person ➢ Ensure the next shift is made aware of any changes to the TMP and that these changes will be implemented and disseminated to workers	**3**	Traffic Controllers
		Working near crocodile habitat		➢ Establish a communication plan and an escape route in the event of a crocodile sighting ➢ Conduct visual inspection of area ➢ DO NOT enter waterway without appropriate risk controls ➢ Stay well clear of the waterway where possible or use a spotter where required	**3**	TWNT Supervisor Traffic Controllers

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Induction / Sign On					
Prior to signing the below, I have had opportunity for input into the development or review of the SWMS. I acknowledge by signing below I am FIT for duty, I have read and understand he steps involved with this SWMS and my obligations that relate to the individual activities that create the SWMS I will comply with this SWMS, Company Policies and Procedures, and ensure those around me comply or I will stop the works immediately.					
Date	**Name**	**I was consulted / had input into the SWMS content**		**Company**	**Signature**
		Yes / No	**Comments**		

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ADDITIONAL HAZARDS / STEPS TO PROCESS IDENTIFIED

Additional Steps / Hazards are to be recorded below in table. Once completed given to TWNT supervisor to update SWMS content.
Where an update has occurred, all personnel **MUST** resign on to acknowledge any changes.

STEP	DESCRIPTION	HAZARDS	CURRENT RISK LEVEL	CONTROL MEASURES	RESIDUAL RISK LEVEL

Information has been redacted due to confidentiality requirements

13.14 APPENDIX N TMP Completion Checklist

This checklist MUST be completed to ensure all required documentation has been included in this TMP before providing for use at the work site.

Document	Yes	N/A
Risk Analysis - **Completed**	✓	
Traffic Guidance Scheme(s) - **Completed**	✓	
Sign and Equipment Manifest - **Completed**	✓	
Certificate of Currency of Public Liability Insurance - **Current**	✓	
Road Authority Application for Permit to Work within the NTG Road Reserve – **Completed**		✓
Conditions of Approval - **Completed**		✓
Road Authority Permit/Tracking No. Notification - **Assigned**		
Portable Traffic Signal Authorisation - **Approval**		✓
Temporary Speed Limit Authorisation - **Approval**		
Agency Notification - **Transmitted**		
Public Notification - **Actioned**		✓

Checklist completed by:

Print name	
Signature	
Date	

Appendix I Origin Beetaloo Basin Project Series

2019 Work Program

This year's work program consists of two exploration wells to evaluate liquids rich gas potential.

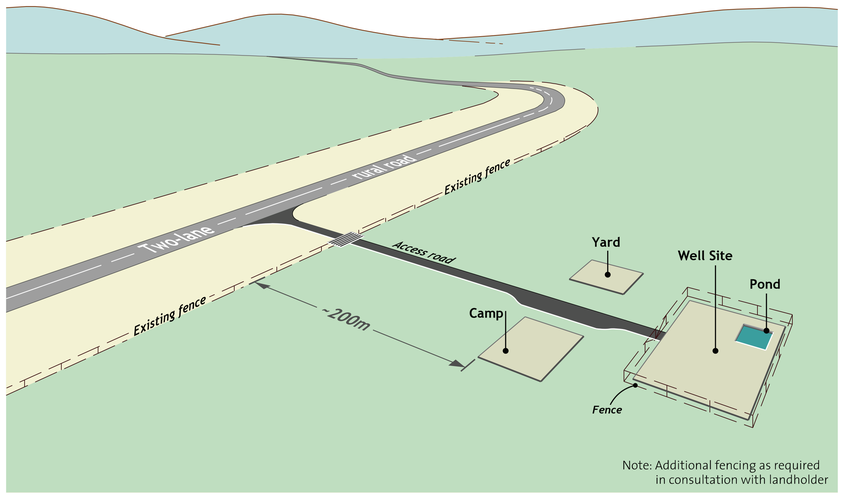
EP 76 Drill and fracture stimulate the Velkerri 76 well

EP 117 Drill and fracture stimulate the Kyalla 117 well

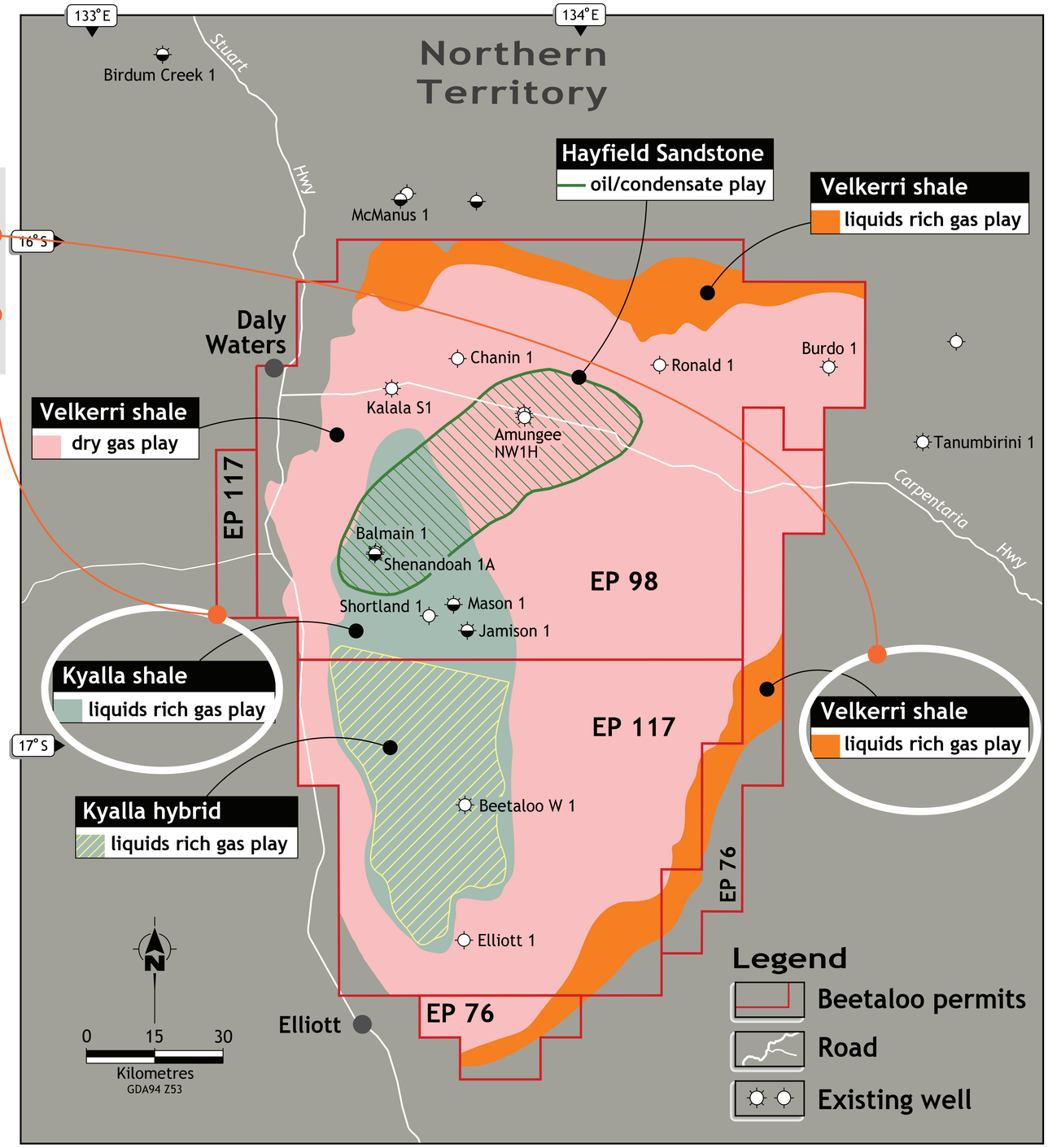
Native Title Holders and custodians together with the Northern Land Council (NLC) completed sacred site clearance and avoidance surveys for this work in September 2018.

Geological studies will continue in other exploration permit areas.

Drilling surface location layout



Note: Additional fencing as required in consultation with landholder



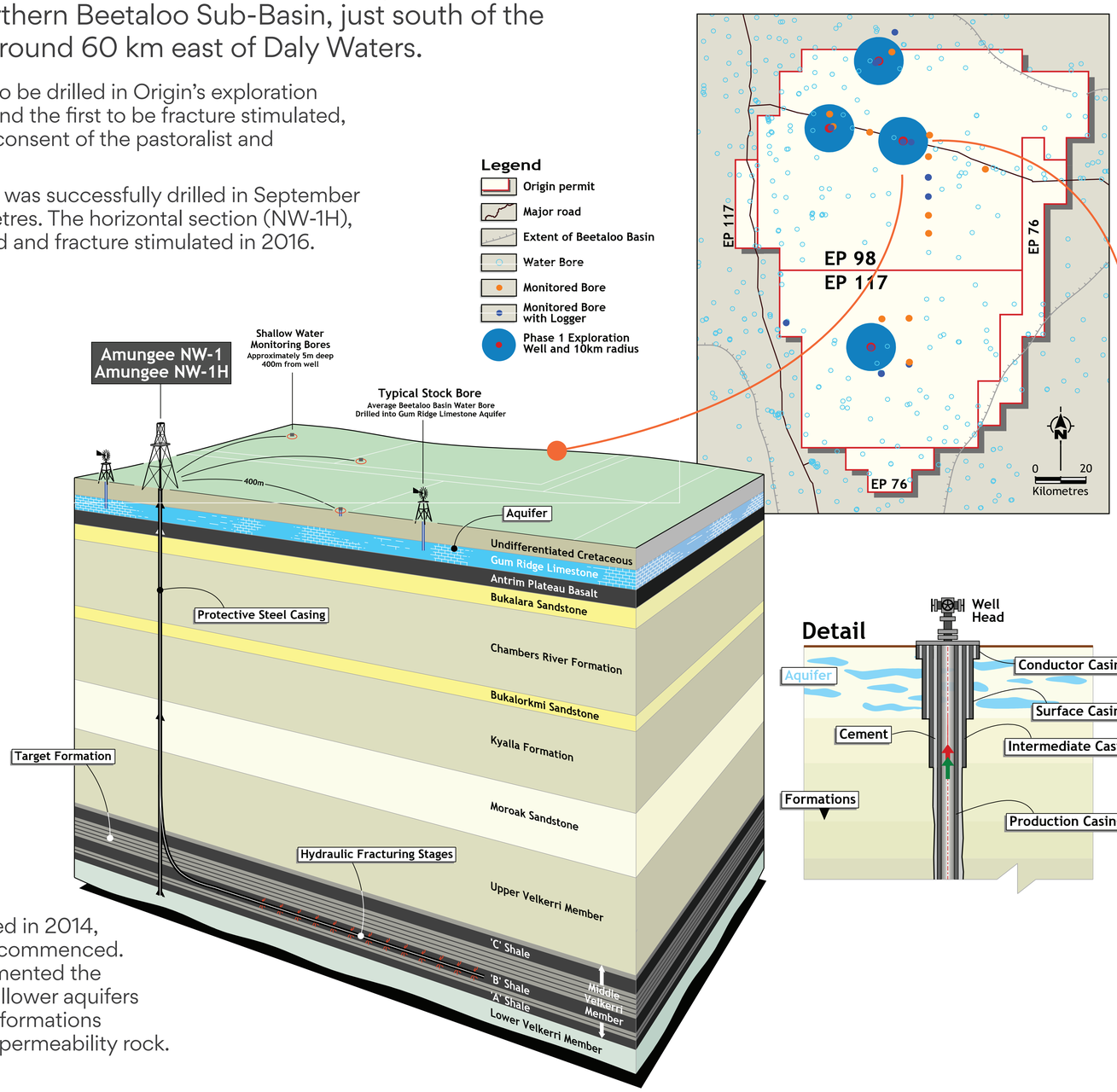
Amungee NW-1 & NW-1H
(Drilling & Environmental Controls)

The Amungee NW-1 / NW-1H well is in the in centre of Exploration Permit 98 (EP98) in the northern Beetaloo Sub-Basin, just south of the Carpentaria Highway and around 60 km east of Daly Waters.

Amungee is the first horizontal well to be drilled in Origin's exploration program in the Beetaloo sub-basin and the first to be fracture stimulated, within existing regulations and with consent of the pastoralist and Traditional Owners.

The vertical stage of the well (NW-1) was successfully drilled in September 2015 to a depth of around 2,600 metres. The horizontal section (NW-1H), around 1,100 metres long, was drilled and fracture stimulated in 2016.

Subsequent production testing over a 57-day period confirmed the wells ability to flow gas, returning an average of 1.1 million cubic feet of gas per day.



Groundwater monitoring

Groundwater monitoring is a regulatory requirement that allows us to detect any potential groundwater impacts that may occur from exploration activities. It also improves our understanding of the natural variability of water volumes and quality, and broader hydrogeological system in the Beetaloo sub-Basin.

Groundwater monitoring commenced in 2014, before current exploration activities commenced. A formal monitoring plan was implemented the following year - focussing on the shallower aquifers which are separated from the target formations containing gas by over 1.5km of low permeability rock.

This monitoring has found there no evidence of any impact from current exploration activities.

- Groundwater levels have remained stable in the shallower Cretaceous and Cambrian Limestone aquifers;
- The Cenozoic perched aquifer closest to surface responds strongly to rainfall, but water levels recede quickly suggesting a limited storage volume;
- Little or no hydrocarbons have been detected in bore sampling. Only one location found dissolved methane in trace concentrations
- All water sampled is suitable for stock use

Beetaloo Basin Gas

Our exploration program is evaluating both dry gas and liquids rich wet gas in the Velkerri and shallower Kyalla shale formations. Each play has different characteristics.

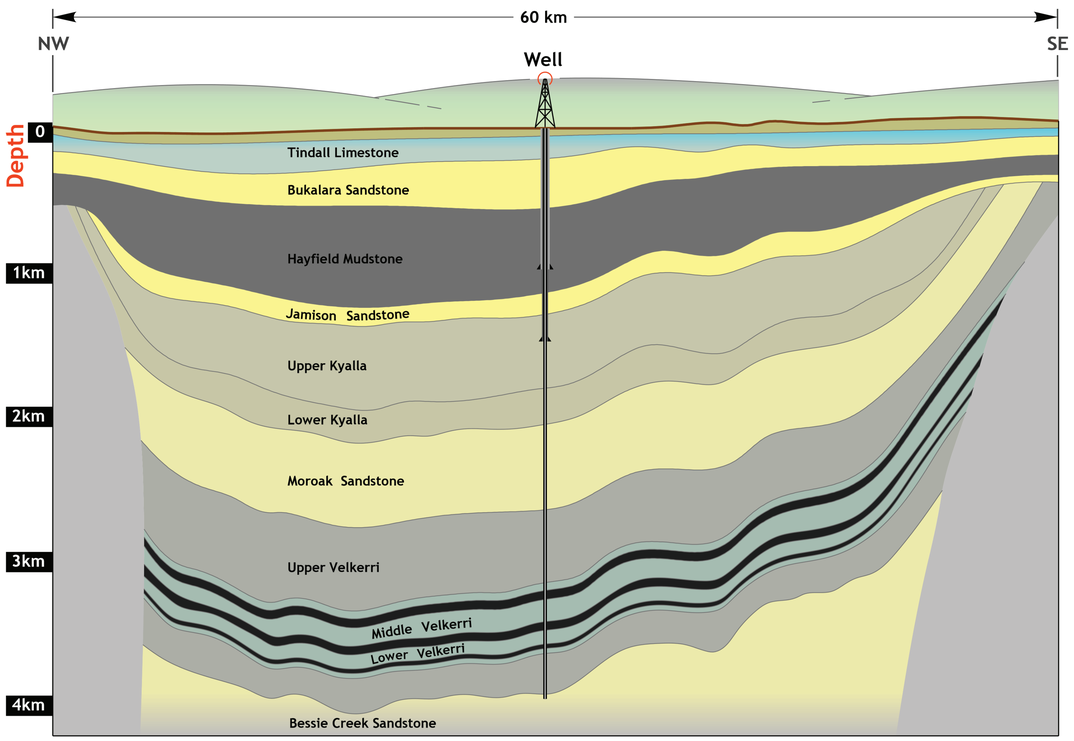
A Billion Years In The Making

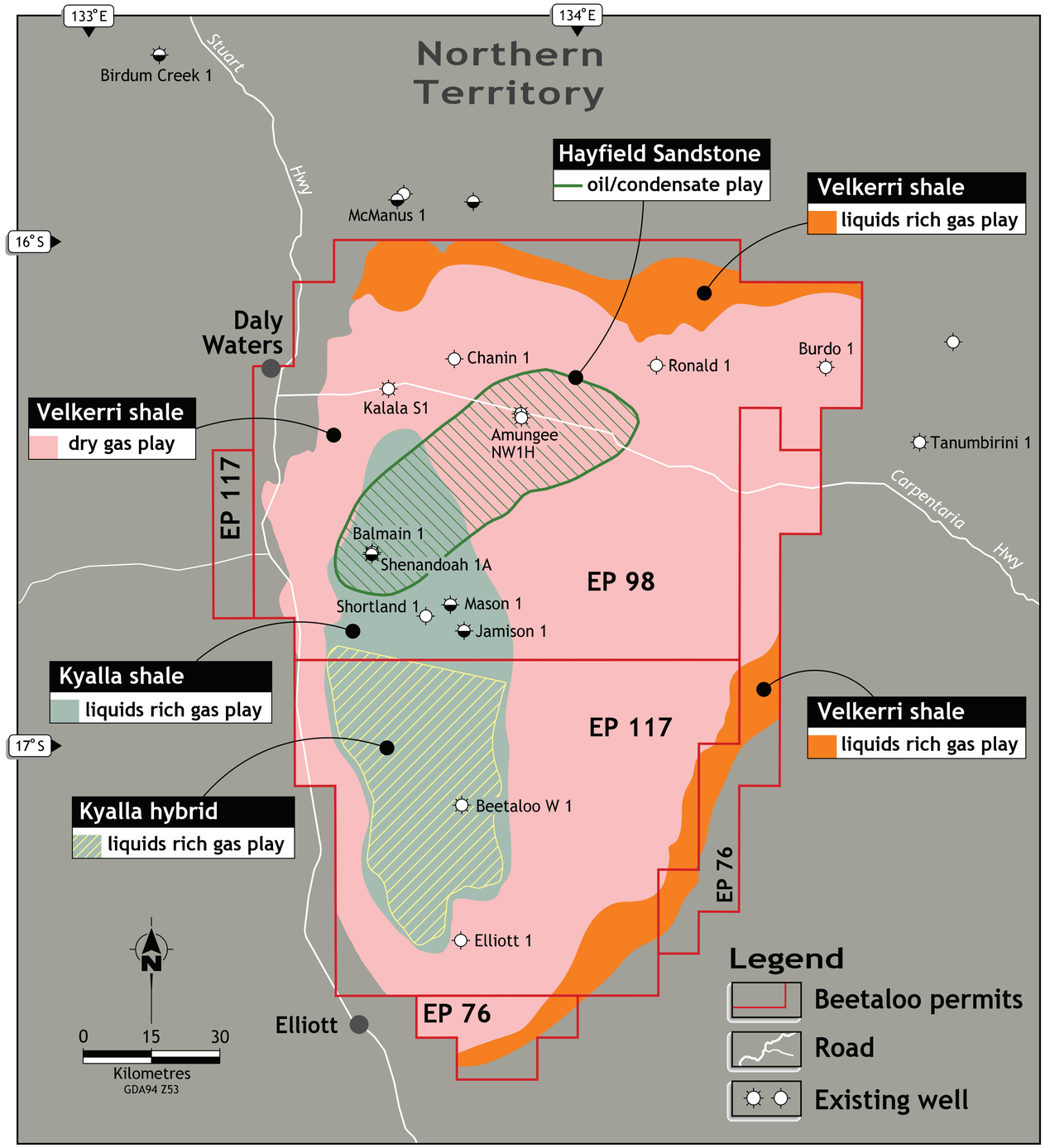
The Beetaloo Basin is 1.4 billion years old - much older than the dinosaurs that roamed the earth between 150 to 200 million years ago.

It's the Proterozoic age, continents are yet to form and the Top End is part of a vast tropical sea.

The Earth's atmosphere is around 3% oxygen and complex life like plants and animals are yet to evolve. Micro-organisms like algae are the main life form. As they die they settle on the ocean floor.

The right combination of depth and temperature then combines to creates the shale rocks we now know as the Velkerri formation, trapping vast reserves of natural gas around two and a half kilometers below surface.





Beetaloo Exploration Project

Origin, together with joint venture partner Falcon Oil and Gas, is exploring for gas in the Northern Territory's Beetaloo Basin.

The Resource Potential

Our exploration project in the Beetaloo Basin is a multi-year, nine well shale gas project that started in mid-2014.

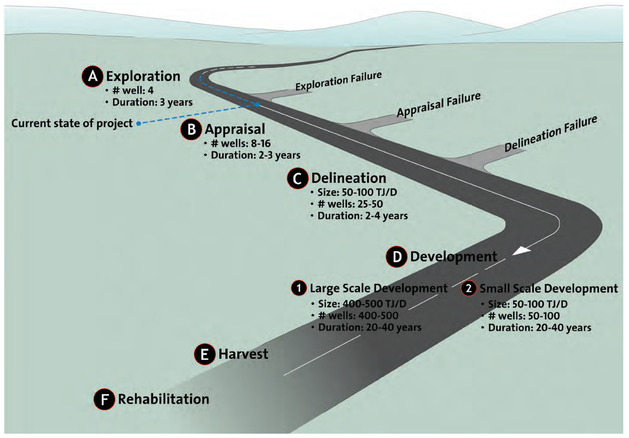
So far, we've drilled four wells. All within regulations and with the consent of the pastoralists and Native Title holders. We plan to drill two more this year (2019).

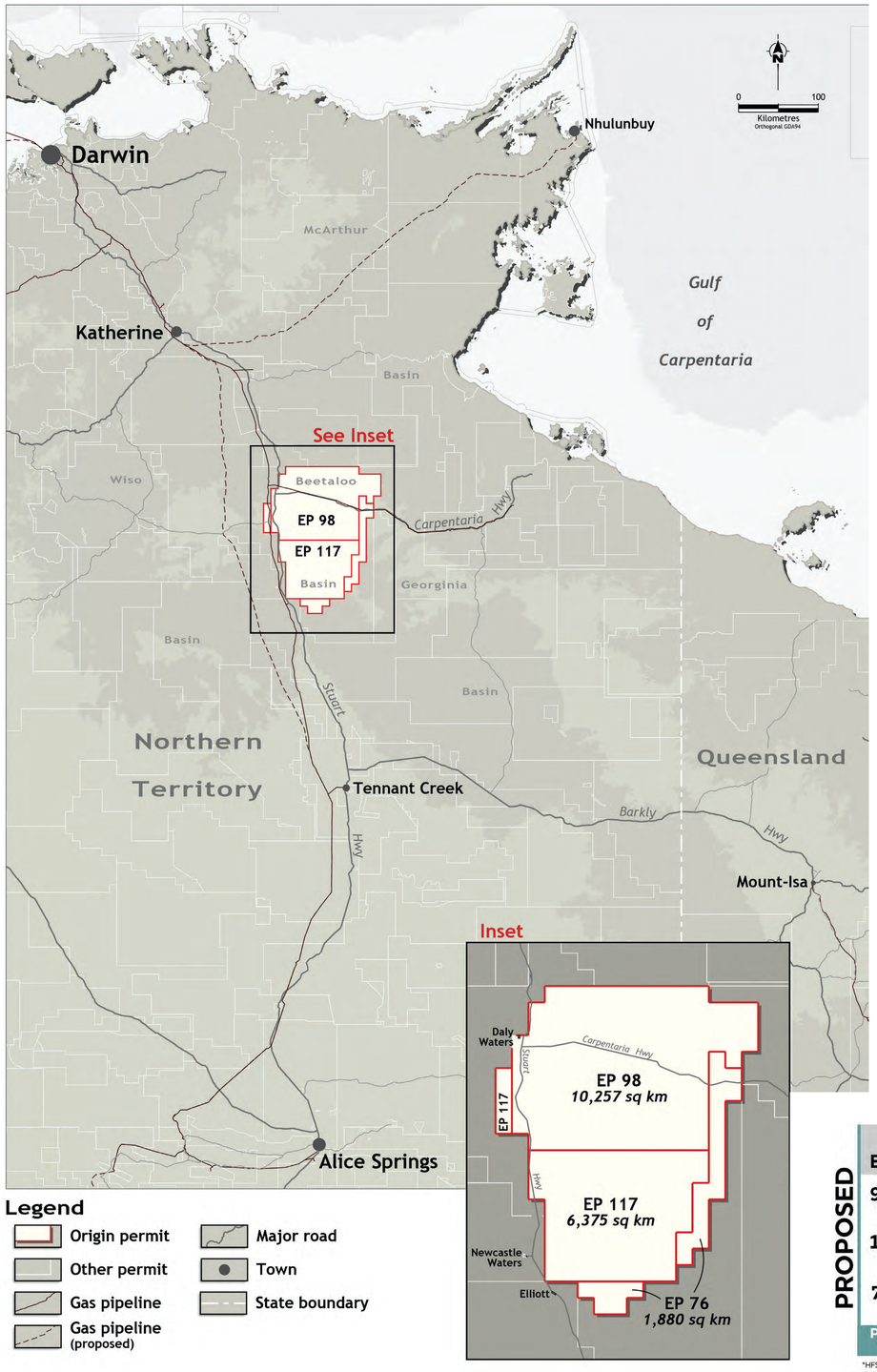
We think there's a very large gas resource underneath the ground with outstanding potential.

We estimate our project could have as much as 61 trillion cubic feet of gas, with 6.6 trillion cubic feet of that already recognised as a contingent resource.

Just how big is this? The Inpex project is 12 trillion cubic feet and the Mereenie gas fields have produced around 240 billion cubic feet since the mid 1980's.

The Road Ahead





Inset

Legend

- Origin permit
- Other permit
- Gas pipeline
- Gas pipeline (proposed)
- Major road
- Town
- State boundary

The Benefits

If successful, and development goes ahead, the project means:

- more work for and jobs with local companies, including Aboriginal companies
- the opportunity to supply goods and services to the project
- financial payment for host pastoralists and Native Title holders
- taxes and royalties – providing government with more money that can go to improving community services, infrastructure and telecommunications
- energy security (delivering gas to the Eastern Australia)

Our Permit Commitments

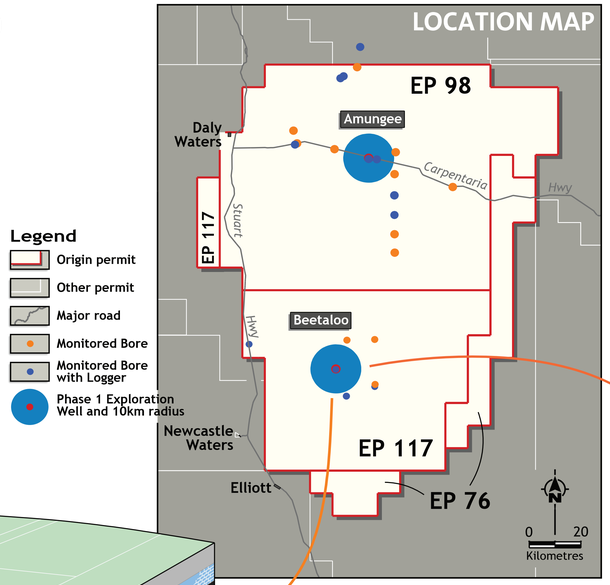
PROPOSED					Moratorium		
	EP	2014	2015	2016	2017-2018	2019-2020	2021-2022
	98	Geological and geophysical studies	2 vertical wells, 1 horizontal well	1 HFS horizontal well		Geological and geophysical studies	Geological and geophysical studies
	117	Geological and geophysical studies	Geological and geophysical studies	1 vertical well		1 vertical pilot / evaluation well 1 HFS horizontal well	1 HFS horizontal well
	76	Geological and geophysical studies	Geological and geophysical studies	Geological and geophysical studies		1 vertical pilot / evaluation well 1 HFS horizontal well	1 HFS horizontal well
	Permit Year	1	2	3		4	5

*HFS
Hydraulic Fracture Stimulation 4 March 2019

Beetaloo W1
(Drilling & Environmental Controls)

The Beetaloo W-1 well is in the centre of Exploration Permit 117 (EP117) in the southern Beetaloo Sub-Basin, east of the Stuart Highway and around 54 km northeast of Elliott.

The vertical well was successfully drilled in July 2016 to a depth of around 3,100 metres within the lower Velkerri formation. The well was cased and suspended in September that year.



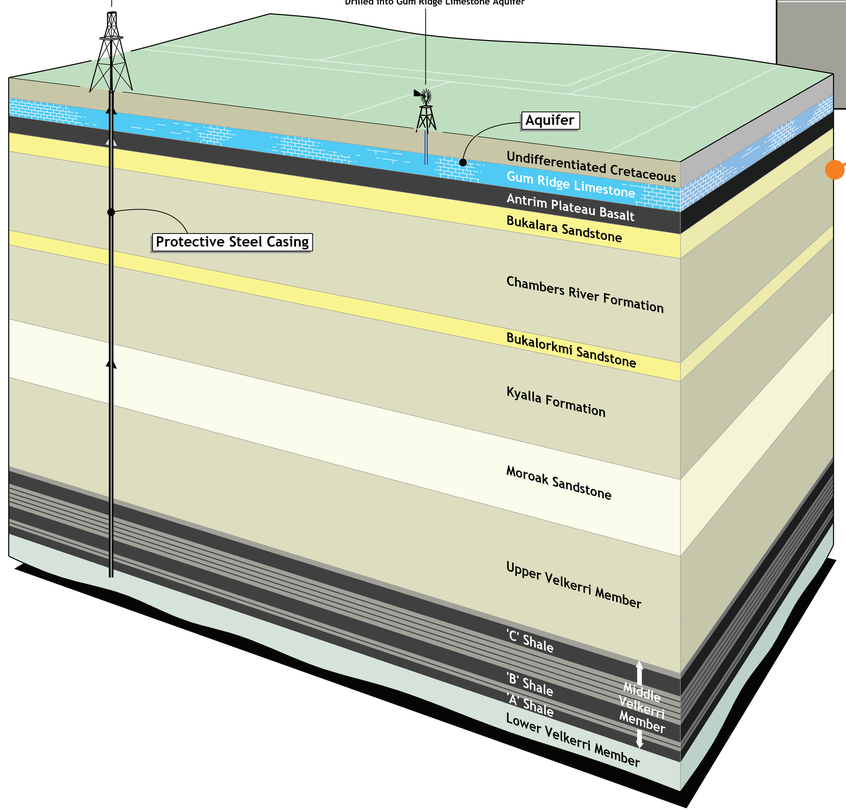
This monitoring has found there no evidence of any impact from current exploration activities.

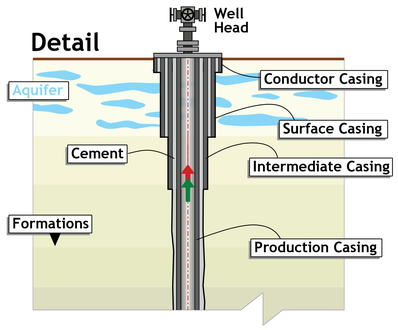
- Groundwater levels have remained stable in the shallower Cretaceous and Cambrian Limestone aquifers;
- The Cenozoic perched aquifer closest to surface responds strongly to rainfall, but water levels recede quickly suggesting a limited storage volume;
- Little or no hydrocarbons have been detected in bore sampling. Only one location found dissolved methane in trace concentrations
- All water sampled is suitable for stock use

Groundwater monitoring

Groundwater monitoring is a regulatory requirement that allows us to detect any potential groundwater impacts that may occur from exploration activities. It also improves our understanding of the natural variability of water volumes and quality, and broader hydrogeological system in the Beetaloo sub-Basin.

Groundwater monitoring commenced in 2014, before current exploration activities commenced. A formal monitoring plan was implemented the following year - focussing on the shallower aquifers which are separated from the target formations containing gas by over 1.5km of low permeability rock.





Conventional and Unconventional

Conventional and Unconventional are industry terms used to define where gas is found underground and how it's extracted.

It's the same gas (natural gas reserves are mostly methane with some propane, butane and light condensates) - the main difference is how it occurs in nature today.

Conventional gas has typically migrated from where it formed millions of years ago to a sandstone reservoir where it's trapped between porous grains under a denser layer of rock that acts as a cap or seal.

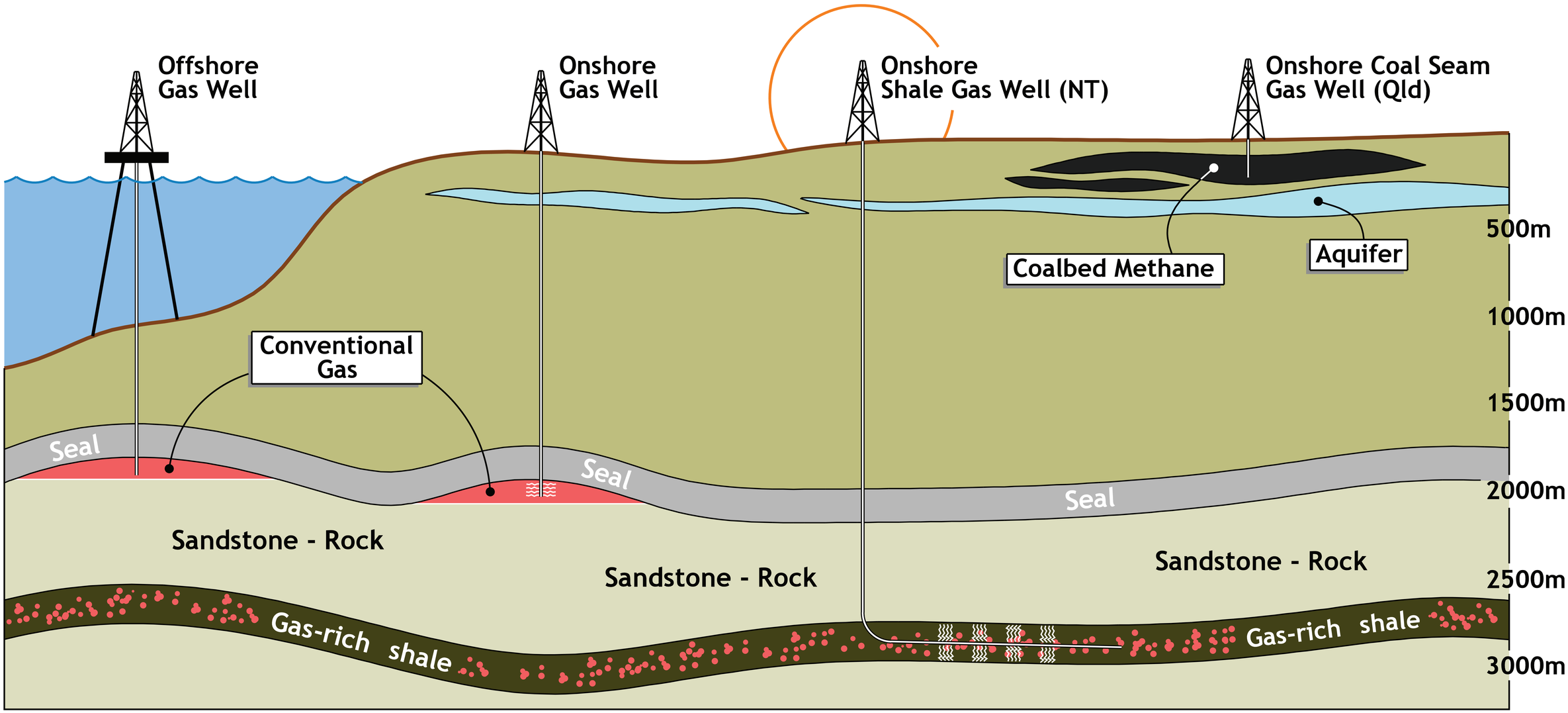
Unconventional gas is typically extracted from where it formed, in coal seams or shale formations that can be less porous and are sometimes described as tighter.

Extracting gas from either source can require a range of different techniques and processes.

It's a common misunderstanding that conventional reserves do not require fracture stimulation and unconventional reserves do.

For example, around a third of conventional wells in the Mereenie field near Alice Springs have been fracked.

Less than a quarter of Origin's unconventional coal seam gas wells in Queensland are fracked.



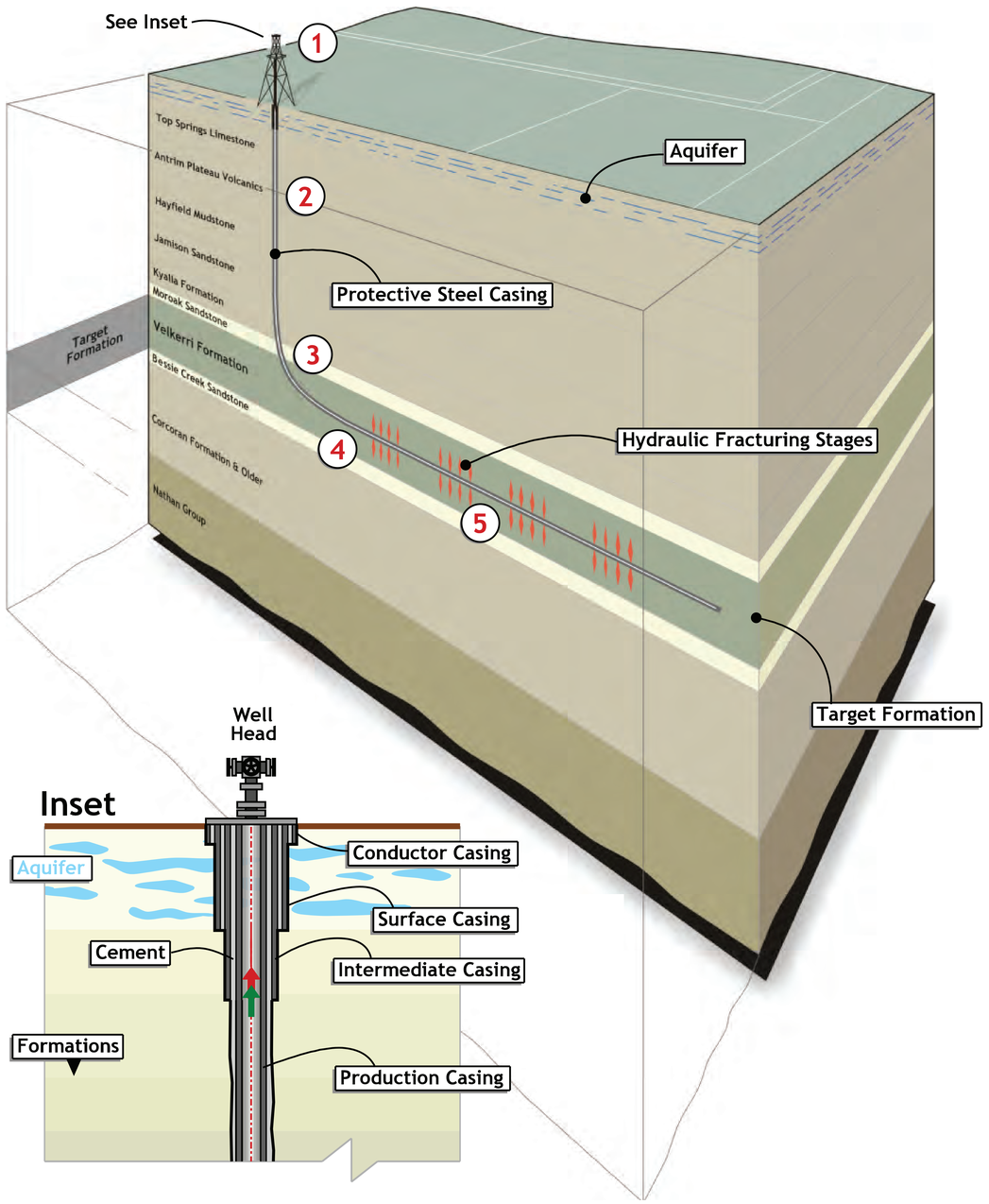
Drilling For Shale Gas

Our exploration program includes drilling both vertical and horizontal wells that target the underground shale rock formations in the Beetaloo Basin.

Long Reach Horizontal Drilling

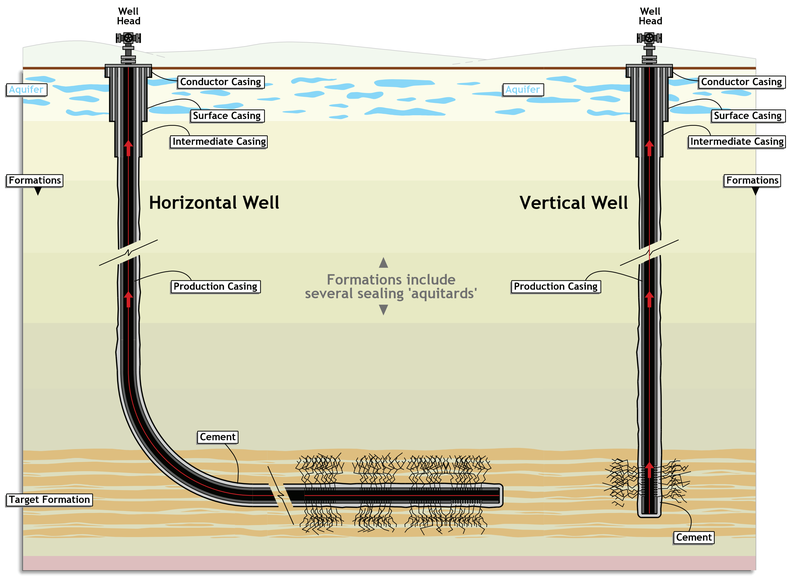
Steps in Horizontal Drilling:

1. Negotiate and agree access, obtain approval and bring in drilling rig and equipment
2. Drill vertical section of well using conventional methods
3. Drill kick-off (curved) section, with the use of a downhole motor mounted directly above the bit, in order to make the turn from vertical to horizontal. Downhole instruments called MWD (measuring while drilling) packages transmit sensor readings upward, allowing operators at the surface to build the angle
4. Drill horizontal wellbore, still using MWD to hold the angle and direction
5. Case off the well with steel casing and cement to allow for completion and fracture stimulation, preparing the well for production



Vertical Wells and Long Reach Horizontal Wells

- Origin will drill both vertical and horizontal wells during the Exploration Phase/s
- Vertical wells allow a more cost effective assessment of the potential for gas and liquids in the target zones and provide some information on production capability
- Horizontal wells will be required to assess the potential for economic gas and liquid recovery rates
- Horizontal wells are most likely to be required for field development



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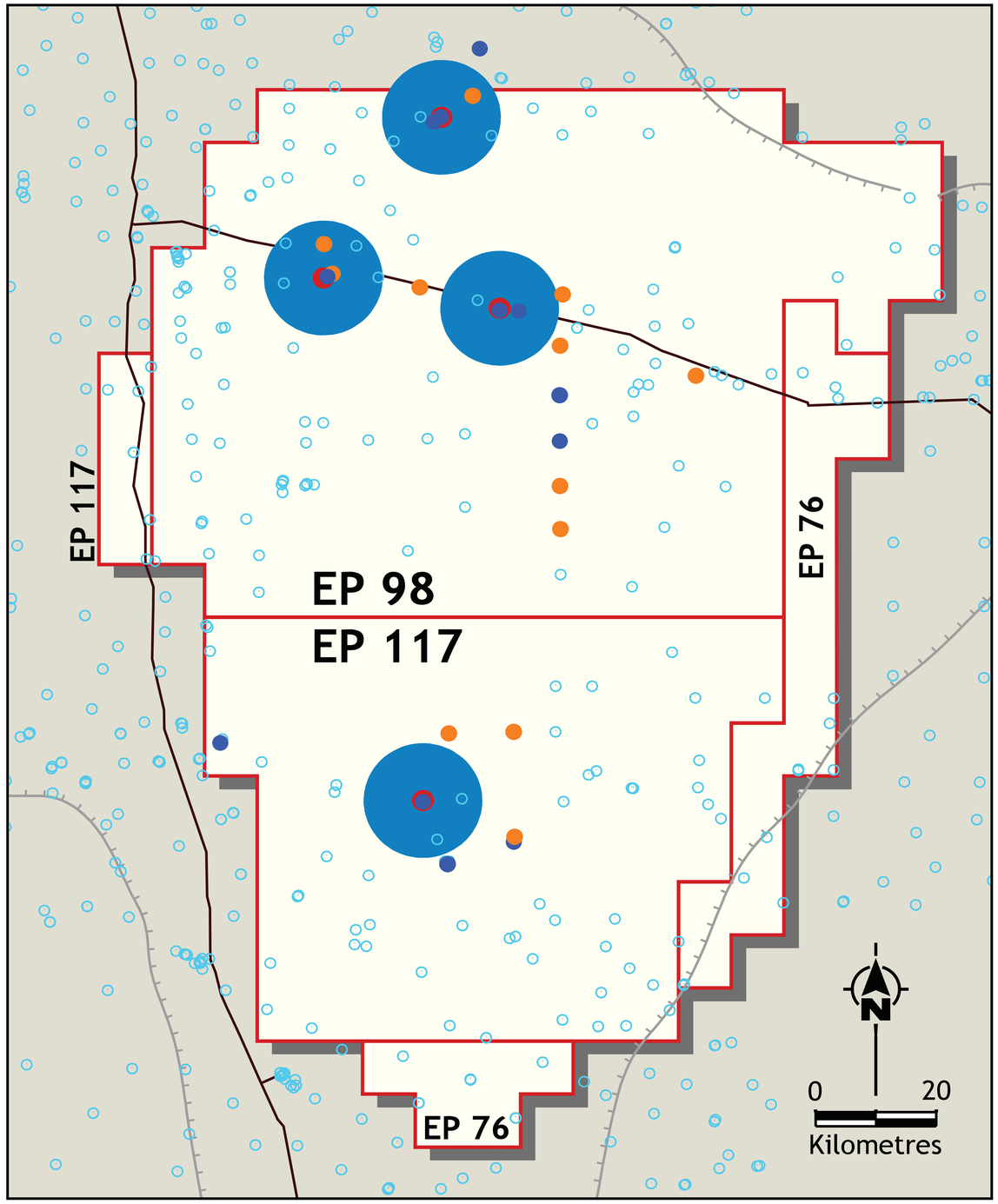


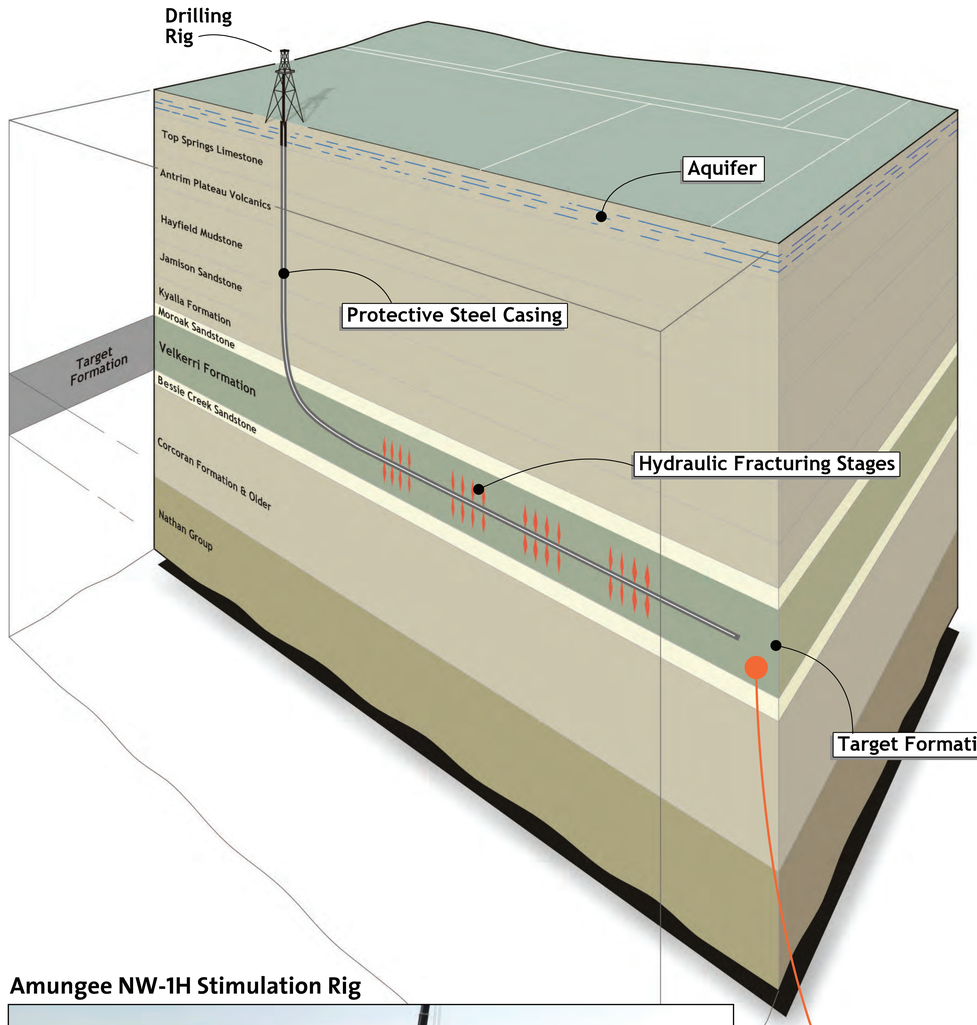
Hydraulic Fracture Stimulation (Fracking)

Fracking is the technical process designed to release the gas trapped in the dense shale rocks deep underground.

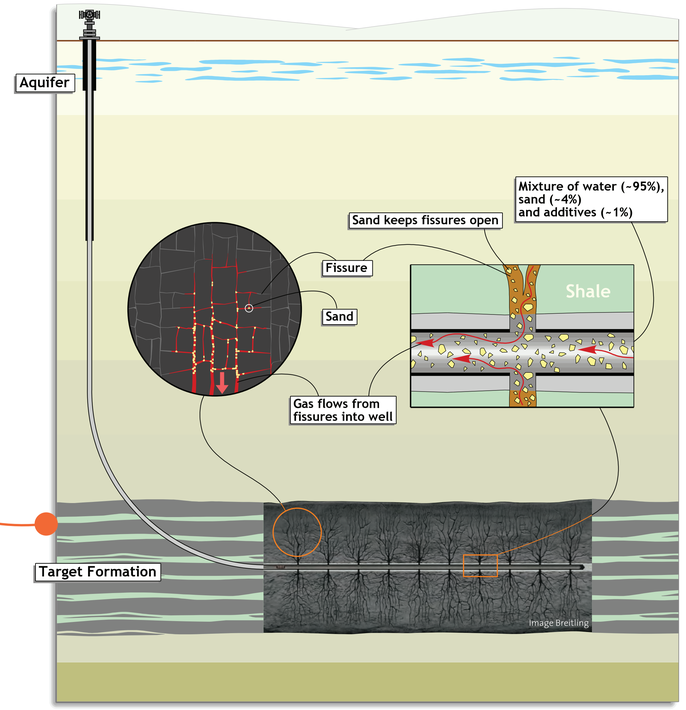
It involves pumping water mixed with sand and some chemical additives in low concentrations under pressure to fracture the shale, creating tiny pathways in the rock that allow the gas to flow into the well and be brought to the surface.

Key facts about fracking in the Beetaloo

- Distance offers important protection – there's over 2 kilometres between the shallower aquifers and the deeper rocks where gas is found.
- Both zones are effectively sealed off by several thick geological layers in between called aquatards.
- It's not physically possible for a fracture to extend upwards into the aquifer. Because of the distance, and because the amount of energy and pressure used in fracking isn't enough to connect and create pathways outside of the rock formation where gas is found.
- Any natural vertical fractures or old abandoned bores are extremely unlikely to provide a pathway for fracking fluids to reach a fresh water zone due to the greater weight (what's called hydrostatic head pressure) pushing down from above.
- Seismic work allows us to map the geology and avoid any large structures or faults.



Amungee NW-1H Stimulation Rig



Protecting groundwater

We understand how important groundwater resources are to Traditional Owners, pastoralists and the community.

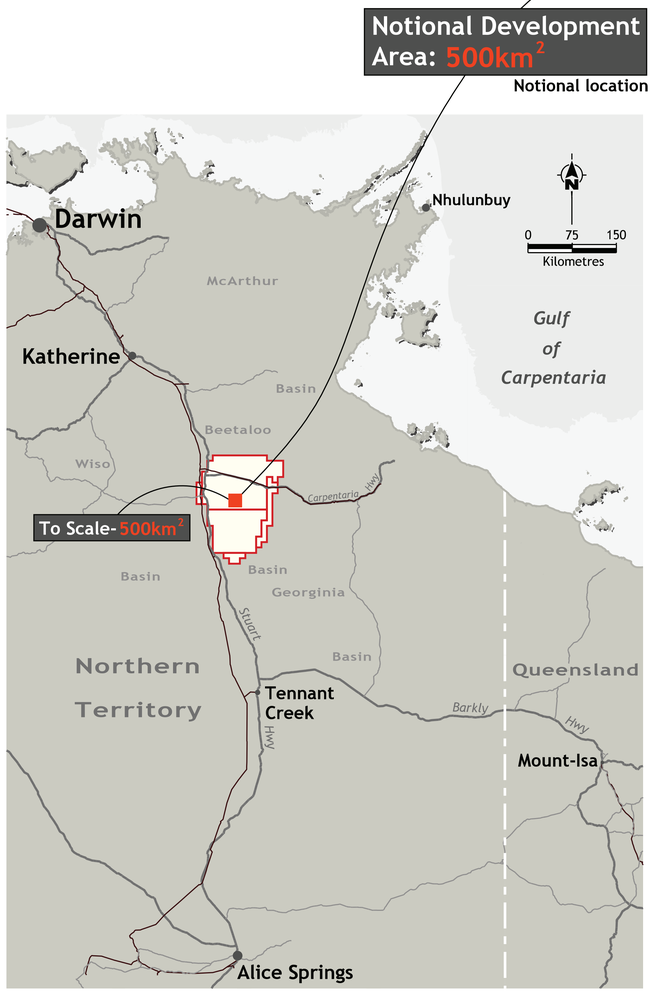
Both engineered and natural geological barriers isolate and protect underground water sources.

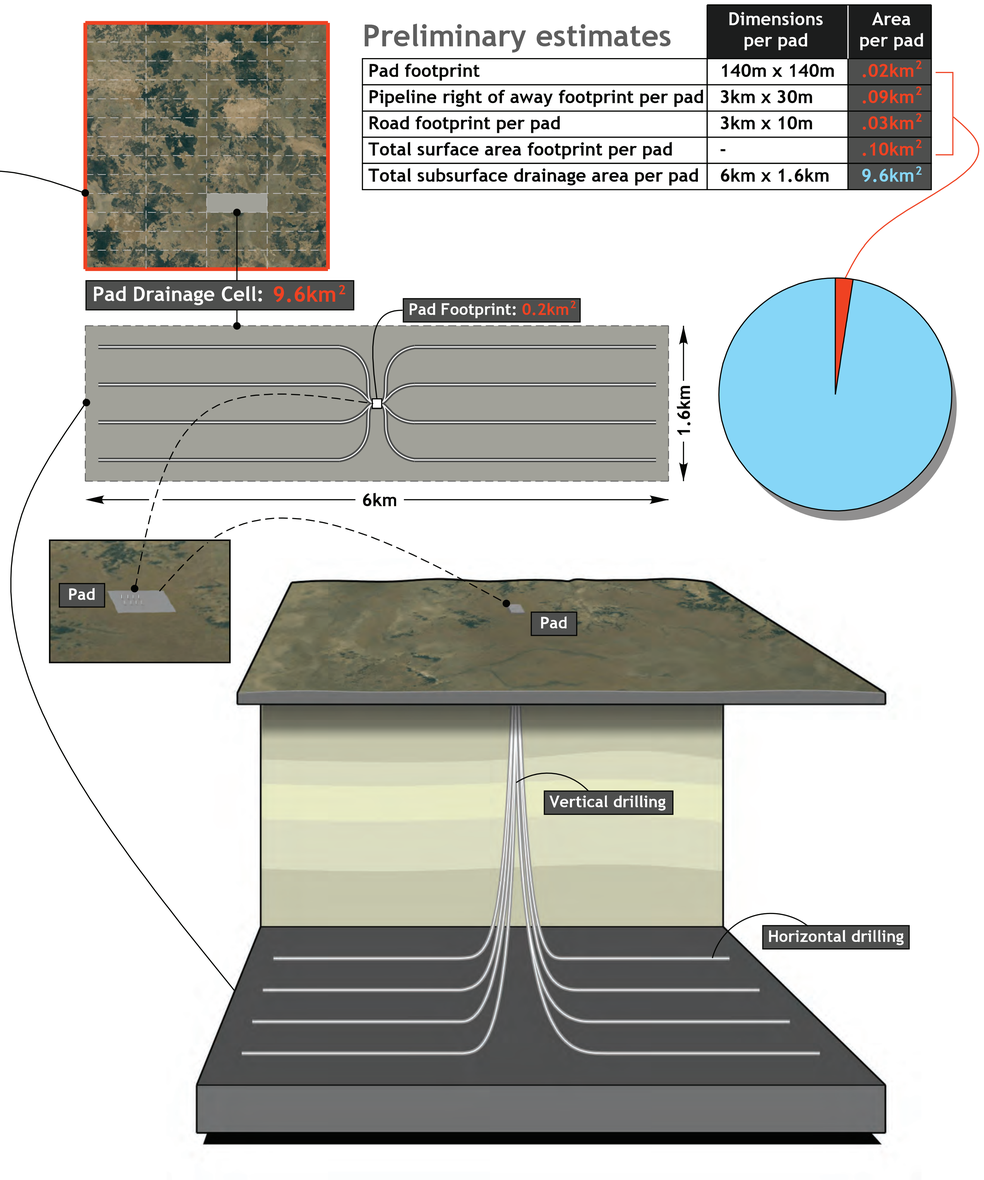
Multiple controls are put in place to protect the environment and groundwater. If these controls aren't successfully met when we drill - we don't frack.

Minimising Above Ground Impacts

Multi -pad drilling and horizontal wells have a small surface footprint – minimising disruption to pastoral operations.

- In our submission to the NT Scientific Inquiry we described the surface footprint for large scale development scenario being no more than 10 square kilometres.
- This is based on multi-pad well design, and related surface infrastructure taking up no more than 2 per cent of a 500 square km land area.
- As further context, this total development area would occur on a handful of pastoral leases.





Preliminary estimates	Dimensions per pad	Area per pad
Pad footprint	140m x 140m	.02km²
Pipeline right of away footprint per pad	3km x 30m	.09km²
Road footprint per pad	3km x 10m	.03km²
Total surface area footprint per pad	-	.10km²
Total subsurface drainage area per pad	6km x 1.6km	9.6km²

Well Integrity

Engineering standards, steel and cement ensure the drilling and fracking of gas wells do not create a pathway between the underground layers of rock or deteriorate over time.

Built Strong - To Last The Test Of Time

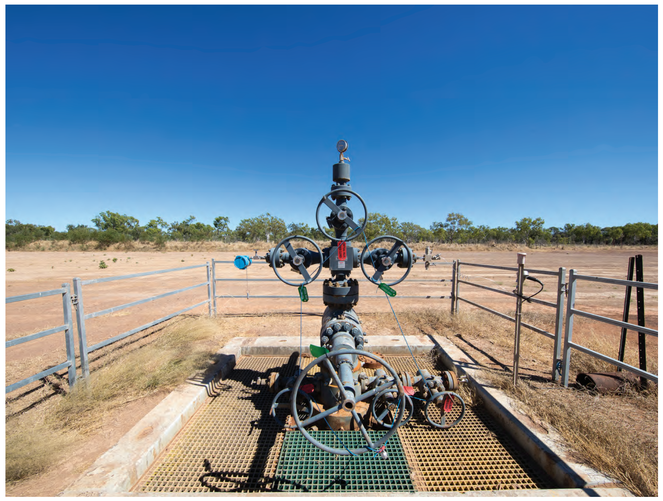
A gas well has three main parts – the steel casing, the above ground well head, and cement which is engineered to be as strong as the rock that it will live in.

Casing and cement hold the hole open and protect or prevent any cross flow between the surrounding underground formations. The cement is pumped down the inside and back up the outside of the casing.

An x-ray device sent down the well (a technique called logging) combined with pressure testing confirm the quality of the job.

The casing is designed to ensure its strong enough to withstand the most extreme loads it could be subjected to.

Added to this is a program of regulatory control and oversight, and the requirement to appropriately decommission every well at the end of its operational life.



Engineering Standards And Performance Data

Category		Description	Risk
1		Shallow surface casing + top of production casing cement below over pressured hydrocarbon reservoir	High
2		Shallow surface casing + top of production casing cement below under pressured hydrocarbon reservoir	
3		Shallow surface casing + top of production casing cement above top of gas	
4		Shallow surface casing + top of production casing cement above surface casing shoe	
5		Deep surface casing + top of production casing cement below under pressured hydrocarbon reservoir	
6		Deep surface casing + top of production casing cement above top of gas	
7		Deep surface casing + top of production casing cement above surface casing shoe	
8		Deep surface casing + 1 intermediate casing + top of production casing cement below top of gas	
9		Shallow surface casing + 1 intermediate casing + top of production casing cement above casing shoe	
10		Deep surface casing + 1 intermediate casing + top of production casing cement above top of gas	
11		Deep surface casing + 1 intermediate casing + top of production casing cement above casing shoe	
12		Deep surface casing + 2 intermediate casing strings + top of production casing cement above casing shoe	Low

Origin's minimum design requirement for a producing well

Origin's minimum design requirement for a P&A well

Origin's Beetaloo wells

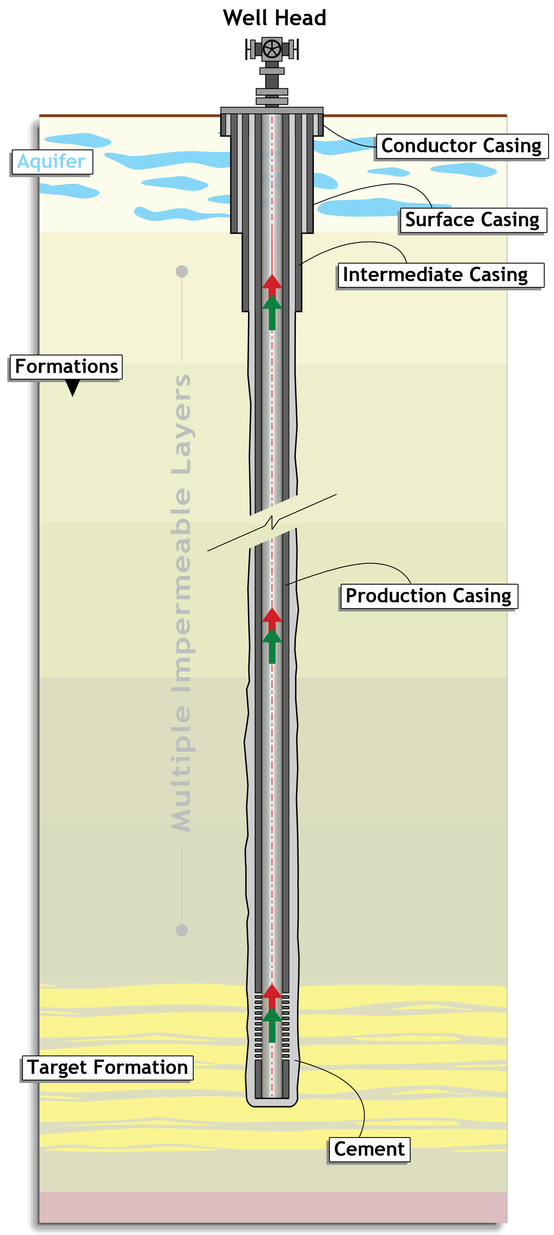
(a) **Vertical and deviated wells**

CATEGORY	ORIGINAL WELL COUNT	POTENTIAL BARRIER FAILURES	POTENTIAL BARRIER FAILURES %	CATASTROPHIC BARRIER FAILURES	CATASTROPHIC BARRIER FAILURES %	AVG COMPLETION DATE	P&A WELL COUNT	CURRENT WELL COUNT	ORIGINAL AVG SURFACE CASING DEPTH (FT)	ORIGINAL AVG TOP OF PRODUCTION CEMENT (FT)
Category 1	166	100	60.24%	3	1.81%	1979	57	15	253	7,334
Category 2	621	219	35.27%	5	0.81%	1983	138	301	306	6,566
Category 3	46	16	34.78%	1	2.17%	1987	14	31	321	4,008
Category 4	7	0	0.00%	0	0.00%	1982	1	15	222	125
Category 5	8,789	77	0.88%	1	0.01%	1995	782	6,140	559	6,111
Category 6	5,433	6	0.11%	0	0.00%	2007	105	7,181	712	2,816
Category 7	1,766	0	0.00%	0	0.00%	2009	8	2,040	719	534
TOTAL	16,828	418	2.48%	10	0.06%		1,105	15,723		
D&A	147									

(b) **Horizontal wells**

CATEGORY	ORIGINAL WELL COUNT	POTENTIAL BARRIER FAILURES	POTENTIAL BARRIER FAILURES %	CATASTROPHIC BARRIER FAILURES	CATASTROPHIC BARRIER FAILURES %	AVG COMPLETION DATE	P&A WELL COUNT	CURRENT WELL COUNT	ORIGINAL AVG SURFACE CASING DEPTH (FT)	ORIGINAL AVG TOP OF PRODUCTION CEMENT (FT)
Category 1	0	0	0.00%	0	0.00%	NA	0	0	NA	NA
Category 2	0	0	0.00%	0	0.00%	NA	0	0	NA	NA
Category 3	0	0	0.00%	0	0.00%	NA	0	0	NA	NA
Category 4	0	0	0.00%	0	0.00%	NA	0	0	NA	NA
Category 5	0	0	0.00%	0	0.00%	NA	0	0	NA	NA
Category 6	269	0	0.00%	0	0.00%	2012	1	268	789	2,153
Category 7	704	0	0.00%	0	0.00%	2012	2	702	929	442
TOTAL	973	0	0.00%	0	0.00%		3	970		
D&A	0									

Well Construction - Protecting Aquifers



About Origin

Many Australians know Origin as one of the country's largest electricity retailers. We also have significant interests in power generation and natural gas production. This includes exploring for natural gas reserves to develop as future energy sources. Where we find that it makes good sense to produce the gas, we develop and deliver it to our customers in Australia and overseas.

How We Operate

We know we have to get energy right. For our customers. For our communities. For the planet.

Relationships are built on trust and doing what we say what will do. We realise every community is different and that locals know the areas where we work far better than we do.

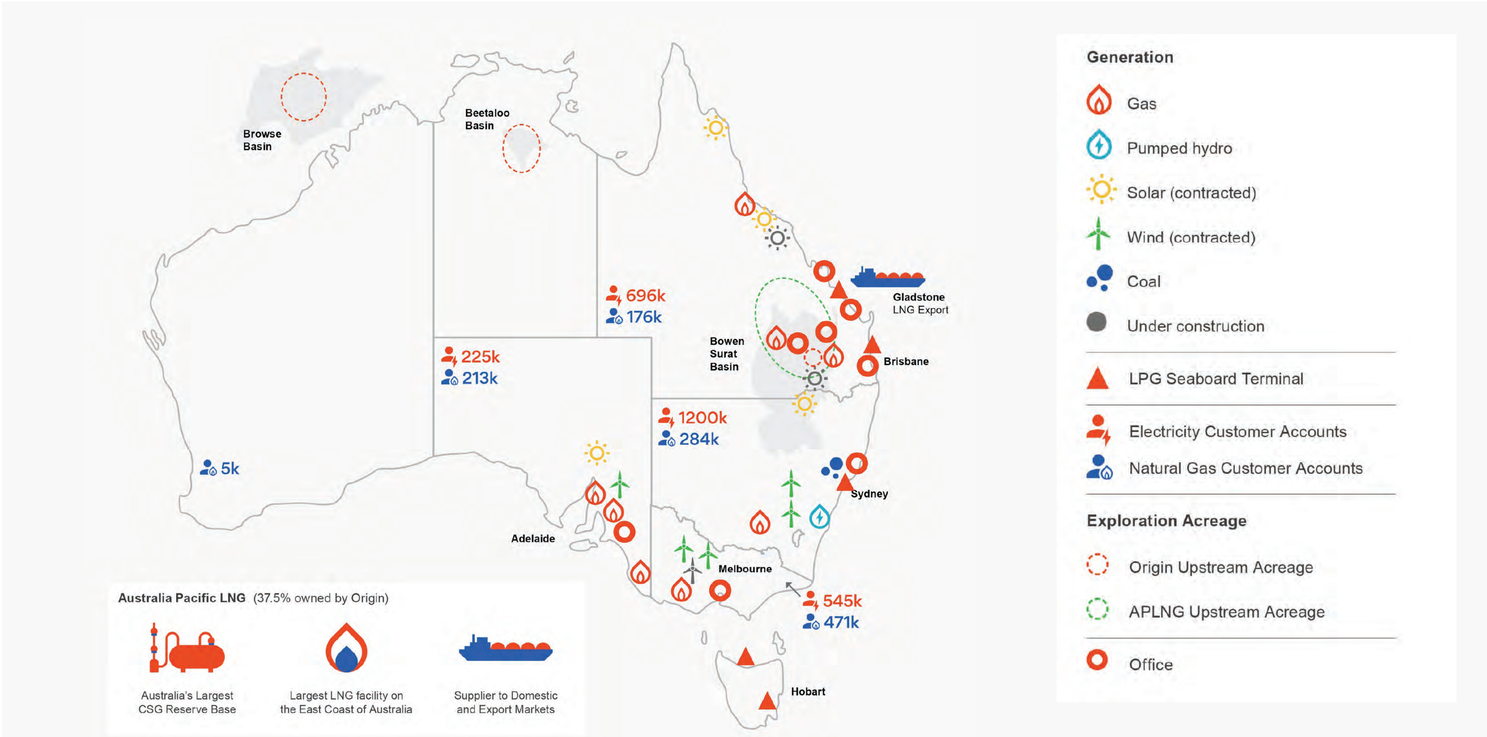
We promise to talk with you about our plans and listen, to help better guide our decision making.

Co-existence is a proven reality in other parts of the country today.

We will always look for ways we can work together to create shared benefit for all Territorians.

Gas wells on Qld grazing lands

Where We Operate



One Of Australia's Leading Energy Companies

Australia's Leading Energy Retailer
4.1 million gas, electricity and LPG customer accounts

Ensuring Domestic Gas Supply
Delivering around 30% of all gas on the east coast with APLNG

Growing Renewable Supply
Targeted to make up more than 25% of our generation mix by 2020

Powering Australia
7,000 MW of gas, coal and renewable generation and storage across the east coast

Appendix J Compliance with Stakeholder Engagement Obligations under *Petroleum (Environment) Regulations 2016*

Section 7(2)(a)	Document and Content	Date Provided
(i) "the regulated activity the interest holder proposes to carry out"	**Letter from Origin to [redacted] (on behalf of Amungee)** (**Appendix J**) • Includes a table outlining the regulated activities Origin proposes to perform for Velkerri Well 76, including: o Drilling of 1-3 new wells; o Construction of a new well pad; o Drilling of 3-4 new water bores (1-2 extraction and 2 monitoring); o Construction of a drilling camp; and o Construction of a new access road. • Includes a timetable outlining the work program Origin proposes to undertake.	22 August 2018
	• **Letter from Origin to [redacted] (Draft Land Access and Compensation Agreement)** (**Appendix J**) Lists the activities Origin proposes to carry out on Amungee Mungee Station from the date of the Agreement until December 2020, including: o Monitoring, maintenance and rehabilitation of existing wells, access roads and monitoring bores; o Walking the area of the exploration permits; o Driving along existing roads and tracks in the area; o Identifying and installing water monitoring or extraction bores including, where required, the construction of access roads to drill these bores; o Taking soil or water samples; o Geophysical surveying not involving site preparation; o Aerial, electrical or environmental surveying; o Emissions monitoring, including installation or monitoring stations; o Survey pegging; o Scouting (including preliminary consideration of appropriate sites for wells and other infrastructure); o Investigations and surveys and any other minimal impact activities including, without limitation, environmental, flora and fauna, geotechnical, cultural heritage and native title field work; and o All other activities incidental to the activities above which will have no impact or only a minor impact.	22 August 2018
		20 November 2018

	Draft Pastoral Land Access and Compensation Agreement (**Appendix J**)
	
	• Item 1 of Schedule 2 (P30 – 33) lists the Agreed Petroleum Activities which include all activities and works reasonably associated with the construction and operation of one exploration well and includes the following activities:
	  o Gates, grids, fences and access points;
	  o Existing access roads;
	  o New access track(s);
	  o Petroleum exploration well;
	  o Rig laydown area;
	  o Laydown area;
	  o Water bore;
	  o Campsite; and
	  o Scouting, surveys and soil and water sampling activities.
	• Item 3 of Schedule 2 (P34) list the indicative duration of the Agreed Petroleum Activities.	

	Beetaloo Basin Exploration Project – Weed Management Plan (**Appendix C**)
	
	• Lists the primary activities subject to the Weed Management Plan as being (P5):
	  o Access track construction, use and maintenance;
	  o Exploration lease pad construction, use and maintenance;
	  o Gravel pit construction and maintenance;
	  o Drilling, stimulating, completing and maintaining petroleum exploration wells; and
	• Routine access, maintenance and monitoring of all exploration areas subject to this plan.
		17 May 2019

	Trafficwerx NT Traffic Management Plan (**Appendix G**) • Provides that a temporary site access road will be constructed as a regulated activity (P2-3), including project dates, hours of work, duration and traffic management plans.	17 May 2019
	Draft Beetaloo Basin Groundwater Monitoring Bore Installation Program – Velkerri 76 Environment Management Plan (**Appendix J**) • Identifies the regulated activities to be undertaken by Origin, including (on P8): o Construction of two 50m^2 groundwater monitoring bore lease sites;	22 May 2019

	o Establishment of six 100m^2 gravel pits; o Installation of approximately 2km of access tracks; o Grading and forming of 80km of existing access tracks (including vegetation clearing) o Installation of fencelines, gates, grids and firebreaks. • Provides for specific groundwater monitoring and sampling bore drilling activities to be undertaken (P10-12). • Provides for the construction of civil contractor working camps (P12).	
	Draft Beetaloo Basin Velkerri 76 S2 Civil Construction Environment Management Plan (**Appendix J**) • Provides detailed information on the civil construction program for regulated activities, including details of (P12–15): o Exploration well-lease pad infrastructure, camp pad and helipads program; o Drilling sumps; o Stockpile area; o Gravel pits; o Access tracks; and o Fly camps. • Provides detail on the water supply and use ancillary to the regulated activities (P15-16). • Provides a timetable of each civil construction activity to be undertaken (P22).	22 May 2019
	Origin Drilling For Shale Gas Poster (**Appendix H**) • Explains that the exploration program for future activities will include drilling of both vertical and horizontal wells. Provides a description of the steps involved in drilling horizontal wells.	24 May 2019
(ii) "the location (or locations) where it is proposed to carry out the activity"	**Email from Origin to** [redacted] (**Appendix J**) • An Origin representative offers to arrange a sit down meeting with [redacted] of Bullwaddy Pastoral Co Pty Limited, part owner of Amungee Mungee Station, to go through the well location selection process and ranking.	2 July 2018

	Letter from Origin to [redacted] as representative for joint owners of Amungee Mungee Station) (**Appendix I**) • Includes a map of potential well location clearance areas, coordinates of new wells and proximity requirements of supporting facilities. • The work programme timeline attached to the letter allowed the landholder to gain an understanding of the impacts on its operations of Origin's early phase works and the later fracking and stimulation phase.	22 August 2018
	Draft Pastoral Land Access and Compensation Agreement (**Appendix J**) • Identifies the affected Pastoral Property (NT Portion 1079, Vol 786 Folio 762) activities to be undertaken on (P1). • Item 2 of Schedule 2 states the access tracks and well site are shown in the plans attached to Annexure D of the agreement. No plans are attached to Annexure D (P34).	20 November 2018
	Beetaloo Basin Exploration Project – Weed Management Plan (**Appendix C**) • Includes maps of the proposed exploration activities and locations of current weed growth and of high weed risk in relation to proposed well locations (high-aerial view) (P4, 10 – 12).	17 May 2019
	Trafficwerx NT Traffic Management Plan (**Appendix G**) • Includes multiple detailed diagrams outlining the construction areas of the proposed access roads in relation to the Stuart Highway (Appendix C – P46 to 52, Appendix K P68). • Provides for the specific location of the proposed access road along the Stuart Highway (P1).	17 May 2019
	Draft Beetaloo Basin Groundwater Monitoring Bore Installation Program – Velkerri 76 Environment Management Plan (**Appendix J**) • Includes map of EP98, EP117 and EP76 locations and location of proposed Velkerri 76 well in EP area (P2). • Includes proposed lease area location detail for Velkerri well control and impact monitoring bores (P3 – Table 1). • Includes proposed gravel pit location detail (P4 – Table 2). • Includes proposed water bore lease area layouts (P10 - 11 – Figures 4 and 5).	22 May 2019

	Draft Beetaloo Basin Velkerri 76 S2 Civil Construction Environment Management Plan (**Appendix J**) • Includes map of EP98, EP117 and EP76 locations and proposed infrastructure location and disturbance area (P2 – 3). • Includes detailed location information for regulated activities proposed to occur (P3 – Table 1), including: o Velkerri 76 S2 well pad; o Camp lease pad; o Stockpile laydown; o Helipad; o Gravel Pits 4 and 5 (with associated access tracks); o Gravity Pits 6 and 7. • Includes map of specific location of Velkerri S2 site (P12 of PDF – Figure 3). • Includes map of specific location of Velkerri S2 site in relation to Vegetation communities (P43 of PDF – Figure 7). • Appendix B includes infrastructure design drawings which includes locality plan (P86 of PDF).	22 May 2019
	Origin Groundwater Monitoring Poster (**Appendix H**) • Includes a map of proposed Phase 1 exploration wells and proximity to Origin's monitored water bores.	24 May 2019
	Origin Beetaloo Exploration Project Poster (**Appendix H**) • Includes a map of Origin EP98, EP117 and EP76 locations.	24 May 2019
	Origin 2019 Work Program Poster (**Appendix H**) • Includes a map of EP98, EP117 and EP76 and the location of each Phase 1 exploration well in broader EP98, EP117 and EP76 area. • Includes a map of the drilling surface location in proximity to the Stuart Highway.	24 May 2019

(iii) "the anticipated environmental impacts and environmental risks of the activity" **AND** **(iv)** "the proposed environmental outcomes in relation to the activity"	**Beetaloo Basin Exploration Project – Weed Management Plan** (**Appendix C**) • The purpose of the Plan is to ensure the risk of weed introduction and spread, resulting from the regulated activities performed by Origin, are mitigated to protect (among other things) the environmental interests of the Territory (P4). • Considers the risk of weed spreading and introduction with evidence from previous weed management surveys conducted on the land (P9 - 17 – incl. Table 4).	17 May 2019
	Trafficwerx NT Traffic Management Plan (**Appendix G**) • Includes references to the anticipated environmental impacts or environmental risks of access track construction and other traffic-environment aspects in describing environmental management processes and outcomes.	17 May 2019
	Draft Beetaloo Basin Groundwater Monitoring Bore Installation Program – Velkerri 76 Environment Management Plan (**Appendix J**) • Provides detailed description for and associated risks of the physical environment of the EP98, EP117 and EP76 area, including (P23-28): o Climate; o Geology; o Soils; o Hydrology; and o Hydrogeology. • Provides detailed description for and associated risks of the biological environment of the EP98, EP117 and EP76 area, including (P28-32): o Bioregions; o Vegetation communities; o Flora; o Weeds; o Fauna; o Significant / endangered fauna; and	22 May 2019

	o Feral and pest fauna. • Provides a description of environmental and cultural sensitives, including (P33-34): o Native title; o Archaeology Assessment; o Areas of cultural significance; o Natural resources; o Non-indigenous heritage; o Historic heritage assessment; and o Protected or conservation areas. • Includes an outline of Origin's risk management approach and management tools (P39-42). • Includes detailed tables of environmental impacts, risks and outcomes for specific environmental aspects, including: o Soil and erosion (P43 - Table 19); o Surface Water and Groundwater (P44 – Table 20); o Vegetation, Flora, Fauna and Habitat (P45 – Table 21); o Weeds (P46 – Table 22); o Waste Management (P47 – Table 23); o Air Quality – Dust and Emissions (P48 – Table 24); o Lighting, noise, vibration and visual amenity (P48 – Table 25); o Bushfire (P49 – Table 26); o Cultural heritage and sacred sites (P49 – Table 27); and o Community (P50 – Table 28). • Provides an emergency response plan to account for situations of high risk of environmental harm occurring, including bushfire and contaminant spills (P56). • Includes table outlining water bore drilling program risk assessment (P267 of PDF).	
	Draft Beetaloo Basin Velkerri 76 S2 Civil Construction Environment Management Plan (**Appendix J**) • Includes an assessment of environmental factors against environmental objectives at risk (P8–10 – Table 5). • Provides a detailed description for and associated risks of the physical environment of the EP98, EP117 and EP76 area (P23-27), including: o Climate; o Geology;	22 May 2019

- Soils;
- Hydrology; and
- Hydrogeology.

- Provides a detailed description for and associated risks of the biological environment of the EP98, EP117 and EP76 area (P27-34), including:

  - Bioregions;
  - Vegetation communities;
  - Flora;
  - Weeds;
  - Fauna;
  - Significant / endangered fauna;
  - Feral and pest fauna.

- Provides description of environmental and cultural sensitives (P34- 37), including:
  - Native title;
  - Archaeology Assessment;
  - Areas of cultural significance;
  - Natural resources;
  - Non-indigenous heritage;
  - Historic heritage assessment; and
  - Protected or conservation areas.
- Includes an outline of Origin's risk management approach and management tools (P39-42).
- Includes detailed tables of environmental impacts, risks and outcomes for specific environmental aspects, including:

  - Soil and erosion (P46 – Table 24);
  - Surface Water and Groundwater (P47–48 – Tables 25 - 26);
  - Vegetation, Flora, Fauna and Habitat (P49 – Table 27);
  - Weeds (P50 – Table 28);
  - Waste Management (P51 – Table 29);
  - Air Quality – Dust and Emissions (P52 – Table 30);
  - Lighting, noise, vibration and visual amenity (P53 – Table 31);
  - Bushfire (P54 – Table 32);
  - Cultural heritage and sacred sites (P55 – Table 33);
  - Community (P56 – Table 34); and

	o Traffic (P56 – Table 35). • Provides an emergency response plan to account for situations of high risk of environmental harm occurring, including bushfire and contaminant spills (P64). • Appendix D - Erosion and Sediment Control Plan includes an assessment of the permit area erosion susceptibility (P130–134 of PDF), including: o Erosion hazard assessment for Velkerri; o Soil loss estimate; and o Erosion risk and determination of erosion and sediment control. • Appendix H – Environmental Risk Assessment includes detailed table assessing environmental factors against activity risk sources (P248 of PDF).	
(v) "the possible consequences of carrying out the activity to the stakeholder's rights or activities"	**Letter from Origin to [redacted] (on behalf of Amungee)** (**Appendix J**) • Includes a map and coordinates table detailing the locations and clearance buffers of proposed work at three well locations, including the Velkerri V76 well. • The map included in the letter shows the planned route of access tracks across the land and the proposed clearance areas. • Attachment 2 is a draft work program of activities Origin intends to undertake on the land.	22 August 2018
	Draft Pastoral Land Access and Compensation Agreement (**Appendix J**) • Clause 3 (P5) provides that Origin must conduct the regulated activities in such a way: o as to not interfere with the lawful rights or activities of the stakeholder; o that is in accordance with good exploration and petroleum industry practice; o that is within an agreed access area and not on any other part of the pastoral property. • Clause 5 (P7) provides that Origin must give written notice of at least 10 business days before commencing the regulated activities. • Clause 7 (P8) provides the stakeholder with an opportunity to inspect the regulated activities. • Clause 8 (P8) provides the stakeholder an avenue to make suggestions to Origin about the regulated activities where they affect the stakeholder's activities or rights.	20 November 2018

	• Clause 10 (P8-9) provides that Origin must not carry out any regulated activities within 5 kilometres of a residence and within 1 kilometre of a garden or artificial water accumulation. Origin must also erect and maintain appropriate temporary fencing. • Clause 11 (P9) requires Origin to use best endeavours to ensure that the regulated activities do not cause an impaired capacity to any water aquifers beneath the property and having the property certified as 'organic'.	
	Beetaloo Basin Exploration Project – Weed Management Plan (**Appendix C**) • The plan details the risk mitigation measures to be implemented to control / prevent weed spread. The plan demonstrates how risk of week spread will be managed to ensure there is no consequence in this regard to the stakeholders' rights and activities.	17 May 2019
	Trafficwerx NT Traffic Management Plan (**Appendix G**) • The plan sets out the scope of work to establish a temporary site access road during construction. The location of the access track across the plaintiffs' property is detailed (P2). • The plan includes information about project dates and what times of day traffic management will be in place (P3). • Discussion about how traffic impacts will be managed are discussed in relation to fumes, volatile substances, noise, air quality (P13). • There are maps referencing the access road works proposed to be undertaken which outline impacts to traffic on the Stuart Highway (P46-52).	17 May 2019
	Draft Beetaloo Basin Groundwater Monitoring Bore Installation Program – Velkerri 76 Environment Management Plan (**Appendix J**) • Provides for the environmental impacts and risks to land (P6 and P43-50). • Lists the civil activities subject to the EMP (P8-9). • Provides images of the proposed water bore lease area layout (P10 – Figure 4). • Lists equipment and machinery required for civil construction, water bore drilling and groundwater monitoring and corresponding timeframes (P14-15). • References the pastoral leasing purpose of the underlying land, including the Amungee Mungee Station specifically (P36). • Provides erosion and sediment control measures for proposed regulated activities (P292-297 of PDF).	22 May 2019

	Draft Beetaloo Basin Velkerri 76 S2 Civil Construction Environment Management Plan (**Appendix J**) • Provides for the environmental impacts and risks to land (P8-10 and P46-57). • References the civil construction program (P12-15) which describes the location, size and proposed use of key areas for proposed regulated activities. • Outlines the peak maximum anticipated traffic flow increase associated within Origin activities for civil activities to be 44 vehicles per day during rig mobilisation and demobilisation and 12 vehicles for several days during related infrastructure equipment mobilisation and demobilisation (P18-20). • Lists equipment and machinery required for civil construction works and provides detailed civil construction scope timing indicating impacts to land (P22). • References the pastoral leasing purpose of the underlying land, including the Amungee Mungee Station specifically. • Indicates that impacts on the stakeholder are not anticipated due to the separation distances between properties and homesteads and the regulated activities (P37). • Appendix B includes infrastructure design drawings (P85 of PDF). • Provides erosion and sediment control measures for proposed regulated activities (P135-140 of PDF).	22 May 2019

Appendix K Amungee Mungee stakeholder consultation documentation

Comments from Stakeholder	Relevant section of EMP	Assessment of merit	Origin's response
(a) "No Environmental Management Plan is submitted for the main Regulated Activity which is the drilling, hydraulic fracture stimulation and well testing of a future exploration well" "There are fundamental errors relating to the description of the technical works program in accord with the regulations" "No detailed work program is provided for each technical works area"	Part 2.3 'Project Description' (Pages 2 to 3). Part 4 'Description of the regulated activity' (Pages 32 to 38).	Part 2.3 describes the scope of activities Origin proposes to undertake under the EMP and distinguishes the civil construction activities from future activities, including exploration well construction and data collection. The activities identified and detailed in Part 4 of the EMP are the activities Origin intends to perform as part of a technical works programme for petroleum activities under EP76. The activities will constitute 'regulated activities' under the definition provided in section 5(1) of the *Petroleum (Environment) Regulations 2016*. This EMP is not an EMP for any drilling or stimulation associated with hydraulic fracturing activities. The scope of this EMP is limited to the activities identified and detailed in Part 4 of the EMP. Origin, through its legal representative King & Wood Mallesons, communicated the scope of this EMP as a plan for civil construction activities on Amungee Mungee Station by letter on 22 May 2019. Part 4.11 'Timelines' outlines the place in time the activities Origin proposes to undertake under the EMP in comparison to other activities that will be the subject of a later EMP. Part 4 provides sufficient detail on the activities Origin will undertake on and around the Velkerri 76 S2 site for the purposes of the EMP.	The stakeholder has misunderstood the scope of this EMP and the activities that will be conducted under it. Origin will continue to engage with the stakeholder to ensure they have a clear understanding of the scope of Origin's current, and future, activities on land. Origin considers that a technical works programme is not required to be provided in the EMP or to stakeholders beyond the level of detail provided for in the EMP. Future regulated activities will be the subject of future EMPs and associated stakeholder engagement.
(b) "The EMPs are required for a Regulated Activity that is not described in either EMP"	Part 1 'Executive Summary' (Page 5); Part 4 'Description of the regulated activity' (Pages 25 to 38).	Part 4 of the EMP provides a detailed description of the activities that are covered under the EMP, including construction of: • Construction of a.(4.5 ha) lease pad and associated lease pad infrastructure; • Construction of a camp pad (1.2 ha); • Construction of a stockpile area (0.2 ha); • Construction of a helipad (0.5 ha);	Origin considers that the content of the EMP addresses this comment from the stakeholder. The stakeholder's contention

		• Construction of up to 4 gravel pits (4 ha) and associated access tracks (2.4 hectares); • Construction of a drilling sump, cellar and sediment basin on the cleared lease pad; and • Installation of fencing, gates and grids on the Velkerri S2 76 site. The description of each activity includes a detailed analysis of the size and structure of works, the structure of any installations, the reasons for the choice of works and methods of both construction and ongoing operation of the installations and works. Part 4 also addresses the ancillary aspects of the construction activities, including: • anticipated greenhouse gas emissions; • water supply and use; • chemical utilisation and storage; • waste management strategies; • weed management strategies; • traffic management strategies; • rehabilitation planning; and • ongoing monitoring programs. Each of the activities is to occur by reference to a detailed timeline included in Part 4.11.	misconstrues the purpose of the draft EMP which has been disclosed to the stakeholder.
(c) "Maps prepared are not at a sufficient scale to allow the interpretation of impacts for each technical works program at each location"	Figure 2 'Location of proposed activities within Origin's Exploration tenure' (Page 16) Figure 3 'Site location map' (Page 17); Figure 9 'Existing landholder and groundwater	Figure 3 provides a map of the specific location of the Velkerri 76 S2 site, which is the location that all activities proposed under the EMP, excluding gravel pit construction, will occur on. Figure 3 further outlines the locations of each of the four gravel pits to be constructed (being numbers 4, 5, 6 and 7 on Amungee Station). This map is intended to be read in conjunction with Figure 2, which provides a broader view of the EP area to contextualise the region of the Northern Territory activities will be performed in. In addition to the gravel pit locations identified in Figures 2 and 3, Table 1 provides approximated co-ordinates for the land on which the gravel pits are proposed to be constructed. Figure 9 identifies the location of existing landholder and groundwater monitoring bores and their proximity to the Velkerri S2 76 site.	Origin considers that the content of the EMP addresses this comment from the stakeholder. However, Origin will provide larger scale maps to the stakeholder as part of its ongoing stakeholder engagement commitments.

	monitoring bores' (Page 44) Figure 10 'Vegetation communities surrounding the proposed Velkerri 76 S2 Lease pad' (Page 48); Figure 11 'Fire frequency map of the Beetaloo Basin (Page 52). Appendix D, Figures 2 to 4 Appendix D of Appendix E 'Erosion and Sediment Control Plan for Lease Pads'	Figure 10 provides further environmental habitat and native flora location information for the Velkerri 76 S2 site to communicate each of the activities' interaction with the environmental habitat. Figure 11 is a region map of fire frequency. This map uses a broad scale to communicate the level risk of bush fire spread to the Velkerri 76 S2 site. In Appendix D, Figures 2 to 4 provide a region map of weed locations. This map uses a broad scale to communicate the level of risk of weed spread in the area of the Velkerri 76 S2 site. Appendix D of Appendix E includes 1cm:50m maps of the Velkerri 76 S2 site and Stuart Highway that detail the specific location of all installations to be constructed on the site and as part of the Stuart Highway works. These installation details are accompanied by proposed management techniques for water (clean and dirty) flow across the site and Stuart Highway locations for erosion and sediment control purposes.	
(d) "No detailed description of environmental values is provided for each technical works program at each location"	Part 5 'Description of the existing environment' (Pages 39 to 57) Part 7 'Environmental Risk Assessment' (Pages 60 to 69) Appendix F 'Land Condition Assessment'	Part 5 of the EMP is a summary of a Land Condition Assessment completed in August 2018 for the land of and surrounding the Velkerri 76 S2 site and identifies the environmental values present on the relevant land. A full version of the Land Condition Assessment is included at Appendix E. Each table in Part 7 of the EMP identifies and details an environmental value relevant to the Velkerri 76 S2 site and the activities that may pose an environmental risk of to the site. Specific risk management controls and measurement criteria for managing risk are outlined for each environmental value.	Origin considers that the content of the EMP addresses this comment from the stakeholder. Origin does not accept the stakeholder's contention which is clearly not made out having regard to the contents of the draft EMP disclosed to the stakeholder.
(e) "No apparent effort has been made within the EMP documentation to	Table 5 'Assessment against environmental	Table 5 identifies 'Inland Water Environmental Quality' as a project specific environmental value. The value focuses on ensuring the quality of groundwater and surface water to ensure water values, including existing use of water in the land, are	Origin considers that the content of the EMP addresses this

	describe the impact of any works upon existing agricultural and water operation"	factors and objectives' (Pages 20 to 23) Part 4.3 'Water Supply and Use' (Pages 30 to 31) Table 34 'Environmental Values and Objectives – Community' (Page 76)	protected. Origin concluded that there is no significant risk of impact on pastoralist bores from groundwater extraction associated with the activities under this EMP. Table 5 further considers 'Social, economic and cultural surroundings' as a project specific environmental value. The value focuses on ensuring the social and economic values of the Northern Territory are protected. Origin concluded that the impact from increased traffic and the location of infrastructure is unlikely to impact the pastoralists directly or the pastoralists' social and economic enjoyment of the land. Part 4.3 considers the water extraction activities Origin proposes to carry out as part of the proposed civil construction activities. This includes assessment of the four pastoralist extraction bores Origin has identified as being located within 15 kilometres of the proposed Velkerri 76 S2 well site. Origin's assessment concludes that there would be no significant impact on the pastoralists water use. Further assessment is present in Appendix C – 'Water Extraction Licence – Statement of Reason'. Table 34 outlines that the limited nature of the activities results in a low level of risk to the pastoralists and their activities. Any risks are considered reduced by the additional controls Origin will implement when undertaking the activities.	comment from the stakeholder. Origin further considers that previous consultation with the stakeholder addresses concerns of the stakeholder regarding the specific method by which Origin will undertake activities on Amungee Mungee Station. Please refer to 'Appendix I'.
(f)	"Amungee consider the EMPs as delivered are fatally flawed, the EMPs simply are not based upon the relevant science, are generalised and have been collated without reference to the Regulations or the Recommendations of the Scientific Inquiry into Hydraulic Fracturing dated 27 March 2018."	Part 3 'Environmental Legislation and other Requirements' (Pages 13 to 24) Part 4 'Description of the regulated activity' (Pages 25 38) Part 5 'Description of the existing environment' (Pages 39 to 57) Part 6 'Stakeholder and Community Engagement' (Page 57 to 60) Part 7 'Environmental	The EMP includes detailed descriptions of the activities to be undertaken (in Part 4) and of the existing environment (in Part 3) to inform the environmental risks, impacts and outcomes of the activities described in Part 7. The EMP features a number of technical and scientific reports developed specifically for the activities to be undertaken in development of the Velkerri 76 S2 site as annexures. These reports have informed the content of the EMP, including Part 5. Origin was an active contributor to the Scientific Inquiry into Hydraulic Fracturing, as noted in Part 6, and acknowledges the key recommendations of the Inquiry throughout the EMP. This includes express acknowledgment of the Scientific Inquiry and the key recommendations in Part 3.3 and references to compliance with the minimum requirements set out in the 'Code of Practice: Onshore Petroleum Activities in the Northern Territory' developed as a result of the Scientific Inquiry.	Origin considers that the content of the EMP addresses this comment from the stakeholder. Origin does not accept the stakeholder's contention which is clearly not made out having regard to the contents of the draft EMP disclosed to the stakeholder.

	Risk Assessment’ (Pages 60 to 77)		

Information has been redacted due to confidentiality requirements

Appendix L Environmental Risk Assessment

Ref	Environmental Factor	Impact Description	Risk Source	Unmitigated risk- no controls or regulations			Codes of Practice	Site specific risk mitigation measures	Residual Risk Rating			Effectiveness of Treatment	Scientific uncertainty	Uncertainty Ranking
				Consequence	Likelihood	Risk Rating			Consequence	Likelihood	Risk Rating			
1	Groundwater	Contamination of aquifer from Chemical and waste storage, handling and spills)	•Storage, handling and transportation of chemicals, fuels and wastes	2	2	L	A.4.7 Containment of Contaminants	Source •Small volumes of fuels, oil and chemical to be utilised associated with machinery operation and field maintenance.. •All chemical, fuel and waste storage and handling areas to be stored in accordance with Australian standards; such as AS1940 •Licenced waste transporters to be used to transport listed wastes •Chemicals to be transported and stored in accordance with the NT transport of Dangerous Goods by Road and Rail (National Uniform Legislation) Act 2010 Pathway •Separation between the surface and closest aquifer over 70m, with interbedded clays likely to limit contaminant migration •All transportation of listed wastes and Dangerous goods to be undertaken via licenced contractors. Receptor •Separation between storage areas and closest aquifer over 70m, •Nearest landholder extraction bore 12km •Impact and control ground water monitoring bores will be installed within exploration wells which will detect contamination. •Area remote with major urban areas to be avoided during the transportation of dangerous goods and wastes in accordance with the NT Dangerous Goods Act. •Spills ad leaks to be cleaned up and rectified as soon as possible.	2	2	L	Effective	The regulatory regime legislating the storage, handling and transportation of dangerous goods and combustible liquids within Australia is mature. - Origin has extensive experience in transporting, storing and managing chemicals and fuels associated with unconventional petroleum activities. -EPA Study of Hydraulic Fracturing for oil and gas and its potential impact on drinking water resources (Us EPA 2016) -Scientific Inquiry into Hydraulic fracturing in the Northern Territory (2018) Final Report	Low
2	Surface Water	Contamination of surface water from surface activities	Storage and handling of chemicals and fuel	2	3	M	A.4.7 containment of contaminants	Source All areas where chemicals and fuels are stored will have secondary containment. Weekly inspections will be implemented and spills rectified as soon as practicable. Pathway Spill management procedures implemented by contractor Receptor Area remote with closest water bore approximately 11km.	1	3	L	Effective	The regulatory regime legislating the storage, handling and transportation of dangerous goods and combustible liquids within Australia is mature. - Origin has extensive experience in transporting, storing and managing chemicals and fuels associated with unconventional petroleum activities. -EPA Study of Hydraulic Fracturing for oil and gas and its potential impact on drinking water resources (Us EPA 2016) -Scientific Inquiry into Hydraulic fracturing in the Northern Territory (2018) Final Report	Low
3			Release of stormwater from activities to surface water	2	3	M	A.4.1 Site selection and planning A.4.3 Erosion and sediment control and hydrology	Source •Erosion and sediment controls implemented as per erosion and sediment control plan. •Lease pad located away from watercourses or regional flow paths •Stockpiled debris to be used to discourage water concentration Pathway •Erosion and sediment controls implemented as per erosion and sediment control plan. Receptor •Area remote with closest watercourse approximately 13km.	1	3	L	Effective	The understanding of the risks associated with the release of stormwater from construction sites is mature, with international standards providing guidance to manage the risk. -The NT has a range of technical guidance notes covering soil management, erosion and sediment control. this includes the NT Land Clearing Guidelines	Low
4			Erosion and sediment releases from lease pads and access tracks	2	3	M	A.4.1 Site selection and planning A.4.3 Erosion and sediment control and hydrology	Source Erosion and sediment controls implemented in accordance with the erosion and sediment control plan Lease pad located away from watercourses or regional flow paths Land clearing to be undertaken in accordance with the NT Land clearing Guidelines. No clearing of vegetation in watercourses proposed. Pathway Erosion and sediment control plan implemented. Receptor Lease pad located away from watercourses. Area remote with closest watercourse approximately 13km.	1	3	L	Effective	The understanding of the risks associated with the release of stormwater from construction sites is mature, with international standards providing guidance to manage the risk. -The NT has a range of technical guidance notes covering soil management, erosion and sediment control. this includes the NT Land Clearing Guidelines	Low

Ref	Environmental Factor	Impact Description	Risk Source	Unmitigated risk- no controls or regulations			Codes of Practice	Site specific risk mitigation measures	Residual Risk Rating			Effectiveness of Treatment	Scientific uncertainty	Uncertainty Ranking
				Consequence	Likelihood	Risk Rating			Consequence	Likelihood	Risk Rating			
5	Surface Water	Changes in surface water hydrology resulting vegetation dieback from ponding and diversions away from natural surface systems with environmental and cultural value	infrastructure located on regional flow path resulting in changes to surface water flow	1	2	L	A.4.1 Site selection and planning A.4.3 Erosion and sediment control and hydrology	Source •Erosion and sediment controls implemented in accordance with the erosion and sediment control plan •Lease pad located away from watercourses or regional flow paths •Land clearing to be undertaken in accordance with the NT Land clearing Guidelines. •No clearing of vegetation in watercourses proposed. •Lease pads to be designed to divert stormwater around, without impeding natural surface water flows. •Stockpiled debris to be used to discourage water concentration Pathway •lease pads to be designed to reduce impact on overland flows. Receptor •Area remote with closest watercourse approximately 13km. •The lease area is flat, with water to be diverted around the perimeter of the site.	1	2	L	Effective	Well understood risk with management strategies within the NT Land clearing Guidelines.	Low
6	Water usage	Unsustainable groundwater extraction impacts landholders and groundwater dependent ecosystems	Over extraction of groundwater for civils,	3	1	L	B.4.17 Groundwater monitoring	Source •Groundwater extraction for activities to be restricted to the minimum water required. •Exploration well located ~12km from closest extraction point. •All water take will have a water extraction licence in accordance with NT Water Act. Pathway •Drawdown from activity and other users assessed, with impacts to closest receptor determined. Receptor •Closest receptor ~12km from extraction point.	3	1	L	Effective	-US EPA Study of Hydraulic Fracturing for oil and gas and its potential impact on drinking water resources (Us EPA 2016) -Scientific Inquiry into Hydraulic fracturing in the Northern Territory (2018) Final Report	Low
7	Soil	Loss in long term soil productivity and viability	Soil compaction from access tracks and leases	3	2	M	A.4.1 Site selection and planning	Source •Land clearing undertaken in accordance with NT Land clearing Guidelines. •Land condition assessment completed Lease pads to be stripped of topsoil. •Areas to be rehabilitated to reduce impacts associated with compaction. Pathway • Areas to be rehabilitated to reduce impacts associated with compaction. Receptor • Disturbance area is small	2	1	L	Effective	Well understood risk with management strategies within the NT Land clearing Guidelines.	Low
8			Soil erosion from cleared areas (access tracks, lease pads and camp pads)	3	4	M	A.4.3 Erosion and sediment control and hydrology	Source • Land clearing undertaken in accordance with NT Land clearing Guidelines. • Land condition assessment completed • Lease pads to be stripped of topsoil. • Areas to be rehabilitated to reduce impacts associated with compaction. • Erosion and sediment control plan implemented. • Stockpiled debris to be used to discourage water concentration Pathway • Areas to be rehabilitated to reduce impacts associated with compaction. Receptor • Disturbance area is small	1	4	M	Effective	The understanding of the risks associated with the release of stormwater from construction sites is mature, with international standards providing guidance to manage the risk. -The NT has a range of technical guidance notes covering soil management, erosion and sediment control. this includes the NT Land Clearing Guidelines	Low
9			• Disturbance of creek and stream banks.	1	1	L	A.4.1 Site selection and planning A.4.4 biodiversity Protection	• Clearing is not proposed for any creeks or watercourses	1	1	L	Effective	Well understood risk with management strategies within the NT Land clearing Guidelines.	Low
10		Soil contamination reduces viability of soil resources	Soil contamination from spill of fuels, chemical and wastes	2	3	M	A.4.7 containment of contaminants	Source • all chemicals to be stored in accordance with Australian Standards, such as AS 1940 •contractor to have spill management procedure •All wastes to be transported in accordance with the NT Waste Management and Pollution Control act Pathway • Contractors to have spill management procedure • All wastes stored and handled in accordance with NT Waste management and Pollution Control Act Receptor •Spill management procedures to be implemented by contractors to prevent, detect, remediate and report spills •Weekly inspections of field storages to identify and rectify spills as soon as practicable. •All wastes stored and handled in accordance with NT Waste management and Pollution Control Act	1	3	L	Effective	Origin has extensive experience in transporting, storing and managing chemicals associated with unconventional petroleum wells across Australia -US EPA Study of Hydraulic Fracturing for oil and gas and its potential impact on drinking water resources (Us EPA 2016) -Scientific Inquiry into Hydraulic fracturing in the Northern Territory (2018) Final Report Beetaloo Sub-basin -CSIRO regional baseline monitoring program- -Control and impact monitoring bores as per Preliminary guidelines: Groundwater Monitoring bores for Exploration Petroleum Wells in the Beetaloo Sub-basin	Low

Ref	Environmental Factor	Impact Description	Risk Source	Unmitigated risk- no controls or regulations			Codes of Practice	Site specific risk mitigation measures	Residual Risk Rating			Effectiveness of Treatment	Scientific uncertainty	Uncertainty Ranking
				Consequence	Likelihood	Risk Rating			Consequence	Likelihood	Risk Rating			
11		Soil contamination form the disposal of greywater and sewerage from camp activates.	Greywater and sewerage disposal (camps)	1	2	L	A.4.1 Site Selection	•All sewage to be removed offsite and disposed of in accordance with the NT Waste Management and Pollution Control Act •Greywater to be released in accordance with the Department of Health guidelines.	1	2	L	Effective	Risks associated with sewerage transportation and greywater disposal are well known, with technical guidance notes for system design available within the NT.	Low
12	Terrestrial Flora and Fauna	• Disturbance to environmentally sensitive areas and/or high valued habitat areas	• Clearing of high valued conservation areas or habitat for infrastructure	2	2	L	A.4.1 Site selection and planning A.4.4 Biodiversity protection	Source •Site location avoids areas of high conservation value as a priority. •Field ecology scouting undertaken as a part of a land condition assessment to prevent impacts to high conservation value areas. •Areas are not considered high conservation value, are not threatened/ endangered, with impacts unlikely to result in fragmentation. •Clearing area minimised to minimum area required to safely undertake activity. Pathway •Land clearing conducted in accordance with NT Land Clearing Guidelines Receptor •Land condition assessment confirms the proposed area is regionally abundant and not of high conservation value.	2	2	L	Effective	Multiple field ecological scouts have been undertaken by AECOM since 2005 Field ecological scouts completed by AECOM in 2018. NT Natural Resource vegetation Maps	Low
13			Activity (vehicle and machinery) noise and lighting on well pads and access tracks	1	3	L	A.4.1 Site selection and planning A.4.2 Noise	Source •Site location avoids areas of high conservation value as a priority. •Field ecology scouting undertaken as a part of a land condition assessment to prevent impacts to high conservation value areas. •Areas are not considered high conservation value, are not threatened/ endangered, with impacts unlikely to result in significant disturbance to threatened/ endangered species. Pathway • Land clearing conducted in accordance with NT Land Clearing Guidelines Receptor • Land condition assessment confirms the proposed area is regionally abundant and not of high conservation value.	1	3	L	Effective	Risks associated with noise on fauna are well understood.	Low
14			introduction and spread of weeds in the area	2	4	M	A.4.5 Weed management	Source •Weed management plan to implemented to prevent, detect, control and report weed infestations •Earthmoving equipment to be sourced from NT. •The use of earth moving equipment from outside of the not anticipated •All equipment and vehicles to be washed down and to have a biosecurity declaration certificate prior to access to site. •Areas of proposed exploration have been surveyed and are deemed to have low weed abundance. Pathway •Equipment to be wash-down and certified. •Origin assurance activities to target equipment wash-down certificates to ensure standards are being met. Receptor •Area is free of weeds and monitoring will be implemented around infrastructure to detect the spread/ introduction of weed species.	2	4	M	Effective	Risks associated with weeds are well studied within literature and by the NT DENR Field weed surveys completed prior to and after construction activities.	Low
15			Fragmentation of habitat	2	1	L	A.4.1 Site selection and planning A.4.4 Biodiversity protection	Source •Site location avoids areas of high conservation value as a priority. •Field ecology scouting undertaken as a part of a land condition assessment to prevent impacts to high conservation value areas. •Areas are not considered high conservation value, are not threatened/ endangered, regionally extensive and impacts are unlikely to result in fragmentation. Pathway •Land clearing conducted in accordance with NT Land Clearing Guidelines Receptor •Land condition assessment confirms the proposed area is regionally extensive and not of high conservation value. •Land clearing pressures from other industries not significant in the area.	2	1	L	Effective	The risks associated with habitat fragmentation are well covered in literature. -NT DENR vegetation maps -Field ecological surveys completed across the tenure since 2005; including the subject area.	Low

Ref	Environmental Factor	Impact Description	Risk Source	Unmitigated risk- no controls or regulations			Codes of Practice	Site specific risk mitigation measures	Residual Risk Rating			Effectiveness of Treatment	Scientific uncertainty	Uncertainty Ranking
				Consequence	Likelihood	Risk Rating			Consequence	Likelihood	Risk Rating			
16			Accidental ignition of fire from civil activities	3	3	M	A 4.6 fire management	Source •Bushfire management plan controls (fire breaks, fire fighting equipment etc.) implemented •Bushfire awareness included in site inductions •Designated smoking areas onsite. •Fire fighting equipment to be available to deal with fires. •Fire breaks to be implemented around lease and camp pads • Appropriate separation distances between future flares and surrounding vegetation. Pathway • Fire breaks to be implemented around lease and camp pads Receptor •Activities will comply with landholder and regional bushfire management plans •Area in the vicinity of the lease has had recent fire activity- reducing the fuel load.	3	3	M	Effective	Risks associated with Bushfire well known, with numerous literature and NT Government management plans and technical guidance notes.	Low
17			Erosion and sediment release reduces surroudning biodiversit through habitat degredation	2	3	M	A.4.1 Site selection and planning A.4.3 Erosion and sediment control and hydrology	Source • Land clearing undertaken in accordance with NT Land clearing Guidelines. • Land condition assessment completed • Area flat, with activity completed during low risk erosion period • Erosion and sediment control plan implemented to prevent, detect and respond to erosion. • Routine inspections and maintenance implemented • Adjacent areas are cosnidered regionally extensive and not threatned • Stockpiled debris to be used to discourage water concentration Pathway • Areas to be rehabilitated to reduce impacts associated with compaction. Receptor • Disturbance area is small compared to vegetation communities	2	2	L	Effective	Risks associated with erosion and sediment releases well documented through the construction industry and legislation.	Low
18			Poor rehabilitation	2	2	L	A.4.8 rehabilitation	•A site specific rehabilitation plan will be developed prior to rehabilitation Plan will be developed in consultation with leaseholder and DENR •Rehabilitation success criteria developed with ongoing monitoring undertaken to measure success. •Maintenance undertaken periodically to fix defects.	2	2	L	Effective	Risks associated with rehabilitation are well known Knowledge of rehabilitation within the beet aloo Basin has been gained based on previous seismic line rehabilitation programs.	Low
19		•impacts (direct and indirect) to flora and fauna species, including the loss of threatened or endangered species	• Clearing habitat for infrastructure	2	2	L	A.4.1 Site selection and planning A.4.4 Biodiversity protection	Source Site location avoids areas where threatened flora and fauna are predicted. Cleared areas to be clearly marked to avoid confusion. Field ecology scouting undertaken as a part of a land condition assessment to identify protected flora and fauna Significant disturbance to threatened/ endangered flor and fauna species is not anticipated.. Clearing area minimised to minimum area required to safely undertake activity. Pathway Land clearing conducted in accordance with NT Land Clearing Guidelines Receptor Land condition assessment confirms the proposed area is regionally abundant and not of high conservation value.	2	2	L	Effective	Multiple field ecological scouts have been undertaken by AECOM since 2005 Field ecological scouts completed by AECOM in 2018. NR vegetation Maps	Low
20			• Trapping and drowning of fauna in sumps	2	4	M	C.5.1 Drilling Materials	Source Lease pads to be fenced to prevent stock ingress into sumps and cellars. Sumps and cellars to have adequate barricading to prevent access. Pathway Lease pads fenced to prevent stock and wildlife access. Receptor Lease pads fenced to prevent stock and wildlife access.	2	2	L	Effective	Risks associated with potentially trapping and drowning fauna in sumps and pits are well understood. Origin has extensive experience in managing sumps, ponds and tanks to prevent fauna ingress.	Low

Ref	Environmental Factor	Impact Description	Risk Source	Unmitigated risk- no controls or regulations			Codes of Practice	Site specific risk mitigation measures	Residual Risk Rating			Effectiveness of Treatment	Scientific uncertainty	Uncertainty Ranking
				Consequence	Likelihood	Risk Rating			Consequence	Likelihood	Risk Rating			
14			• Vehicle collisions with fauna (including threatened bird species) – fauna mortality	1	3	L	A.4.4 Biodiversity protection	Source •vehicle speed limits <80km/hr for dirt road •Vehicle movements to avoid driving at night. •Construction noise will deter most fauna ad birds preventing bird strike. •Spotters to be used when clearing vegetaiton; work to stop when birds or fauna are identified within cleared area and allowed to leave n their own accord. Pathway •vehicle speed limits to be reduced around areas of high risk of fauna collision •construction noise will prevent fauna presence in area Receptor •spotters to be used during clearing activities.	1	3	L	Effective	Risks associated with fauna collisions are well known.	Low
14			• Activity noise, lighting on well pads and access tracks disturbs fauna	1	3	L	A.4.1 Site selection and planning A.4.2 noise	Source •Site location avoids areas of high conservation value as a priority. •Activity to occur during 6am-7pm- no lighting required. field ecology scouting undertaken as a part of a land condition assessment to prevent impacts to high conservation value areas. •Areas are not considered high conservation value, are not threatened/ endangered, with impacts unlikely to result in fragmentation. Pathway •Land clearing conducted in accordance with NT Land Clearing Guidelines •Lighting levels minimised to the level required to complete work safely. Receptor •Land condition assessment confirms the proposed area is regionally abundant and not of high conservation value.	1	3	L	Effective	Risks associated with noise and light impacts on flora and fauna are covered extensively in literature.	Low
14			Activity dust impacts on high biodiversity value areas, icnluding those used by threatened species	1	3	L	A.4.4 Biodiversity protection	Source •Site location avoids areas of high conservation value as a priority. •field ecology scouting undertaken as a part of a land condition assessment to prevent impacts to high conservation value areas. •Although some threatened species may utilise habitat, the broader habitat level is extensive compared to disturbed area •Dust suppression to be utilised to prevent dust formation Pathway •Land clearing conducted in accordance with NT Land Clearing Guidelines Receptor •Land condition assessment confirms the proposed area is regionally abundant and not of high conservation value. Threatened species likely to be deterred by construction noise, limiting exposure	1	2	L	Effective	The level of actviity, combined with understanding of dust impacts on fauna and vegetation communities results in a low level of scientific uncertainty.	Low
14			•Encouragement of feral animals and other pest species increases competition with native species	1	3	L	A.4.4 Biodiversity protection	Source •Camp wastes to be stored in a manner that to prevent attracting feral animals •All food scraps to be removed from site and disposed of at a licenced facility.	1	3	L	Effective	The risks associated with encouraging feral animals with inadequate waste management is well understood within literature and government policy.	Low
14			introduction and spread of weeds in the area	3	5	H	A.4.5 Weed management	Source •Weed management plan to be approved by DENR and implemented to prevent, identify, control and report weed infestations. •Earthmoving equipment to be sourced from NT. •The use of earth moving equipment from outside of the not anticipated •All equipment and vehicles to be washed down and to have a biosecurity declaration certificate prior to access to site. •Areas of proposed exploration have been surveyed and are deemed to have low weed abundance. Pathway •Equipment to be wash-down and certified. •Origin assurance activities to target equipment wash-down certificates to ensure standards are being met. Receptor •Area is free of weeds and monitoring will be implemented around infrastructure to detect the spread/ introduction of weed species.	2	4	M	Effective	Risks associated with weeds are well studied within literature and by the NT DENR Field weed surveys completed prior to and after construction activities.	Low

Ref	Environmental Factor	Impact Description	Risk Source	Unmitigated risk- no controls or regulations			Codes of Practice	Site specific risk mitigation measures	Residual Risk Rating			Effectiveness of Treatment	Scientific uncertainty	Uncertainty Ranking
				Consequence	Likelihood	Risk Rating			Consequence	Likelihood	Risk Rating			
14			fragmentation of habitat	1	1	L	A.4.1 Site selection and planning A.4.4 Biodiversity protection	Source •Site location avoids areas of high conservation value as a priority. •Cleared areas to be clearly marked to avoid confusion. •Field ecology scouting undertaken as a part of a land condition assessment to prevent impacts to high conservation value areas. •Areas are not considered high conservation value, are not threatened/ endangered, regionally extensive and impacts are unlikely to result in fragmentation. Pathway •Land clearing conducted in accordance with NT Land Clearing Guidelines Receptor •Land condition assessment confirms the proposed area is regionally extensive and not of high conservation value. •Land clearing pressures form other industries not significant in the area.	1	1	L	Effective	The risks associated with habitat fragmentation are well covered in literature. -NT DENR vegetation maps -Field ecological surveys completed across the tenure since 2005; including the subject area.	Low
14			Poor rehabilitation reduces habitat quality	2	3	M	A.4.8 rehabilitation	•A site specific rehabilitation plan will be developed prior to rehabilitation •Plan will be developed in consultation with leaseholder and DENR •Rehabilitation success criteria developed with ongoing monitoring undertaken to measure success. •Maintenance undertaken periodically to fix defects.	2	2	L	Effective	The risks associated with habitat fragmentation are well covered in literature. -NT DENR vegetation maps -Field ecological surveys completed across the tenure since 2005; including the subject area.	Low
14			Accidental ignition of fire from civil activities	3	4	M	A 4.6 fire management	Source •Bushfire management plan implemented to implement the required bushfire controls (fire breaks, fire fighting equipment etc.) •Bushfire awareness included in site inductions •Designated smoking areas onsite. •Fire fighting equipment to be available to deal with fires. •Fire breaks to be implemented around lease and camp pads •Appropriate separation distances between flares and surrounding vegetation. Pathway •Fire breaks to be implemented around lease and camp pads Receptor •Activities will comply with landholder and regional bushfire management plans •Area in the vicinity of the lease has had recent fire activity- reducing the fuel load.	3	3	M	Effective	Risks associated with Bushfire are well known, with numerous literature and NT Government management plans and technical guidance notes.	Low
14	Cultural Heritage and Sacred Sites	Disturbance of sacred site or culturally sensitive area	• Sites disturbed directly by access track construction	3	1	L	A.4.1 Site selection and planning	Source •All areas of the proposed activity to be cleared by NLC •AAPA certificates for proposed work program granted prior to commencement. •The location of infrastructure has considered proximity to sacred sites. •Access track to Velkerri site intersects RWA4. No areas of cultural significance within 7km of proposed lease area. •Contractors will be made aware of all restricted work areas and AAPA certificate C2019/039 conditions (RWA construction limits of 3m of track each side of the centre line and 9 metre road corridor) Pathway •Access track to Velkerri site intersects RWA4. these areas will be communicated to contractors and pegged out to ensure compliance with requirements. Receptor •Access track to Velkerri site intersects RWA4. No areas of cultural significance within 7km of proposed lease area.	3	1	L	Effective	All sites of the proposed activity must have Traditional Owner clearance via the NLC AAPA certificates are required for all activities. Restricted work areas are identified	Low
14			• Accidental ignition by site activities (civil works, grinding, smoking) or site personnel	3	3	M	A 4.6 fire management	Source •Bushfire management plan implemented to implement the required bushfire controls (fire breaks, fire fighting equipment etc.) •Bushfire awareness included in site inductions •Designated smoking areas onsite. •Fire fighting equipment to be available to deal with fires. •Fire breaks to be implemented around lease and camp pads •Appropriate separation distances between flares and surrounding vegetation. Pathway •Fire breaks to be implemented around lease and camp pads Receptor •Activities will comply with landholder and regional bushfire management plans •Area in the vicinity of the lease has had recent fire activity- reducing the fuel load.	3	3	M	Effective	risks associated with Bushfire well known, with numerous literature and NT Government management plans and technical guidance notes.	Low

Ref	Environmental Factor	Impact Description	Risk Source	Unmitigated risk- no controls or regulations			Codes of Practice	Site specific risk mitigation measures	Residual Risk Rating			Effectiveness of Treatment	Scientific uncertainty	Uncertainty Ranking
				Consequence	Likelihood	Risk Rating			Consequence	Likelihood	Risk Rating			
14			Personnel unauthorised access to restricted work area	3	2	M	A.4.1 Site selection and planning	Source •Access track to Velkerri site intersects RWA4. No areas of cultural significance within 7km of proposed lease area. •Contractors will be made aware of all restricted work areas and AAPA certificate C2019/039 conditions (RWA construction limits of 3m of track each side of the centre line and 9 metre road corridor) •All staff to be inducted covering restricted work areas and cultural heritage. •Access off lease not permitted. Pathway •Access off lease not permitted. Receptor •Access off lease not permitted. •Access track to Velkerri site intersects RWA4. No areas of cultural significance within 7km of proposed lease area.	2	1	L	Effective	All sites of the proposed activity must have Traditional Owner clearance via the NLC AAPA certificates are required for all activities. Restricted work areas are identified	Low
14	Community impact	Impacts to pastoralist and tourists, including loss of visual amenity, traffic and industrialisation of landscape.	industrialisation of landscape	1	1	L	A.4.1 Site selection and planning A.4.1.1 Well pad specific site selection	•Site located 103km away from the Stuart Highway and 50km nearest homestead- activity is not anticipated to be visible •Level of clearing for infrastructure small	1	1	L	Effective	Risks associated with aesthetic changes due to infrastructure construction are well known and not restricted to the petroleum industry.	Low
14			increased safety hazard and loss of service resulting from traffic and heavy vehicle operations	2	3	M	A.4.1 Site selection and planning	•Traffic management plan for the Stuart Highway access point usage has been approved by DPIL •Traffic impacts are expected to be small and temporary- no loss of service expected •All transportation of equipment, contaminated material, etc.to comply with the relevant Dangerous goods regulation and heavy vehicle driver requirements (as outlined in the NT Heavy vehicle driver handbook). this will include the use of appropriate load constraints, reduced speed limits, signage and other hazard controls during heavy vehicle movements. •Access route away from the main homestead •appropriate traffic control and signage to be used during equipment mobilisations and road works in corridor. •location of activity away from major tourism hubs - activity not visible from road.	2	1	L	Effective	Risks associated with increased traffic are well know throughout literature and policy	Low
14			Light emissions activities	1	1	L	A.4.1 Site selection and planning	•Site located 103km away from the Stuart Highway and 50km nearest homestead- activity is not anticipated to be visible	1	1	L	Effective	risks associated with light emission well known with various literature and technical guidelines available to mitigate impacts.	Low
14			Employee behaviour	1	3	L		•Work is located approximately 100km from the Stuart Highway with limited interaction with community • code of conduct behaviour to be completed outlining expected behaviour • use of dry fly camps reduces community interaction •drug and alcohol policy to reduce unruly behaviour	1	2	L	Effective	Behavioural controls associated with employees is a standard business management control.	Low
14			noise emissions from activities	1	1	L	A.4.1 Site selection and planning A.4.2 Noise	•Site located 103km away from the Stuart Highway and 50km from nearest homestead- activity is not anticipated to be visible	1	1	L	Effective	risks associated with noise emission well known with various literature and NT noise guidelines available to mitigate impacts.	Low
14		Reduction in agriculture productivity	introduction and spread of weeds	3	5	H	A.4.5 Weed management	Source •Weed management plan to be approved by DENR and implemented to prevent, detect, control and report weed infestations. •Earthmoving equipment to be sourced from NT. •The use of earth moving equipment from outside of the not anticipated •All equipment and vehicles to be washed down and to have a biosecurity declaration certificate prior to access to site. •Areas of proposed exploration have been surveyed and are deemed to have low weed abundance. Pathway •Equipment to be wash-down and certified. •Origin assurance activities to target equipment wash-down certificates to ensure standards are being met. Receptor •Area is free of weeds and monitoring will be implemented around infrastructure to detect the spread/ introduction of weed species.	2	3	M	Effective	Risks associated with weeds are well studied within literature and by the NT DENR Field weed surveys completed prior to and after construction activities.	Low

Ref	Environmental Factor	Impact Description	Risk Source	Unmitigated risk- no controls or regulations			Codes of Practice	Site specific risk mitigation measures	Residual Risk Rating			Effectiveness of Treatment	Scientific uncertainty	Uncertainty Ranking
				Consequence	Likelihood	Risk Rating			Consequence	Likelihood	Risk Rating			
14			over extraction of groundwater water	1	1	L	A.4.1.1 well pad specific site selection requirements B.4.17 Groundwater monitoring	Source •Groundwater extraction for activities to be restricted to the minimum water required. Groundwater extraction assessed as a part of Water extraction Licence •Exploration well located ~11.4km from closest extraction point. •All water take licenced in accordance with NT Water Act. Pathway •Drawdown from activity and other users assessed, with impacts to closest receptor determined. Receptor •Closest receptor ~11km from extraction point.	1	1	L	Effective	The regional understanding of the CLA is sufficient to understand the risks associated with groundwater extraction. The absence of users and small exploration take reduces the uncertainty of the activity	Low
14			impact to surface hydrology reduces water capture	1	1	L	A.4.3 Erosion and sediment control and hydrology A.4.1 Site selection and planning	Source •Lease pads located away form major watercourses or flow paths •Lease pads designed to not disrupt flow paths, with overland flow diverted around lease •Infrastructure design in accordance with the NT Land Clearing Guidelines •Erosion and Sediment Control Plan implemented.	1	1	L	Effective	The risks associated with changes in surface hydrology are well known. Guidance notes are available via the NT1 Land Clearing guidelines and BPESC to minimise the impact on surface hydrology.	Low
14			Bushfire from accidental ignition by site activities or personnel	3	4	M	A 4.6 fire management	Source •Bushfire management plan implemented to prevent and manage bushfires •Bushfire awareness included in site inductions •Designated smoking areas onsite. •Fire fighting equipment to be available to deal with fires. •Fire breaks to be implemented around lease and camp pads •Appropriate separation distances between flares and surrounding vegetation. Pathway •Fire breaks to be implemented around lease and camp pads Receptor •Activities will comply with landholder and regional bushfire management plans •Area in the vicinity of the lease has had recent fire activity- reducing the fuel load.	3	3	M	Effective	risks associated with Bushfire well known, with numerous literature and NT Government management plans and technical guidance notes.	Low
14			Poor rehabilitation of exploration infrastructure	2	3	M	A.4.8 rehabilitation	•A site specific rehabilitation plan will be developed prior to rehabilitation •Plan will be developed in consultation with leaseholder and DENR •Rehabilitation success criteria developed with ongoing monitoring undertaken to measure success. •Maintenance undertaken periodically to fix defects.	2	2	L	Effective	Risks associated with rehabilitation are well known Knowledge of rehabilitation within the beet aloo Basin has been gained based on previous seismic line rehabilitation programs.	Low
14			disruption of agricultural operations	2	2	L	A.4.1 Site selection and planning A.4.2 Noise	•All activities require engagement with leaseholders •Lease sites located to avoid disruption to agriculture operations and infrastructure •Lease located away from pastoralist water bores and water supply infrastructure. •Environmental risks are mitigated through adoption of codes of Practice. •Engagement undertaken in accordance with NT Petroleum Act	1	1	L	Effective	Origin has extensive experience in co-existing with agricultural users. Consultation with pastoralists is undertaken to ensure impacts on their activities are mitigated.	Low
14		Labour competition with local businesses and agricultural procedures	Exploration activities compete with agricultural industry for resources	2	2	L		•Proposed activity is temporary with no major labour requirements •Local contractors for existing communities used where available •Contracts structure to reduce boom and bust cycle (clear understanding of limited scope of work) •All work to be short term with predominantly skilled workforce sourced regionally •local businesses have been engaged on proposed activity schedule.	1	1	L	Effective	Risks associated with small scale, limited duration projects on local economies are well known. The short nature of the projects reduces the risks of boom and bust type cycles.	Low
14	Air Quality	Reduction in air quality associated with exploration emissions	Emissions from the combustion of diesel	1	1	L	A.4.1 Site selection and planning D.5.1 Baseline assessment	Source •Low emission equipment to be selected •All equipment to be maintained in accordance with the manufacturers recommendations. Pathway •Site located away from receptors. Receptor •No sensitive receptors within 50km	1	1	L	Effective	Risks associated with diesel combustion are well known both within Australia and Internationally. Methods for estimating emissions are available via the National Pollution Inventory	Low

Ref	Environmental Factor	Impact Description	Risk Source	Unmitigated risk- no controls or regulations			Codes of Practice	Site specific risk mitigation measures	Residual Risk Rating			Effectiveness of Treatment	Scientific uncertainty	Uncertainty Ranking
				Consequence	Likelihood	Risk Rating			Consequence	Likelihood	Risk Rating			
14		Increased nuisance dust emissions associated with exploration activities	• Civil construction works	1	2	L	A.4.1 Site selection and planning	Source •Water trucks used to decrease dust emissions •Reduced speed limits in proximity to homesteads Pathway •Site located away from receptors. Receptor •No sensitive receptors within 50km	1	2	L	Effective	Origin has extensive experience in managing nuisance emissions of dust during petroleum and construction activities. Strategies for managing dust emissions are well known throughout Australia and the NT.	Low
14			Bushfire from accidental ignition by site activities or personnel	3	4	M	A 4.6 fire management	Source •Bushfire management plan implemented to prevent and respond to bushfires •Bushfire awareness included in site inductions •Designated smoking areas onsite. •Fire fighting equipment to be available to deal with fires. •Fire breaks to be implemented around lease and camp pads •Appropriate separation distances between flares and surrounding vegetation. Pathway •Fire breaks to be implemented around lease and camp pads Receptor •Activities will comply with landholder and regional bushfire management plans •Area in the vicinity of Velkerri 76 S2 lease has had recent fire activity- reducing the fuel load.	2	3	M	Effective	risks associated with Bushfire well known, with numerous literature and NT Government management plans and technical guidance notes.	Low
14	Greenhouse Gas Emissions	Unsustainable Greenhouse Gas emissions from the activity	Combustion of diesel for exploration activities	1	1	L	A.4.1 Site selection and planning	Source •All equipment to be maintained in accordance with the manufacturers recommendations. Pathway •Site located away from receptors. Receptor •No sensitive receptors within 50km	1	1	L	Effective	The risks associated with greenhouse gas generation through diesel combustion are well documented in literature and domestic/ international greenhouse policy (Such as NGERS and IPCC)	Low
14			• Clearing of native vegetation	1	1	L	A.4.1 Site selection and planning A.4.4 Biodiversity Protection	Source •Vegetation clearing levels small •Site location avoids areas where threatened flora and fauna are predicted.. •Field ecology scouting undertaken as a part of a land condition assessment to identify protected flora and fauna •Significant disturbance to threatened/ endangered flor and fauna species is not anticipated.. •Clearing area minimised to minimum area required to safely undertake activity. •Material stockpiled surrounding lease and not burnt Pathway •Land clearing conducted in accordance with NT Land Clearing Guidelines Receptor •Land condition assessment confirms the proposed area is regionally abundant and not of high conservation value.	1	1	L	Effective	Understanding of GHG emissions from land clearing well documented within literature. Emission estimates using the Transport Authorities Greenhouse Group *Greenhouse Gas Assessment Workbook for Road Projects*	Low
14	Cumulative impacts	Cumulative impacts on groundwater quantify	Groundwater take for civil activities and surrounding land users exceeds the natural recharge rate of the basin	2	1	L	Water extraction licences under the NT Water Act	•DENR Water extraction licence groundwater impact assessments include an estimate of current extraction levels at a regional scale. •No intensive users of groundwater within the region; stock and domestic the major usage. •Large sustainabel yield.	2	1	L	Effective	The regional understanding of the CLA is sufficient to understand the risks associated with groundwater extraction. The absence of users and small exploration take reduces the uncertainty of the activity	Low
14		Cumulative impacts on terrestrial ecology	Clearing for civil related works and existing agricultural activities results in impacts to vegetation communities, fragmentation and poses threat to protected flora and fauna	2	1	L	A.4.1 Site selection and planning A.4.1.1 Well pad specific site selection A.4.4 biodiversity Protection	•Area has limited development with no widespread land clearing pressures from agriculture or other users. •Activity is limited in scale and will not material decrease availability of habitat across the region.	2	1	L	Effective	The region has low land clearing pressure with no applications for large scale land clearing present. The level of disturbance proposed is small, with field ecological scouting confirming ecological communities present.	Low
14		Cumulative impacts on amenity	Civil activities further reduces amenity (visual, noise, traffic and lighting) through additional landscape modification, dust, noise, light and traffic.	1	1	L	A.4.1 Site selection and planning A.4.1.1 Well pad specific site selection	•Activity is located away from major transportation routes and is not visible from roads. •Traffic volumes are anticipated to be small and well below existing industries. •A traffic management plan has been submitted to DPIL for the Stuart highway intersection works •Low level of development activity within the region, with activity unlikely to cause declines in amenity.	1	1	L	Effective	The region is underdeveloped with the activity located away from major transportation routes, homesteads and communities. The activity is of a small size and unlikely to result in any loss of amenity.	Low

Ref	Environmental Factor	Impact Description	Risk Source	Unmitigated risk- no controls or regulations			Codes of Practice	Site specific risk mitigation measures	Residual Risk Rating			Effectiveness of Treatment	Scientific uncertainty	Uncertainty Ranking
				Consequence	Likelihood	Risk Rating			Consequence	Likelihood	Risk Rating			
14		Cumulative impacts on surface water quality	Civil activities in addition to existing surrounding land use (agriculture) reduces surface water quality	1	1	L	A.4.1 Site selection and planning A.4.1.1 Well pad specific site selection A.4.3 Erosion and sediment control and hydrology	•Area has limited development with no widespread land clearing pressures from agriculture or other users. •Activity will largely occur on existing disturbed areas with limited additional clearing.	1	1	L	Effective	The region is underdeveloped with the activity located away from major flow pathways with limited topographic variation.. The activity is of a small size and unlikely to result in any material increase in sediment loads to surface waters	Low

Appendix M Bushfire management Plan

BEETALOO BASIN EXPLORATION PROGRAM 2018/2019

Bushfire Management Plan

EP76 & EP117

This document outlines the basic principles for Origin and its Contractors to manage the risk from bushfire, resulting from Exploration activities in the Beetaloo Basin. This BFMP should be read in conjunction with *the relevant Environment Management Plan* and the *Emergency Response Plans for the various Beetaloo activities within Northern Territory*.

Review record

Rev	Date	Reason for issue	Reviewer/s	Consolidator	Approver
0	08/04/2019	BFMP released for approval	A.Court	M.Kernke	M.Hanson

Review due: 08/04/2019

Bushfire Management Plan

NT-2050-15-MP033

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Review due: 08/04/2019

Bushfire Management Plan

NT-2050-15-MP033

Review due: 08/04/2019

1. Introduction

Bushfire management is considered a significant land management activity in the Northern Territory and has been identified as a medium risk in the Origin's Beetaloo Basin Civils and Drilling, Stimulation and Well Testing Program Environmental Management Plans (EMP). As such, this Bushfire Management Plan (BFMP) forms a core component of Origin's risk management.

Origin's operational activities within the permit area pose a potential ignition risk as a result of exploration activities from the movement of rigs, vehicles, machinery and from flaring activities within the Permit Area. In addition, there is a potential for external ignition sources which may impact on Origin's operations including nearby pastoral activities and natural occurrences of fire as a result of lightning strikes.

This BFMP has been prepared in accordance with the Northern Territory *Bushfires Management Act 2013* and other relevant legislation.

1.1 Project Context

For the purpose of this BFMP, the project boundaries include all proposed lease areas and access tracks that are part of Origin's proposed exploration activities for 2019/2020.

The primary activities subject to this BFMP are:

- Site preparation and operation of exploration lease areas;
- Drilling, stimulation and well operation, including drilling camp.

The location of the proposed exploration activities are shown on Table 1.

1.2 Aim and Objective

The aim of this Bushfire Management Plan (BFMP) is to:

- reduce the occurrence of, and minimise the impact of bushfires, thereby reducing the threat to life, property, cultural values and the environment.
- mitigate the potential impact of unplanned fires on Origin's people, assets and operations.

The design of the exploration lease area has complied with Northern Territory and local government statutory laws and regulations and designed to meet all relevant and applicable codes and standards, in particular consideration of the Northern Territory *Bushfires Management Act 2013*, the *Code of Practice for Petroleum Activities in the Northern Territory (2019)* and *Australian Standard for the Construction of Buildings in Bushfire Prone Areas (AS3959-2009).*

It is noted that the NT does not have policy or guidelines controlling development in bushfire prone areas, therefore the requirements of AS 3959 are relied on in this instance to guide infrastructure setbacks (asset protection zones) and the assessment of construction standards for bushfire protection.

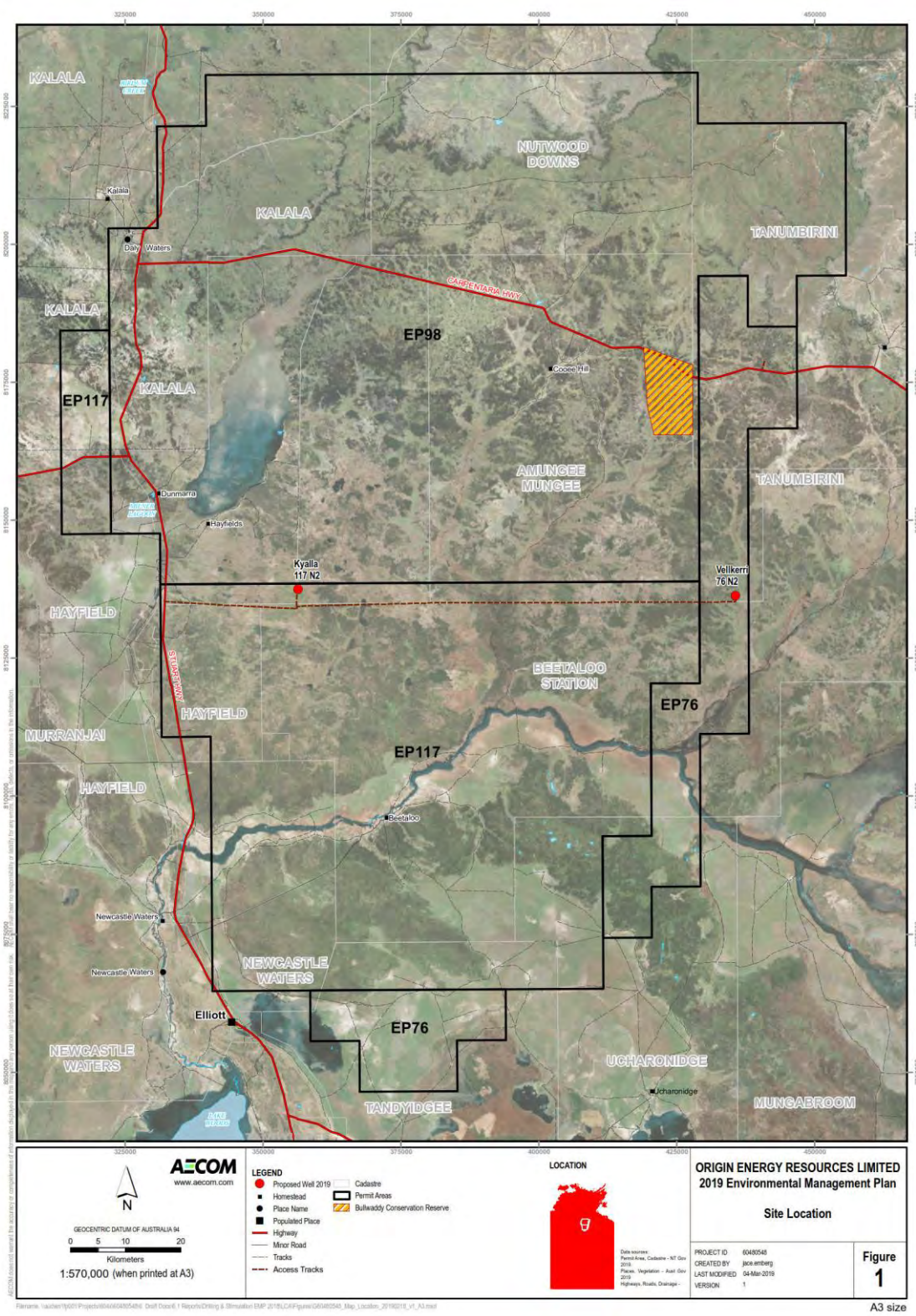

Figure 1 Origin Permit Area and 2019/2020 Exploration

Review due: 08/04/2019

2. Legal and Other Requirements

The following presents the relevant legislation and statutory obligations for the project.

2.1 Northern Territory Petroleum (Environment) Regulations

Petroleum Act 2018, Petroleum (Environment) Regulations 2018 and Schedule of Onshore Petroleum Exploration & Production Requirements 2016

The *Petroleum Act 2016* provides legal framework within which persons are encouraged to undertake effective exploration for petroleum and to develop petroleum production so that the optimum value of the resource is returned to the Territory. It regulates the exploration for, and production of petroleum, including environmental protection measures which should be employed during exploration and production activities, including protection of parks and reserves and rehabilitation.

In addition, the Act is supported by the *Petroleum (Environment) Regulations 2016* and the *Schedule of Onshore Petroleum Exploration and Production Requirements 2016* (Requirements) and the Code of Practice for Petroleum Activities in the Northern Territory 2019 (Guideline).

The *Petroleum (Environment) Regulations 2016* requires that regulated activities are carried out in a manner consistent with the principles of ecologically sustainable development, and by which the environmental impacts and environmental risks of the activities are identified and reduced to an acceptable level.

Under these regulations Origin is required to submit an EMP prior to any petroleum exploration or production activity.

EMP's must include:

- potential environmental risks or impacts (in this instance relating to the increase in bushfire frequency);
- appropriate environmental outcomes, environmental performance standards and measurement criteria;
- appropriate implementation strategy and monitoring, recording and reporting arrangements; and
- demonstrate that there has been an appropriate level of engagement with directly affected stakeholders in developing the plan.

The Code of Practice requires a fire management plan at the project level to be developed as part of an EMP. As such, this BFMP is designed to support and implement the requirements of Origins *Exploration Program 2018/2019.*

2.2 Northern Territory Bushfires Act (2016)

The purpose of the Bushfires Management Act 2016, as defined in section 3, is:

- *to provide for the protection of life, property and the environment through the mitigation, management and suppression of bushfires, and for related purposes;*

The Act defines the role, powers and authorisation of stakeholders engaged in NT fire management.

2.3 Regional Bushfire Management Plans

Regional Bushfire Management Plans (RBMP) have been developed for areas of the NT. The aim of these regional plans is to assist in identifying and categorising bushfire risk by:

- Identifying the regions risk category; and
- Allocating resources and control/treatments for risk management.

At the time of authoring the project area is partially covered by the Savanna Fire Management Zone RBMP. The Barkley Region currently does not have a RBMP. The land use map and the project area is presented in Figure 2.

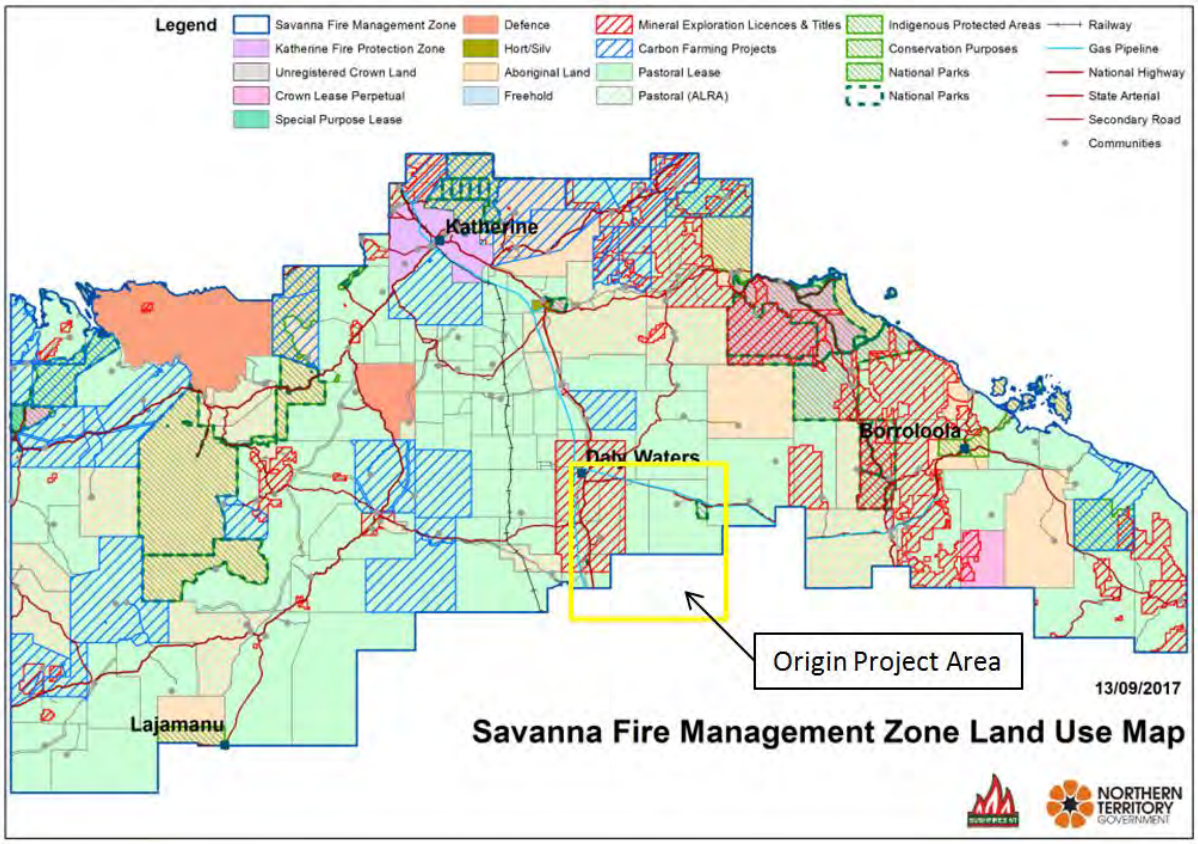

Figure 2 Savanna Fire Management Land Use

3. Origin's Bushfire Management Standards and Guidance

Origin maintains a Bushfire Management Standard to provide overarching guidance to Business Units on bushfire management, asset protection measures and bushfire preparedness. The guidance structure underlying the Bushfire Management Standard is based on three pillars:

- Asset Mitigation
- Landscape Mitigation
- Preparedness and Response.

The Bushfire Management Standard outlines Origin's requirements to protect assets, ensure a safe work environment and meet environmental obligations.

Additional relevant guidance documents include:

- Generic Bushfire Asset Protection Zone (APZ) Guide (Appendix B); and
- IG Bushfire Preparedness Tool (Appendix C).

Although these guidelines are based on Queensland conditions, they provide the minimum requirements to ensure the site and site personnel are prepared to manage bushfire risk. Due to the NT not having specific policies or guidelines controlling developments in bushfire prone areas, this BFMP has considered the requirements of AS 3959 to guide bushland infrastructure setbacks (asset protection zones) and the assessment of construction standards for bushfire protection.

For the implementation of the BFMP, Origin has appointed **Robert Wear** as the Fire Officer of the Beetaloo Exploration Program 2019/2020. Contact details are as follows:

Name:	Robert Wear
Title:	Construction Superintendent – Beetaloo Exploration
Mobile:	0467 679 003
Satellite Phone:	0147 612 733
Email:	Robert.Wear@upstream.originenergy.com.au

4. Bushfire Hazard Assessment

A bushfire hazard assessment has been completed for the proposed exploration activities at Kyalla 117 N2 and Velkerri 76 S2 as part of the land condition assessment.

The bushfire hazard assessment involved the following tasks:

- Desktop review of available project and available environmental data and reports, as well as Australian Standards and Guidelines for bushfire management.
- A site assessment:
  - Vegetation classification in accordance to the classification system provided in AS3959-2009 Australian Standard for the Construction of Buildings in Bushfire Prone Areas
  - Determination of the boundary of classified vegetation in relation to the proposed site
  - Measurement of slope
  - Recording of site observations of neighbouring properties /areas land use, fire history and existing bushfire management advantages (i.e. water supply, vehicle access).
- Based on results from the site assessment, the Bushfire Attack Level (BAL) calculations for the sites were completed using the Fire Protection Association of Australia Flamesol BAL calculator V4.7 which models the "method 1' BAL assessment procedure in AS3595-2009.

It is noted that BALs are a means of measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact, using increments of radiant heat expressed in kW/m2, and the basis for establishing the requirements for construction to improve protection of site elements to attack by bushfire.

BAL ratings in AS 3959-2009 (from low to high) are BAL-LOW, BAL-12.5, BAL-19, BAL-29, BAL-40 and BAL FZ (flame zone). The BAL rating of a building/infrastructure can be reduced by clearing vegetation; the wider the clearing the lower the BAL rating. BAL-LOW can only be achieved if there is no bushfire hazard vegetation within 100 m of the asset.

4.1 Fire Regime and Fire History

Fire is a natural occurrence in most Australian ecosystems and plays an important role in their ecology. Fire is generally excluded from Mitchell grasslands by pastoral management in order to maintain forage throughout the dry season (HLA, 2005) whereas fire is more frequent in the Sturt Plateau.

Historical, the majority of dry season fires (June to September) have occurred in the northern half of the permit area, in EP76, EP98 and EP117. At this time of year fires are likely to be high intensity (HLA, 2005). Wet season fires (October to May) have also occurred within in the permit area, although these fires are likely to be patchy and of lower intensity, depending on the stat of curing of the fuel load.

Bullwaddy and Lancewood communities, which are located throughout the permit area are fire sensitive and hot fires have the ability to reduce habitat quality for both flora and fauna species. Research suggests that fauna diversity may be impacted by hot fire, particularly for diurnal reptiles (e.g. Legg *et al., 2008).* The Bulwaddy/Lancewood vegetation community located west of Velkerri 76 S2 has value as a fauna refugia habitat. The low fuel loads in this habitat generally restrict spread of fire but the scrub margins are sensitive to fire (Tropical Savannas CRC 2001; Parks and Wildlife 2005).

Fire scar mapping provided on the North Australia and Rangelands Fire Information (NAFI) site for 2009-2018 presented in Figure 3 indicates the project area has a burn frequency of approximately every 3 to 5 years.

Based on field data, fire disturbance was determined at each of the proposed lease areas as follows:

- Vekerri 76 S2-1 – Fire Frequency 2-3 years previous, Intensity 1 (minor scars on some trees/shrubs and Height <1m.
- Kyalla 117 N2-1 – Fire Frequency 1-2 years previous, Intensity 4 (some trees and shrubs killed) and Height 1-4 m. It was noted that site appeared to have had a hot fire go through previously with abundance of new Acacia regrowth.

4.2 Bushfire Classification

Table 1 presents the site assessment details for Kyalla 117 N2 and Velkerri 76 S2 for the determination of the BAL for the permit area.

Table 1 Bushfire Classification for Kyalla 117 N2 and Velkerri 76 S2

Location	Vegetation Type	Classification[1]	Slope	Fire Sensitive Habitats/Species
Kyalla 117 N2	Open Woodland with grassland understorey (Tussock)	D Scrub	<1%	None identified.
Velkerri 76 S2	Open Woodland with grassland understorey (Tussock)	D Scrub	<1%	None identified within footprint, however Bullwaddy/Lancewood Community located within 100 m of the lease boundary.

1 Vegetation classification in accordance with AS3959 Table 2.3. Overstoreys of open woodland, low open woodland, tall open shrubland and low open shrubland should be classified to the vegetation type on the basis of their understorey.

Based on results from the site assessment, the Bushfire Attack Level (BAL) calculations for the sites were completed using the Fire Protection Association of Australia Flamesol BAL calculator V4.7 which models the "method 1' BAL assessment procedure in AS3595-2009.

See below the workings for determining the BAL:

Step 1 NT Fire Danger Index (FDI)	40
Step 2 Vegetation Classification	Open Woodland with grassland understory (Tussock)
Step 3 Slope	Flat (>1% slope)
Step 4 Distance (m) from vegetation	approximately 50 m to key infrastructure assets on lease pad.

At 50 m from the classified vegetation type of Woodland (upslope and flat land), the relevant Bushfire Attack Level for the proposed lease areas is BAL-12.5. BAL-12.5 is defined as being susceptible from ember attack. It is noted that if distance from classified vegetation type, the BAL would be assessed as Low where there is insufficient risk to warrant any specific construction requirements for the lease area.

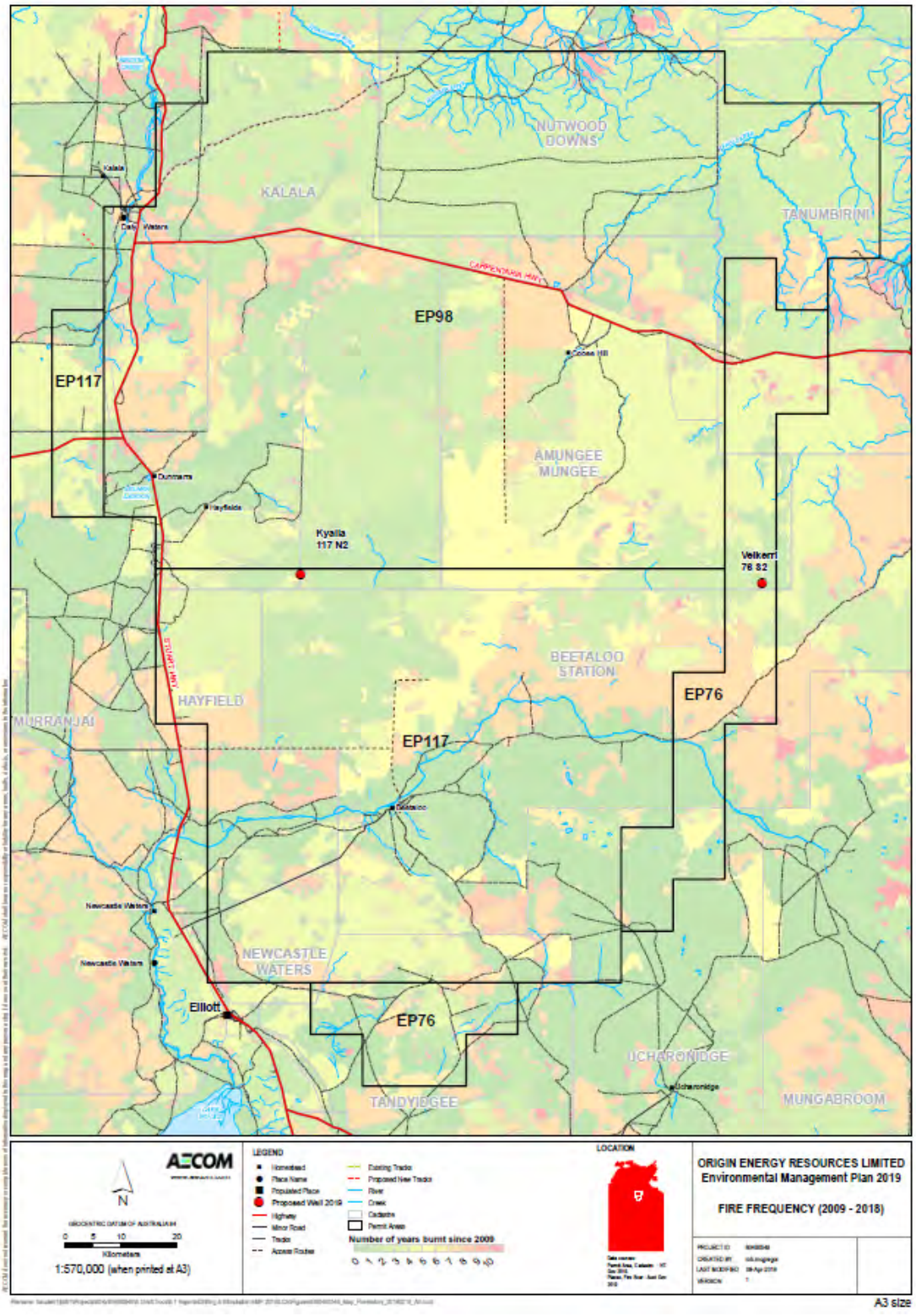

Figure 3 Fire Frequency Map

Review due: 08/04/2019

5. Bushfire Risk Management

Origin has an overarching bushfire management standard that provides guidance for prevention and management of fire associated with Origin activities. The bushfire risk management controls are summarised in

.

Activity	Management Controls
Site design and layout	- Infrastructure development will consider safety in design and placement to reduce the risk of ignition sources to the extent practicable. - Firebreaks and APZ to be utilised for all infrastructure as outlined in Appendix A. - A 10m firebreak used around all infrastructure - Tanks will have a 20m APZ applied to mitigate the risk of fire damage - Flares will be located with at least 25m separation distance from vegetation to ensure safe operations during fire danger periods. - Firebreaks around exploration wells to be maintained for life of the lease area. - Asset protection zones identified based upon fire hazard Index, vegetation type, fuel load and slope as outlined in Appendix A.
General Requirements	- Staff members responsible for managing bushfire risk to be competent in the role they perform. - IG bushfire Preparedness tool (Appendix B) to be utilised daily during periods with a fire danger of severe or greater. - During fire season ensure machinery operators are familiar with bushfire risks, controls and emergency response procedures. - Fire breaks and asset protection zones (APZ) to be maintained, through the following methods – mowing/slashing directly around lease pad, weed spraying. - Coordinate with landholders proactively to direct Hazard Reduction Activities (planned burns /Mosaic burn etc.). - When a Fire Danger Period has been declared, no burning (other than flaring in accordance with this plan) may take place except where a permit to burn has been obtained from a Fire Control Officer or a fire Warden. - Emergency Response Plan to be implemented covering bushfire emergencies - Fire extinguishers to be fitted to all vehicles and mobile equipment - Civil equipment to be available during work campaigns to install additional firebreaks in the event of a fire. - Access tracks and roads will serve as firebreaks to limit the spread of fire. - Smoking areas will be provided and demarcated. - Contractors to have their own fire management and emergency response plans consistent with Origin's, outlining the strategies and procedures to prevent and respond to bushfires.
Civil construction, drilling, simulation, completion and well testing (including flaring)	- Equipment to be kept free of grasses and other combustible material which may catch fire - All hazardous material storage areas to be in accordance with the Flammable and Combustible Liquids Regulations and AS1940. - Flares to be operated at all time with an appropriate flare separation distances (minimum of 25m) based upon flare design

Further information on the determination of APZ is provided in Appendix A and the bushfire Preparedness toll in Appendix B.

Table 2 Bushfire Risk management control summary

Activity	Management Controls
Site design and layout	- Infrastructure development will consider safety in design and placement to reduce the risk of ignition sources to the extent practicable. - Firebreaks and APZ to be utilised for all infrastructure as outlined in Appendix A. - A 10m firebreak used around all infrastructure - Tanks will have a 20m APZ applied to mitigate the risk of fire damage - Flares will be located with at least 25m separation distance from vegetation to ensure safe operations during fire danger periods. - Firebreaks around exploration wells to be maintained for life of the lease area. - Asset protection zones identified based upon fire hazard Index, vegetation type, fuel load and slope as outlined in Appendix A.
General Requirements	- Staff members responsible for managing bushfire risk to be competent in the role they perform. - IG bushfire Preparedness tool (Appendix B) to be utilised daily during periods with a fire danger of severe or greater. - During fire season ensure machinery operators are familiar with bushfire risks, controls and emergency response procedures. - Fire breaks and asset protection zones (APZ) to be maintained, through the following methods – mowing/slashing directly around lease pad, weed spraying. - Coordinate with landholders proactively to direct Hazard Reduction Activities (planned burns /Mosaic burn etc.). - When a Fire Danger Period has been declared, no burning (other than flaring in accordance with this plan) may take place except where a permit to burn has been obtained from a Fire Control Officer or a fire Warden. - Emergency Response Plan to be implemented covering bushfire emergencies - Fire extinguishers to be fitted to all vehicles and mobile equipment - Civil equipment to be available during work campaigns to install additional firebreaks in the event of a fire. - Access tracks and roads will serve as firebreaks to limit the spread of fire. - Smoking areas will be provided and demarcated. - Contractors to have their own fire management and emergency response plans consistent with Origin's, outlining the strategies and procedures to prevent and respond to bushfires.
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6. Hazard reduction activities

Where hazard reduction burns are required to undertake APZ vegetation management, the activities should be coordinated with the following stakeholders:

- Land holders (Pastoralists)
- Traditional Owners
- Regional Fire Services
- Origin Operations.

7. Emergency Response

In the event of a bushfire assessed as impacting Origin sites / designated work areas, the Fire Officer, or delegate, will coordinate response efforts in cooperation with the Emergency Response Team and in accordance with the Emergency Response Plan. As bush fire risk escalates, Origin's emergency response team may support the Savanna Regional Bushfires Committee and Bushfires NT. Consultation and engagement with Bushfires NT and the Landholders will also be required during operations.

Contractors are required to develop Emergency Response Plans which include role competency, appropriate equipment, training and exercising and appropriate documentation relating to the assessed bushfire hazard.

Roles and responsibilities are outlined in the ERP (NT-2050-15-MP0023).

8. Roles and Responsibility

The following sections describe in detail the management strategies for specific components of the landscape, such as soil, ground water and vegetation, and the cultural and social environment, in relation to the different impact-causing activities that may occur.

Each management area has been assigned to specific positions within the Exploration team, as follows:

- **Project Manager** – oversees the whole planning and execution of the exploration program and is the person ultimately responsible making all other parties aware of obligations under the BMP. The Project Manager's role is predominantly office-based.
- **Fire Officer** – person based in the field focussed on the undertaking of operations and construction in accordance with the BMP. This role is responsible for:
    - Ensuring the APZ have been installed and are functioning
    - Act as the designated point of contact for and rapidly responding to any fire related incidents.
    - Liaise with pastoralist to manage on-ground fire-fighting activities.
- **Well-site representatives** – Responsible for Drilling, Stimulation and Well testing operations. This role is responsible for:
    - Ensuring the controls identified in the BMP are implemented
    - Undertaking daily reviews of fire danger and implementing IG bushfire preparedness tool
    - First responder to manage and report fires associated with Origin's activities
- **Field Personnel** – All staff including Origin and contractors that are working in the Exploration Permit areas. Each person is responsible for day to day management of bushfire related risks.

8.1 Training and Awareness

Contractors will be required to demonstrate they have appropriate systems, procedures and training to manage the bushfire risks covered under this plan.

9. Notification Procedure

9.1 Emergency Notifications

Origin is obliged to inform neighbouring Landholders of fire events (manmade and naturally occurring) where they occur on or within Origin's exploration lease areas, and where there is a potential to effect adjoining properties. All notifications and communication should be undertaken by or at the direction of the Fire Officer.

The National Response Centre is a 24/7 contract line and should be notified of any fires in order to support their planning and tasking activities.

National Response Centre - 1800 076 251

10. Recording

All bushfire incidents, near misses and hazards will be reported through Origin's Incident Management System (OCIS), in accordance with standard incident reporting protocols.

11. Reporting

All bushfire incidents will be reported in Origin's OCIS and corrective action initiated.

12. References

Bushfires NT, 2018. *Savanna Regional Bushfire Management Plan 2018*, Department of Environment and Natural Resources.

Northern Territory Fire and Rescue Service, Bushfire Management and Mitigation Publication

Origin Energy Resources Limited. 2018. *IG Bushfire Preparedness Tool.*

Origin Energy Resources Limited. 2018. *Generic Bushfire Asset Protection Zone (APZ) Guide.*

Origin Energy Resources Limited. 2017 *LNG Bushfire Management Standard.*

Appendix A Generic Bushfire Asset Protection Zone Guide

ORIGIN LNG BUSHFIRE MANAGEMENT
GENERIC BUSHFIRE ASSET PROTECTION ZONE (APZ) GUIDE

APZ Implementation Plan

1 Identify the Asset Type as per the table
- If on the list move to Step 2
- If not on the list refer to Supervisor or Emergency Response & Security advisor
- If a permanent manned site ensure that a site specific bushfire assessment (Method 2) has been conducted

2 Determine the vegetation type surrounding the Asset
- If able to identify as either Grassland or Bushland move to Step 3
- If unsure use the bushland (higher) value or clarify with Supervisor, Environmental Advisor or Emergency Response & Security Advisor

3 Determine the slope under the vegetation that is within 100 m of the Asset
- If the area under the vegetation is greater than 5 degrees downslope, refer to supervisor to determine what additional mitigations may be required (refer to diagram A)
- If the area under the vegetation is flat or slopes up going outwards from asset, move to Step 4 (refer to diagram B or C)

4 Are there any environmental, site, landowner or heritage constraints preventing you from manageinging the area?
- No constraints, move to Step 5
- If yes or unsure refer to Supervisor, or to relevant function for advice e.g. Environment, Land Relations or Cultural Heritage

5 Manage APZ
- Ensure regularly maintained and manage as per required standard (grass height no higher than 150 mm)
- Where APZ distances cannot be achieved refer to Supervisor or Emergency Response & Security Advisor to determine other mitigation options

More information – the LNG Bushfire Management Framework can be accessed through the bushfire source page *http://source.originenergy.com.au/Business/lng/safety/emergency/Pages/BushfireMgmt.aspx*

For more information on the assessment method used, please refer to the Origin Bushfire Standard.

Version 1, effective date: 24 October 2014

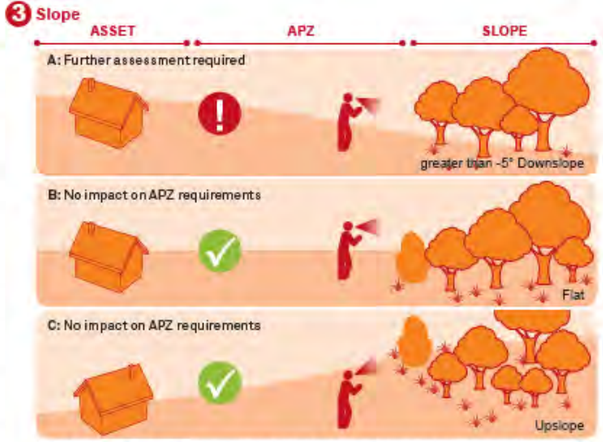
1 APZ per asset type

Site Type	Asset/Infrastructure Type	Vegetation Surrounding Site and Management Required Around Site (in Metres)	
		Grassland	Bushland
Manned Sites	Mobile camps	40	50
	Site Offices/Worksites	40	50
	Homesteads	40	50
	Drill Rigs	40	50
Unmanned Sites	Well Sites	30	40
	Kiosks (HV)	30	40
	Sheds	25	35
	Stock yards	25	35
	Communications towers	20	30
	Lay down yards	20	30
	Water Reinjection sites	20	30
	Lined ponds	10	20
	Pump stations	10	20
	Water gathering stations	10	20
	Water transfer stations	10	20
	High Point Vents	10	20
	Low Point Drains	5	10
	Valve Pits (plastic)	5	10
	Valve Pits (concrete)	1	2
	Regional and shallow water monitoring bores	N/A	N/A

2

Grassland includes everything from sparse native grassland to grassland dominated by exotic species for grazing purposes.
Bushland includes forests, woodlands, scrubs and shrubland.

3 Slope



Slope influences the rate of spread of a fire in that a fire spreads quicker upslope from the fuel (vegetation), approximately doubling its rate of spread for every 10 degrees increase in slope.

4 Constraints

APZ's may only be managed if the land is free from environmental, land heritage and community constraints. This may include:
- Environmental, cultural heritage or historic heritage features
- Land owner agreements
- Other permits and approvals

5 Methods for Managing APZ's

The requirement for an APZ is a managed area where regrowth or grass is managed to a height no higher than 150 mm. The APZ requirements can be achieved by any of the following methods:
- Mowing/Slashing
- Stick Raking
- Weed Spraying
- An approved planned burn

Note: 50 mm is an approximate minimum height for fire to carry.

Where APZ requirements cannot be achieved there are a number of other strategies that can be used to mitigate the assets bushfire risk including:

1. Reducing the fuel loads within the surrounding area and its ability to spread can be achieved through the following methods:
- Annual Hazard Reduction Burning Program
- Firebreak construction and annual maintenance programs
- Stock Grazing

2. Scheduling/Planning should be managed where possible to avoid activities in high risk sites during bushfire periods, in accordance with the Origin LNG Bushfire Preparedness Tool.

3. Response Planning should be conducted for mobile activities (e.g. drilling) during the declared fire season to include:
- Reference to the daily use of the Origin LNG Bushfire Preparedness Tool
- Location of first response fire fighting equipment
- Closest places of safety (method 2 assessed site or town)
- Documented and exercises site evacuation procedures

Review due: 08/04/2019

Appendix B IG Bushfire Preparedness Tool

IG BUSHFIRE PREPAREDNESS TOOL

origin

The following is to be conducted daily during the QLD Fire Season (typically Sep – Jan) and any other forecasted or actual period with a Fire Danger Index (FDI) of Severe of greater.

1. Review Daily Fire Danger Rating
2. Review Fire Danger Matrix Actions Required
3. Determine Site Risk Level — Applies to Mobile Sites Only
4. Determine Restrictions for Mobilising to Site — Applies to Mobile Sites Only
5. Daily Toolbox Planning and Monitoring Routine
6. Bushfire First Responder Checklist

1 DAILY FIRE DANGER RATING

Visit Rural Fire Qld home page then the Origin Weatherzone service:

https://www.ruralfire.qld.gov.au/Pages/FDR.aspx

http://energy.weatherzone.com.au/

Login: ops@originenergy.com.au
Password: originenergyweather1

FIRE DANGER RATING

2 IG FIRE DANGER MATRIX

	WHAT DOES IT MEAN	ALL PERMANENT SITES Method 2 assessed and Asset Protection Zone Maintained	ALL MOBILE SITES AND TEAMS E.G. DRILLING, FSG, SCOUTING, GATHERING Mobile and Non Permanent Sites
Low – Moderate FDI 0 - 11	• The key elements of weather conditions to monitor are sudden drops in relative humidity and an increase in wind strength and temperature. These factors have a direct effect on fire behavior. Be aware of ignition factors of fire and reduce the risk.	• Ensure that all feasible fire related risks are identified and controlled on the site risk register and that defined processes and safety critical activities can be performed safely in times of elevated Fire Danger Rating.	• Ensure individuals are provided with the required resources and tools to be contactable and kept informed on the latest information, updates on weather, fire warnings or incidents in the region that they intend to travel through, visit or work in.
High FDI 12 - 24	• If a fire starts, it is likely to be controlled in these conditions. • Embers can be blown ahead of fires, resulting in spot fires ahead of main fires. This rating presents a minimal risk to life and property (QFRS 2009).	• **Fire Danger Monitoring and Awareness** – Site Management to have a system for the sourcing and communicating (prior to start of shift) weather conditions and Fire Danger Ratings and the ability to notify of any changes all affected employees, visitors and contractors. • **Readiness to Respond** – Review bushfire plans / procedures and check readiness levels.	• **Work Planning** – JSA's are to include an assessment of Bushfire risks. • **Fire Danger Monitoring and Awareness** – Site Management to have a system for the sourcing and communication (prior to start of shift) of weather conditions and Fire Danger Ratings and the ability to notify of any changes to all affected employees, visitors and contractors. • **Readiness to Respond** – Review bushfire plans / procedures and check readiness levels.
Very High FDI 25 - 49	• Fires in these conditions can be difficult to control, with embers being blown ahead of fires, creating spot fires up to 2 km ahead of the fire front. This rating presents a low chance of injury or death (QFRS 2009).	• **Work Planning** – TRA / JSA's are to include an assessment of Bushfire risks. • **Fire Danger Monitoring and Awareness** – Site Management to have a system for the sourcing and communicating (prior to start of shift) weather conditions and Fire Danger Ratings and the ability to notify of any changes all affected employees, visitors and contractors. • **Site Access** – Ensure risks such as access to and from site are considered at different levels of Fire Danger Rating and addressed in the site risk register / site procedures.	• **Work Planning** – JSA's are to include an assessment of Bushfire risks. • **Fire Danger Monitoring and Awareness** – Site Management to have a system for the sourcing and communicating (prior to start of shift) of weather conditions and Fire Danger Ratings and the ability to notify of any changes to all affected employees, visitors and contractors. • **Site Access** – Ensure risks such as access to and from site are considered at different levels of Fire Danger Rating and addressed in the site risk register / site procedures.
Severe FDI 50 - 74	• These are hot, dry and possibly windy conditions for a bush or grass fire. • If a fire starts and takes hold, it will be hard for fire fighters to bring under control. • Fires in these conditions become fast moving and uncontrollable. Embers can be expected to be blown ahead of fires, with the possibility of these embers creating spot fires up to 4 km ahead of the fire front.	• **Work Planning** - Task or activity risk registers / JSA's / SWMS are to be used to mitigate ignition sources and exposure to bushfire. • **Worker Location Monitoring** – Locations and movements of all staff are to be recorded. • **Site Preparation** – Prepare for ember attack by covering / removing exposed combustible material. • **Non Essential Tasks** – All non essential tasks should be delayed, re-scheduled, cancelled or suitably risk assessed and controlled. • **Hot Works** – No Hot works to be undertaken (apart from controlled flaring). Hot works in construction sites (i.e. GPF areas can continue with hot works but need to be under a hot work permit considering proximity to vegetation and with a downwind fire spotter. • **"Stay or Go"** – from site to be undertaken in consultation with supervisor / management (refer to tool over page).	• **Fire Danger Monitoring and Awareness** – Site Management to have a system for the sourcing and communication (prior to start of shift) of weather conditions and Fire Danger Ratings and the ability to notify of any changes to all affected employees, visitors and contractors. • **Essential Tasks** – Task or activity risk registers / JSA's / SWMS are to be used to mitigate ignition sources and exposure to bushfire. Undertaking new tasks must be approved by line management as potential consequences should be considered as Critical for high exposure activities. • **Non Essential Tasks** – All non essential tasks should be delayed, re-scheduled, cancelled or suitably risk assessed and controlled. • **Hot Works** – No Hot works to be undertaken in the field, less controlled flaring. Any required hot works undertaken require a hot works permit and significant precaution implemented. • **Remote Workers** – where only UHF coverage is available, secondary communications / monitoring must be made available e.g. satellite communications, SPOT devices and increase scheduled reporting. • **"Stay or Go"** – from site to be undertaken in consultation with supervisor / management (refer to tool over page). • **Fire threat Updates** – broadcast regular fire updates to workforce across common channels.
Extreme FDI 75 - 99	• These are very hot, dry and windy conditions for a bush or grass fire, flames will be higher than roof tops. • Spot fires will start and move quickly. • Fires in these conditions become fast moving and uncontrollable. Embers can be expected to be blown ahead of fires, with the possibility of these embers creating spot fires up to 6 km ahead of the fire front.. • Rural Fire Queensland suggests that chance of avoiding death or injury in these conditions is unlikely when opting to stay to defend assets (QFRS 2009).	• **Work Planning** – Task or activity risk registers / JSA's / SWMS are to be used to mitigate ignition sources and exposure to bushfire. • **Fire Danger Monitoring and Awareness** – Site Management to have a system for the sourcing and communication of weather conditions and Fire Danger Ratings and the ability to notify of any changes to all affected employees, visitors and contractors. • **Readiness to Respond** – Identify in readiness for a fire event which safe places of refuge and evacuation routes are the preferred options given the conditions. • **Non Essential Tasks** – Tasks with the potential to create an ignition source of fuels should be re-scheduled or cancelled. • **Essential Tasks** – (e.g. Safety Critical Tasks) – Should be risk assessed and appropriate mitigations in place to prevent and manage a fire should a fire eventuate.	• **Work Planning** – If already on location, immediately leave the high risk area. If fire alerts are active or present with a known risk (fire in the area), personnel must execute their contingency plans. • **Readiness to Respond** – Identify readiness for a fire event which safe places of refuge and evacuation routes are the preferred options given the conditions. • **Non Essential tasks** – All non safety-critical tasks must be cancelled. • **Journey Management** – Cancel or delay all planned travel to or through the high risk areas. • **Hot Works** – No Hot works to be undertaken in the field, less controlled flaring. • **Flaring** – Only occur after each site has been risk assessed with local stakeholders, and suitable controls are in place such as Asset Protection Zone (APZ) or a fire watch, in situ fire tender, and trained fire crews. • Working in Communication "black spots" – To be deferred until the threat level reduces to below Severe. • **Remote Workers** – Where only UHF coverage is available, secondary communications / monitoring must be made available e.g. satellite communications, SPOT devices and increase scheduled reporting. • **"Stay or Go"** – From site to be undertaken in consultation with supervisor / management (refer to tool over page). • **Fire threat Updates** – broadcast regular fire updates to workforce across common channels.
Catastrophic FDI 100+	• These are the worst conditions for a bush or grass fire.. • If a fire starts and takes hold, it will be extremely difficult to control and will take significant fire fighting resources and cooler conditions to bring it under control. • Fires in these conditions become fast moving and uncontrollable. Embers can be expected to be blown ahead of fires, with the possibility of these embers creating spotfires up to 20 km ahead of the fire front. Rural Fire Queensland suggests that chance of avoiding death or injury in these conditions is unlikely when opting to stay to defend assets (QFRS 2009). • The safest place to be is away from bushfires and bushfire prone areas.	• **Work Planning** – All tasks that could pose a bushfire threat must be cancelled unless they are safety critical and are controlled within specific procedures. • **Readiness to Respond** – Management to remain informed and regularly check the latest information updates on weather, fire warnings or incidents in their region. • **Hot Works** – No Hot works to be undertaken in the field, less controlled flaring. • **Journey Management** – Cancel or delay all planned travel to or through the high risk areas.	

Indicates a probable Total Fire Ban based on these conditions.

Indicates NO HOT WORKS to be performed (less controlled flaring) – Check local district information. Essential hot works at Permanent sites can be performed with a Hot Works Permit using significant precautions.

(Sourced from, AFAC Capgemini and MDP Fire Danger Rating Matrix) • Version 1, effective date 1 July 2014

3 MOBILE SITE RISK LEVEL

Risk level is determined by three or more aspects in the same category of the highest risk level.

ASPECT	LOW RISK	MEDIUM RISK	HIGH RISK
Site	• Large cleared area Asset Protection Zones (APZ's) around the site of a minimum distance.	• Large cleared Asset Protection Zones (APZ's) around the site not necessarily of the minimum distance	• Minimal cleared Asset Protection Zones (APZ's) around the site, not of the minimum distance
Access	• Multiple routes in and out of site and in different directions.	• At least two routes in and out and in different directions available.	• Single point of entry into and out of the site.
Communications	• Multiple means of communications available including mobile phone, Internet, UHF, Digital Radio or Satellite Phone.	• At least two means of communications with at least one being very reliable.	• Only one means of communications and/ or communications may be unreliable or non-existent.
Fuel Sources and Loads	• Low density and/or high in moisture content e.g. grasslands	• Medium density and/or some degree of moisture content. e.g. well spaced scrubland or woodland.	• High density and/or very dry e.g. dense scrubland or woodland.
Slope	• Flat or Similar with no large slopes within immediate vicinity of work site	• Mostly Flat with large slopes around the vicinity of the worksite	• Undulating or hilly area both on site and in the immediate vicinity of the work site
Firefighting Response/ Safe Havens	• Fire fighting resources within 15 minutes or access to an Origin Permanent Site (Method 2 assessed safe haven) within 15 minutes	• Fire fighting resources > 60 minutes away or access to an • Origin Permanent Site (Method 2 assessed safe haven) within 45 minutes	• No reasonable access to fire fighting resources or an Origin Permanent Site (Method 2 assessed safe haven)

4 MOBILISING TO SITE

2 + 3

This section provides guidance on "Mobilising to Sites".
Note: Refer to matrix on next page for details on "Take Fire Precautions" and "Full Assessment".

FDR	LOW RISK	MEDIUM RISK	HIGH RISK
LOW-MODERATE	Mobilise to Site	Mobilise to Site	Mobilise to Site
HIGH	Mobilise to Site	Mobilise to Site	Take Precautions
VERY HIGH	Mobilise to Site	Mobilise to Site	Take Precautions
SEVERE	Mobilise to Site	Take Precautions	Do Not Mobilise
EXTREME	Take Precautions	Take Precautions	Do Not Mobilise
CATASTROPHIC	Do Not Mobilise	Do Not Mobilise	Do Not Mobilise

EVACUATING FROM SITE

2 + 3

This section provides guidance for when it is appropriate to "Evacuate from sites" based on Fire Danger Index (FDI) and the category of the particular site. **Note:** Refer to matrix on next page for details on "Take Fire Precautions" and "Full Assessment".

FDR	LOW RISK	MEDIUM RISK	HIGH RISK
LOW-MODERATE	Continue Work	Continue Work	Continue Work
HIGH	Continue Work	Continue Work	Take Precautions
VERY HIGH	Continue Work	Continue Work	Take Precautions
SEVERE	Continue Work	Take Precautions	Abandon site / Evacuate if time permits
EXTREME	Take Precautions	Take Precautions	Abandon site / Evacuate if time permits
CATASTROPHIC	Abandon site / Evacuate if time permits	Abandon site / Evacuate if time permits	Abandon site / Evacuate if time permits

5 DAILY TOOLBOX PLANNING AND MONITORING ROUTINE

Preparedness Planning

(Mandatory for all Severe, Extreme and Catastrophic FDI days)

The following must be reviewed daily. If fire alerts are active or presented with a known risk (fire in the area), personnel must execute their contingency plans which needs to encompass the following:

- ☐ Procedure on identifying and notifying of a bushfire
- ☐ Critical equipment to be removed / isolated / shut down.
- ☐ Safe evacuation routes from site(s) and muster points.
- ☐ Communications methods:
  - ✔ Team channels and / or phone numbers
  - ✔ Area channels and / or phone numbers
- ☐ Closest "Safe Havens" (Community or Origin Permanent Sites).

Monitoring Routine

- ☐ Provide timely advice on changes in level of fire risk as available.
- ☐ Monitor team and area common channels for bushfire early warning.
- ☐ Update changes in work location.

6 BUSHFIRE FIRST RESPONDER CHECKLIST

The following sequence must be followed by the first person responding to a fire:

1. **Danger** – Remove yourself and others from danger if safe to do so.
2. **Alarm** – Raise the Alarm either on common radio channel or other agreed process.
3. **Gather Information**
   - ☐ **Location** – Direction from known reference points e.g. roads and Origin infrastructure such as well numbers).
   - ☐ **Impacts (actual and potential)** – Life, property and the environment.
   - ☐ **Fire Characteristics** – Grass or woodlands, flame height, fire front and direction of travel.
   - ☐ **Weather** – Wind strength and direction.
   - ☐ **Response in Progress** – What response is underway and by who (Origin, Landowners or Emergency Services)
   - ☐ **Response Required** – Origin and / or Emergency Services.
   - ☐ **Access** – Safe access and egress routes.
4. **Notify Emergency Services** – Call "000" or "112" (Some mobiles)
5. **Notify Origin** – Supervisor or Superintendent
6. **Respond** – If trained in Origin Fire Management (FM1 or FM2)
7. **Handover** – to the Origin On-Scene Commander (OSC) or QFES on arrival.
8. **Support** – Provide ongoing support to the response as required.

Appendix N Emergency Response Plan

Integrated Gas

EMERGENCY RESPONSE PLAN
Beetaloo Asset (Northern Territory)

This documents details the Emergency Response Plan for the Beetaloo Asset in a manned and unmanned status.

Revision	Date	Description	Originator	Checked	Approved
0	29/04/2019	Issued for use	L Fulford	B Baldwin M Hanson Ed Wong	T Boyes
1	17/06/2019	Update based on DENR feedback	L Fulford	M Kernke	T Boyes

Review due: 01/05/2020

THE THREE WHATS

What can go wrong?
What could cause it to go wrong?
What can I do to prevent it?

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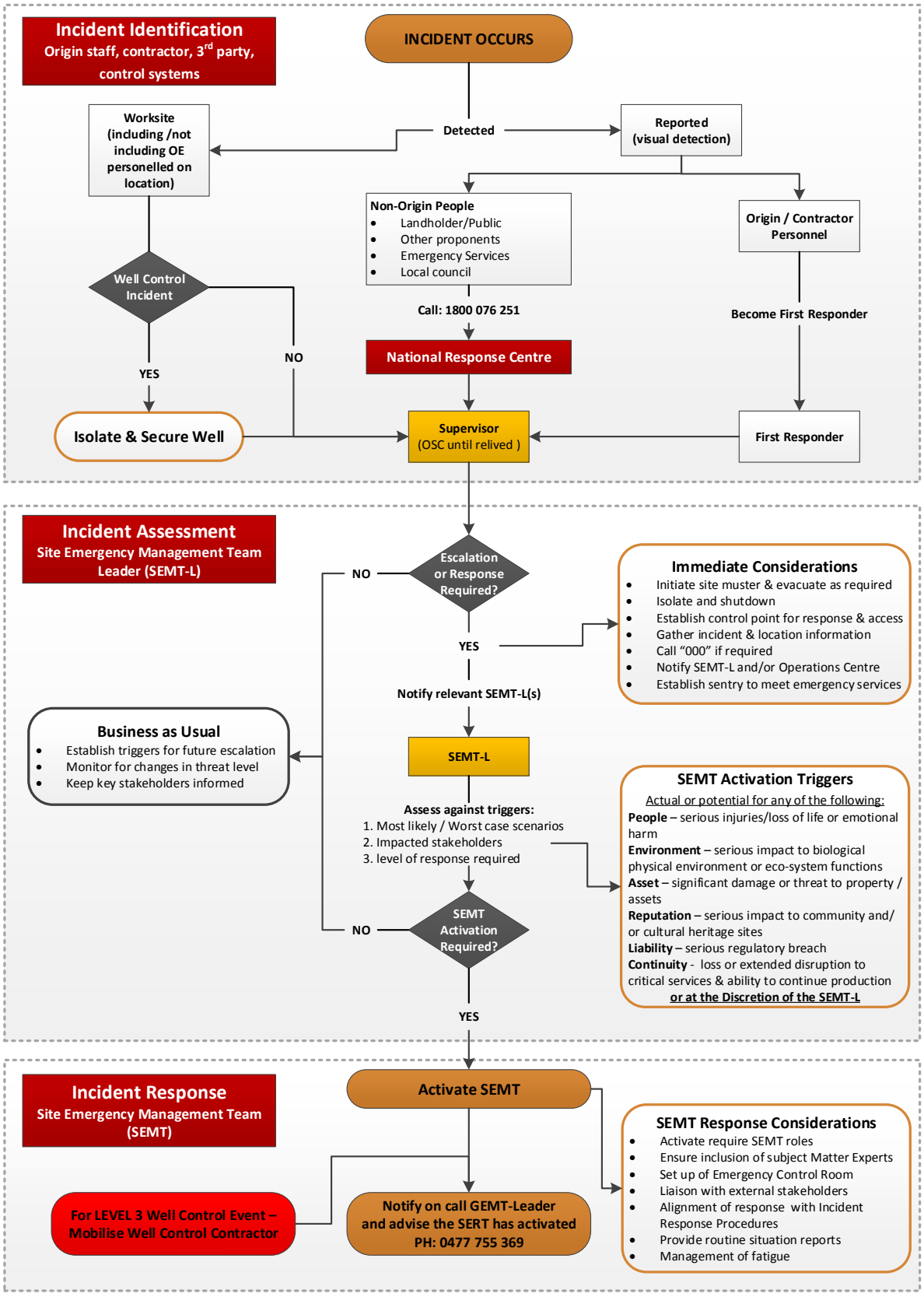
1. Site Emergency Response Plan (SERP) activation immediate actions

When a site level emergency is declared, this plan will be activated and escalated where appropriate.

Table 1: Activation immediate actions

Triggers for Activation			
Site Emergency Response Team activations (actual or potential) for impacts of any of the following and/or at the discretion of the Site Safety Manager.			
People	Serious temporary injury/illness or worse to any person		☐
Environment	Moderate effects on biological physical environment and serious short term effect to eco-system functions		☐
Asset	Serious damage or loss to production, property and/or infrastructure		☐
Reputation	Serious impact to community or cultural heritage		☐
Liability	Serious breach of law or regulation		☐
1 – Isolate and Evacuate			
Muster	Account for all personnel (upwind) whilst assessing the situation		☐
Isolate	Either through Emergency Shutdown Devices (ESD's) or remotely		☐
Evacuate	If required evacuate to designated evacuation points either upwind or at a safe distance as determined by event type or respective response guideline		☐
Control	Establish control points to coordinate response and restrict access		☐
Meeting Points	Nominate predetermined Emergency Services meeting points or establish meeting points near known landmarks or road intersections and establish sentry to meet Emergency Services upon their arrival		☐
2 – Communicate and Escalate			
Confirm	Confirm details of the emergency (type of emergency, injuries, contained or uncontained etc.) and response required.		☐
Activate	Activate ERT, SEMT, brief GEMT-L, contact Emergency Services, communicate with other Stakeholders		☐
Escalate	Consider likely impacts		☐
Impacts (actual & potential)	Most likely	What is realistically likely to happen and who / what is impacted?	☐
	Worst case	How bad could it really get and then who / what is impacted?	
SEMT-Leader: Brief On-Call GEMT Leader **0477 755 369** on situation, response and triggers for further activation.			☐
3 – Respond			
• Continually reassess situation		• Appoint OSC	☐
• Designate communication channels		• Establish exclusion zones	☐
• Activate appropriate resources		• Develop SMEACS briefing	☐
• Apply Incident Response Guidelines		• Provide regular updates	☐
4 – Response Management			
Personnel	Appropriate personnel in the ERT, SEMT and from outside resources		☐
Resources	Appropriate resources available to manage the incident		☐
Tools	Appropriate tools available for the ERT, SEMT, OSC and other responders		☐

Figure 1: Detection, Assessment, Response Flowchart



2. Introduction

This Emergency Response Plan (ERP) encompasses all Growth Asset's activities within the Beetaloo Asset and will be activated to manage emergency events at site.

Locations / site specific information may be recorded either in a contractors emergency response plan (ERP), bridging document, or through another means of providing emergency information, e.g Emergency Response Notification (ERN) form.

The Site Emergency Response Plan (SERP) is designed to direct and guide the On Scene Commander (OSC) and Emergency Response Team (ERT) (if nominated) to respond effectively to site level emergencies and return the site to normal operations.

Further support is provided through the Origin Emergency Response Framework via the Group Emergency Management Plan (GEMP 6522903) and Crisis Management Plan (CMP ORG-RMS-PLA-001).

2.1 Purpose

The purpose of this plan is to describe how to effectively manage site emergencies for the Beetaloo Asset whilst in a manned and unmanned condition.

The plan will:

- Briefly describe the Origin emergency response structure
- Explain the notification and escalation paths for an emergency
- Identify key people and explain what they will do during an emergency
- Describe important information about site infrastructure including:
  - Location
  - Geographic area
  - Isolation points (if applicable)
  - Exclusion zones (if applicable)
  - Other technical information
- Provide tools and templates to use during an emergency.

2.2 Scope

This Plan supports normal manned operations and response to unmanned locations. Unmanned relates to periodic contractor service visits and occasional small team visits.

This plan applies to all employees, contractors and visitors to the following Beetaloo Asset locations and activities:

- Asset Locations details as described in Section 3.
- Activities included in scope are:
  - General travel activities (Walking, Land transport).
  - Non/minimum risk activities such as visual inspections, routine low risk maintenance and monitoring tasks.
  - Accompanying or guiding contractors who are engaged in the above mentioned activities.
  - Laydown yards within tenure.
  - Construction Work (such as access tracks, lease builds, site earthworks, remediation)
  - Drilling, well completion, intervention or abandonment activities.
  - Transport to and from work areas (not including chartered flights to Airfield)

This plan excludes:

- Chartered flights to airfield and commercial flights to Darwin
- Third Line Logistics Freight and Haulage from Depots to Laydown Yards
- Accommodation in commercial establishments outside of the work areas identified in Section 3.

2.3 Compliance with Civil Legislation and Australian Standards

This plan meets the requirements as identified by legislation for emergency response plans including:

Australian Standards, Codes, Guidelines and Commonwealth Legislation

- Work Health and Safety Act 2011.
- Work Health and Safety Regulations 2011.
- Environment Protection and Biodiversity Conservation Act 1999.
- Australian Dangerous Goods Code.
- National Environment Protection (Assessment of Site Contamination) Measure (NEPM) 1999 as amended 2013.

Northern Territory

- Work Health and Safety (National Uniform Legislation) Act 2016.
- Work Health and Safety (National Uniform Legislation) Regulations 2017.
- Petroleum Act 2018.
- Petroleum Regulations 2013.
- Petroleum (Environment) Regulations 2018.
- Code of Practice for Petroleum Activities in the Northern Territory
- Bushfire Management Act 2016.
- Bushfire Management (General) Regulations 2018.
- Dangerous Goods Act 2012.
- Dangerous Goods Regulations 2018.
- Transport of Dangerous Goods by Road and Rail (National Uniform Legislation) Act and Regulations.
- Waste Management and Pollution Control Act 2016.
- Northern Territory Contaminated Land Guideline (June 2017).

2.4 Operator Details

Origin Energy B2 Limited (“Origin”)

Level 25

180 Ann Street, Brisbane, QLD, 4000

2.5 Definition of a Site Emergency

An emergency is defined as an unplanned event within a specific site, facility, field or area, accidentally or deliberately caused, which requires a response to normalise the activity and which may result in an incident such as:

- Injury to people
- A near miss

- Loss of control of any health, safety environment or community related incident as part of the operation
- Damage to the environment
- An uncontrolled release of a substance to air, land and water
- Loss of reputation
- Loss of business
- Loss or damage to product or assets
- Loss of production
- The potential for any of the above

2.6 Project, Construction and Mobile Work Group ER Philosophy.

These teams will have the ability to provide a basic response to: incipient fires, minor spills and basic medical emergencies, in order to preserve life, contain incidents (if able) and reduce the impact on our people, the community, environment and assets.

Section 4, Appendix B and Appendix G identify where increased response capability has been introduced to mitigate the consequences of specific incident types, e,g, Loss of Well Control. Depending on the magnitude of the scenario event, escalation could also include emergency services.

2.7 Site Emergency Management Team Activation/Escalation

This Site Emergency Response Plan (SERP) is activated for emergencies that cause or have the potential to cause SERIOUS or greater consequences. Consequence classification is based on Origins Risk Management Directive ORG- RMS-DIR-001

The Site Emergency Management Team Leader (SEMT-L) or On Scene Comander (OSC) has the authority to activate this SERP. Notification must occur to the Group Emergency Management Team (GEMT) Leader, however escalation and activation of the GEMT is determined by the GEMT on call leader. Escalation to the GEMT is conducted by ringing the GEMT-L on call phone **0477 755 369**. The Origin Emergency Management Structure Escalation Chart shows the different escalation levels between the SERT, GEMT and Crisis Management Team (CMT).

Under certain circumstances the GEMT may be activated without the activation of the SERP / SERT. If required the GEMT-L may then require the activation of SERP's / SERT's to manage an incident/s.

2.8 Document Hierarchy

The Document Hierarchy for Origin Emergency response is identified in Figure 2 below.

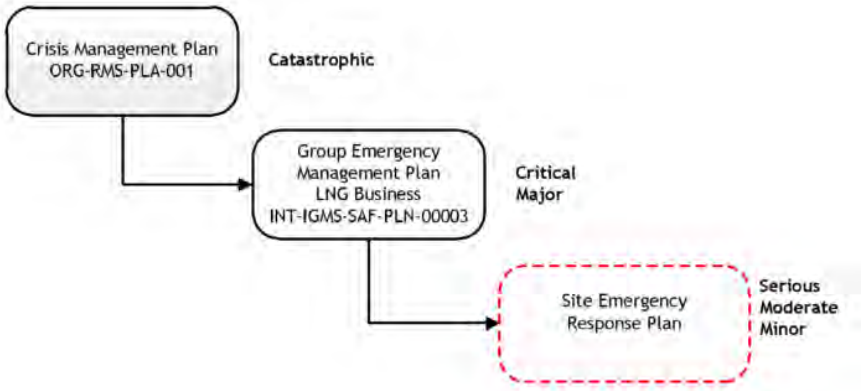


Figure 2 Hierarchy of Emergency Response documentation

2.8.1 Document Hierarchy for Principal Contractors

The relationship of Origin Emergency Response documentation for the Beetaloo Project, in conjunction with Contractor Emergency Response documentation is demonstrated in Figure 3 below.

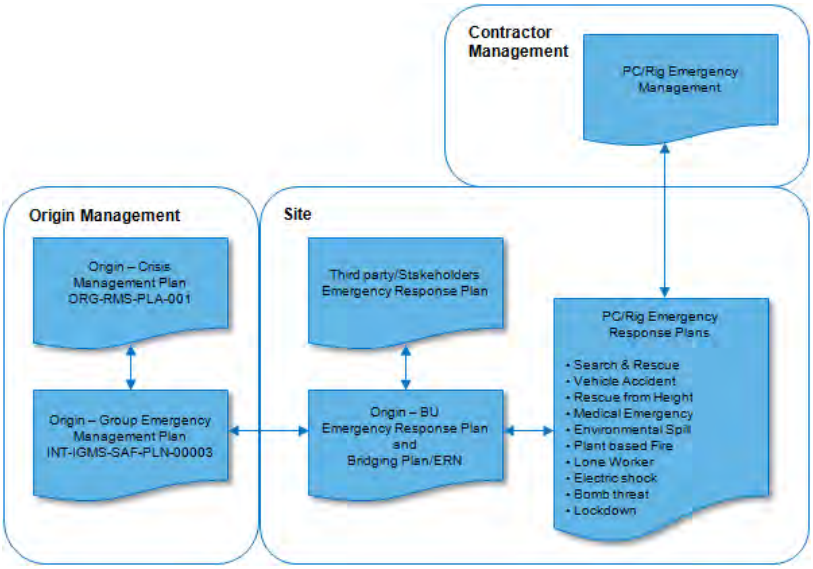


Figure 3 – Hierarchy of Emergency Response documentation

2.8.2 Emergency Management Structure

Figure 4 below identifies the Command and Control and escalation pathway for emergencies.

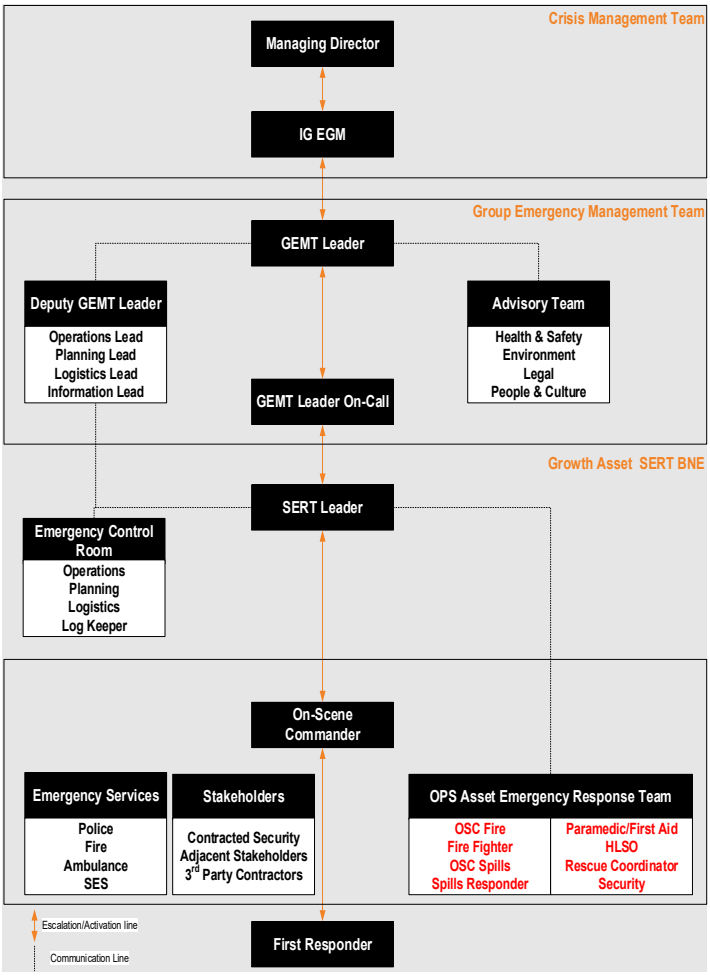


Figure 4 – Emergency Management Structure

3. Beetaloo Asset Locations and Field Activities

Th Integrated Gas Growth Asset Business conducts operations in the Northern Territory (NT) at Beetaloo. The activities conducted in this scope include the following areas:

3.1.1 Drilling, Hydraulic Fracturing Stimulation (HFS), Completion and Well Testing Activities

Works are executed by Rig contractors, and are supervised by an Origin Wellsite Representative (company representative) who at times may additionally undertake rigless operations. Contractors undertaking these scopes of work operate under their own Safety Management System and Emergency Response Plans at designated locations identified within this Emergency Response Plan.

Additionally, these activities are supported by the IG Asset Services Emergency Response Plan CDN/ID 19601361 (where deemed applicable).

IG Field Management is executed through the Growth Assets Operations Manager and Field Supervisors located within project areas during project duration.

3.1.2 Civil construction and related activities

Works such as establishing lay down areas, construction of access tracks, are usually executed by contractors operating under their own Safety Management System and Emergency Response Plans at various Beetaloo locations which are bridged to Origin Energy requirements.. Beetaloo Field Management is executed through the Growth Assets Operations Manager and Field Supervisors located within project areas during project duration.

3.1.3 Commissioning

Works relating to commissioning of infrastructure are executed by contractors for electrical facilities and Rig Contractors for hydrocarbons as per Contractor Safe Systems of Work.

3.1.4 Projects

Works may be executed at varying locations to expand or support capability improvement to Origin Assets at Beetaloo including water monitoring bores, helicopter landing sites, or communication equipment. These Projects are usually delivered by contractors operating under their own Safety Management System and Emergency Response Plans bridged to Origin Energy requirements.

3.1.5 Field Support (logistics)

Where applicable, mobile camps will be executed by Principal Contractors. Warehousing and laydown activities will be managed by specific location ERP for the activity.

3.2 Field Sites / Locations

Site specific details, include location, proximity to emergency services and townships can be found at Appendix C. The maps below identify the location of the Beetaloo Project as well as specific Site locations referenced within this plan.

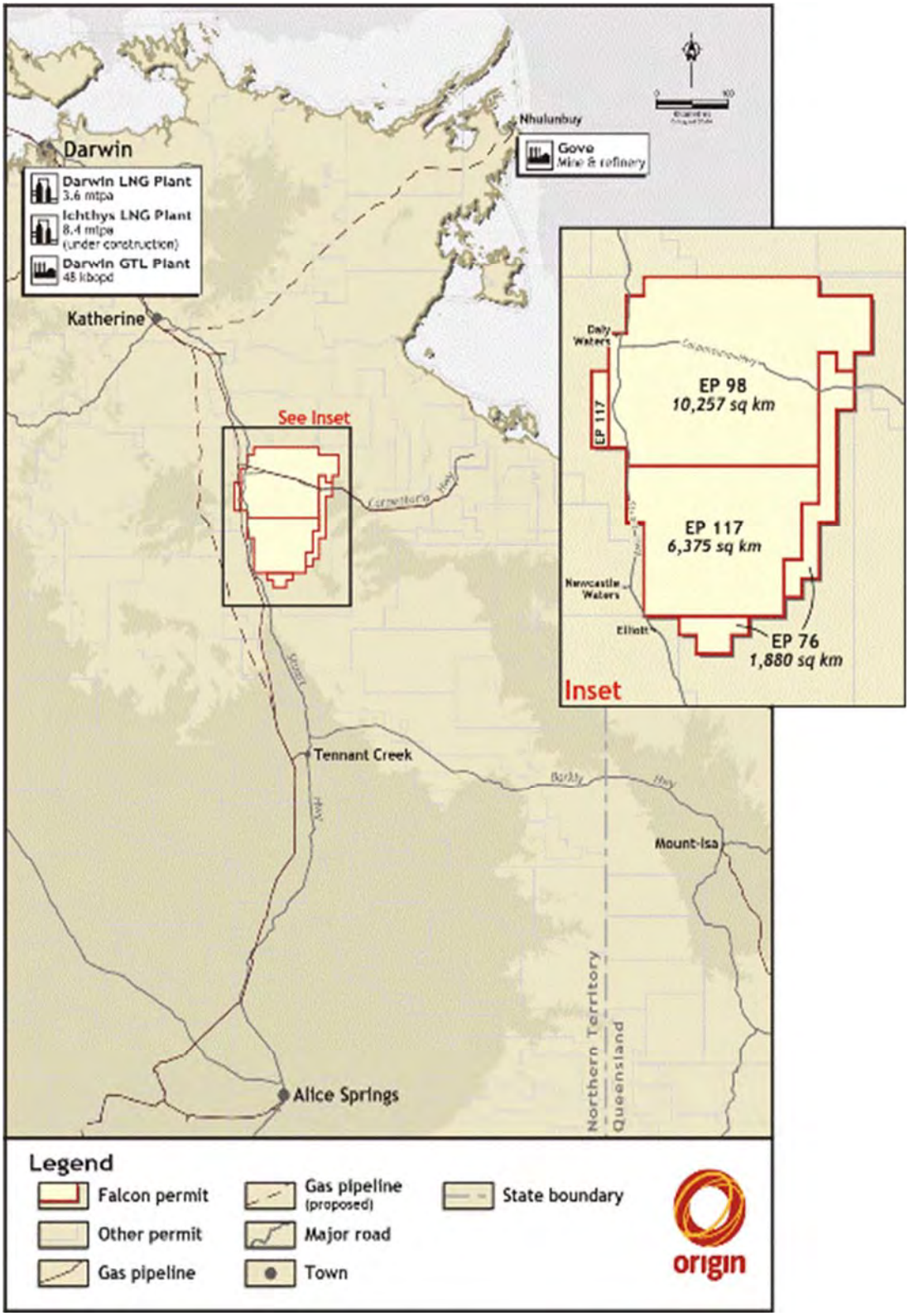


Figure 5: Location of Beetaloo Asset within Northern Territory

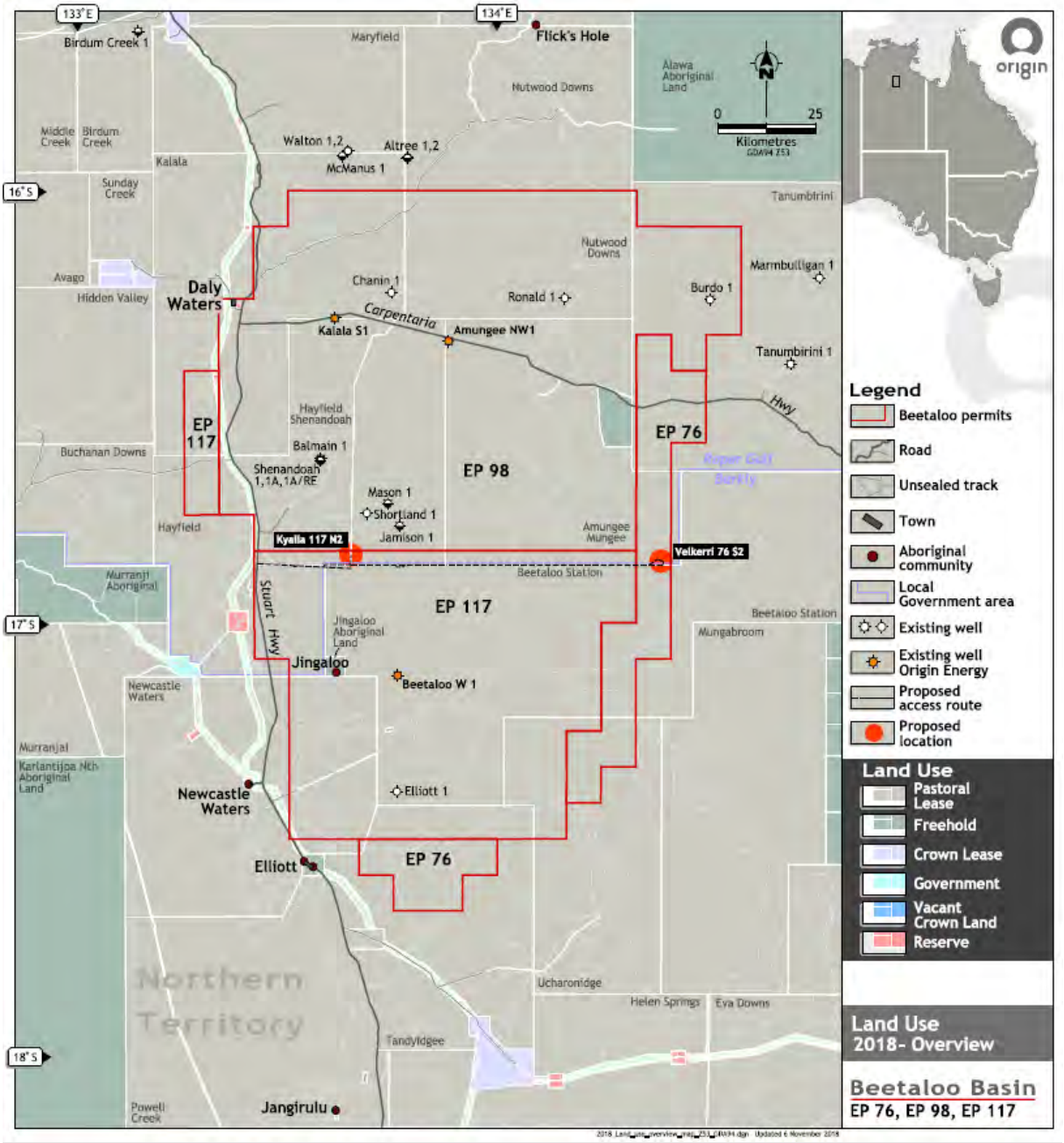


Figure 6 – Current Drilled and proposed wells locations

4. Emergency Scenario Responses

If an incident occurs, the Beetaloo Asset will nominate an OSC and a SEMT-L who will liaise with the Associated contractor (and Contract Owner) and notify the On-Call GEMT Leader. If an emergency event exceeds the contractors capability, i.e. Loss of well control, then Origin Beetaloo Asset will assume management of the incident.

Category	Response Procedures
GENERAL	▪ Evacuation and Alarms ▪ First Responder – Immediate Action Checklist ▪ Activate Emergency Shutdown Device ▪ Shift Change Over Checklist ▪ Termination of Emergency
FIRE	▪ Fire – (Plant, Building/Storage / Accommodation (Including mobile camps), Electrical) ▪ Bushfire
PERSONAL SAFETY	▪ Medical Emergency ▪ Vehicle Accident ▪ Missing Overdue worker ▪ Lone Worker ▪ Snakebite ▪ Rescue from Height ▪ Rescue from Confined space ▪ Rescue from Heights ▪ Communicable Disease ▪ Electrical Shock ▪ Man Down
ENVIRONMENT	▪ Environment Related Incident (Earthquake) ▪ Environment – Weather Related Incident – Storm and Lightning ▪ Loss of Containment / Spill ▪ Flood
FACILITY & EQUIPMENT	▪ Major Structural / Mechanical Damage ▪ HV / LV Electrical Fault
HAZMAT	▪ Diesel ▪ Nitrogen ▪ Plant / Pipeline Gas Leak Without Fire ▪ Loss of Well Control level 1 or 2
SECURITY	▪ Protest / Trespass ▪ Bomb Threat ▪ Armed Intruder ▪ Lockdown

4.1 Scenario Flip Charts

The Emergency Scenario Flip Charts (CDN 3676134) provide an easy to understand detailed response to identified emergency situations and also provide additional scenarios that may not be mentioned. Appendix G contains four main responses from the Flip Charts for ease of reference being: 1.) Bushfire 2.) Flood 3.) Spill and 4.) Loss of Well Control.

4.2 Contractor Scenarios

For some undertakings Origin will delegate its responsibility to a Contractor, or Sub-Contractor with suitable emergency response capability as Origin will have limited/if any field presence at times.

It will be the responsibility of the contractor to provide an initial emergency response and coordinate the emergency event. If an Origin employee is involved in an emergency event at a site under the control of a contractor it is expected that the Origin employee will conform to the contractors response requirements and support the contractor if willing and competent to do so.

Notification of the event will follow normal reporting processes within the business unit. The activation of the GEMT may be required for an incident involving the contractor. While an Origin SEMT-L may be required to coordinate Origin aspects at the incident site, in support of the contractor, contractor management will more likely occur through a nominated Origin contact (i.e.Contract Owner) who will liaise with the contractor emergency management team.

Depending on location of works the contractor may be able to call upon other nearby parties or State Emergency Services for assistance in responding or handling the incident; however the contractor retains responsibility for managing the emergency event.

4.3 Well Monitoring and Control

Appendix B contains all information pertaining to the monitoring of remote wells, well control and classification of well control incidents. A loss of Well Control is considered a Major Accident Event (MAE) which, while rare, requires additional controls and engineering assessments to mitigate potential consequences.

4.3.1 Potential Major Accident Events

A Major Accident Event is an *uncontrolled incident, including fire, explosion or release of dangerous substance with the potential to lead to multiple fatalities or major environmental damage* (potential for critical or catastrophic consequence as per Origin Risk Matrix).

If the Business Unit undertaking the work has the potential for a Major Accident Event to occur these will be identified in the Business Unit Safety Management Plan (SMP) or Safety Case.

For more information refer to MAE hazard assessment and risk reduction (ALARP & SFAIRP requirements) procedure (CDN/ID: 7983063) or contact the Process Safety Advisor at Origin (details in contact list).

5. Campaign specific ERP arrangements

5.1 Roles

The following roles and responsibilities are essential to ensure effective communication within Beetaloo Asset when responding to emergency events.

- First Responder (FR), located at the incident scene and may be a Contractor
- On Scene Commander (OSC) located at the incident scene
- Site Emergency Management Team Leader (SEMT-L), located at either:
  - the Field Emergency Control Room (ECR) ; or
  - The Brisbane ECR, 180 Ann Street, Level 29, Room 29:12

Individuals may undertake multiple roles depending on the nature of the emergency, its duration and complexity. The functional roles that will assist the SEMT-L are listed below and known as the Site Emergency Management Team (SEMT).

- Operations
- Planning
- Logistics
- Log Keeper

Additional roles such as Technical Engineering, Travel and Accommodation Services may supplement the SEMT depending on the type of incident.

If the SEMT-L is unable to undertake their responsibilities a competent alternate or delegate SEMT-L must be appointed to ensure the SEMT continues to function.

If required, depending on the nature and severity of the incident, the Group Emergency Management Team (GEMT) may be activated to support the response. The GEMT can be called upon to support such issues as Regulatory notifications, provide additional manning to site, or source assets required to support the site, such as Aviation.

For in-depth information regarding the above positions refer to the Duty cards in the OSC/SEMT toolkits

SEMT and OSC Toolkit (AUS-IGMS-SAF-GDL CDN 6893451)
http://im.originenergy.com.au/otcs/cs.exe/Open/6893451

5.2 Responsibilities

A summary of responsibilities are located below, with contractors found in the PC ERP.

Roles and responsibilities	
Contractor work parties / First Responder	• Respond to the situation as per the contractors emergency response plan. • Actively participate in the risk management process to assist in the development of emergency action plans; • Check the notice boards for any recent updates to information; • Maintain a high level of awareness of actions to be taken in the event of an emergency situation; • Follow instructions from Emergency Controller, Emergency Services personnel, Fire Wardens, First Aiders and other designated emergency personnel as appropriate; and • Prior to commencing any work or entering a work area, sign on to prestart or JRA for the associated activity.
First Aiders	• Ensure their first aid competencies (minimum *Apply First Aid and CPR*) are maintained and advise the PM prior to the expiry; • Provide first aid treatment or assessment as needed, working within their skill level; • Determine need for medical assistance and provide information to Medical personnel or Emergency services as required; • Ensure that first aid kits are maintained and complete and items are in-date; and • Ensure that all treatments provided, regardless of the type or complexities are recorded.
Site Paramedic / Nurse Practioner	• Provide care on site available during the 12 hr work day (on call 24/7 whilst on location) • Ensures that medical response emergency equipment is suitable and located appropriately; • Checks that Emergency action plans are appropriate for the activity/hazards identified; • Test communication and advises of any changes;
Origin work /travel team supervisor **On Scene Commander**	• Escalate to Operations/ Project Manager • Maintain a log of events • Escalate to Emergency Services, if required. • Act as On Scene Commander (OSC) and manage first response at site level • Ensure that emergency action plans are discussed on a regular basis at Pre-Start / Toolbox meetings, so that all persons under their control are aware of the project emergency procedures; • Ensure that emergency equipment is maintained in good working order (complete, clean and available for immediate use); • Advise the HSE Advisor or Operations/Project Manager of any operational issues that may impact with or affect the emergency action plans; • Ensure that emergency action plans are prominently displayed and available for use by all workers; and • Take role of on-scene commander especially in first response to an emergency incident. During first response, ensure safety of other

	team members and ensure that emergency situation is communicated to the Emergency Controller.
D&C Projects Manager / Operations Manager Growth Assets	• Act as Site Emergency Management Team Leader (SEMT-L) (with respect to taking call from OSC and escalating to Project Manager Provide well monitoring trend analysis as required • Act as journey contact for field teams. • Escalate to GEMT-L as required. • Support field team with emergency service direction/calls as requested
General Manager Growth Assets	• Receive call from Project Manager and support where required. • Participate in Group Emergency Management Team if activated

5.3 Communications

The communication flow between contractors (rig), external services and Origin is demonstrated in the flow chart below:

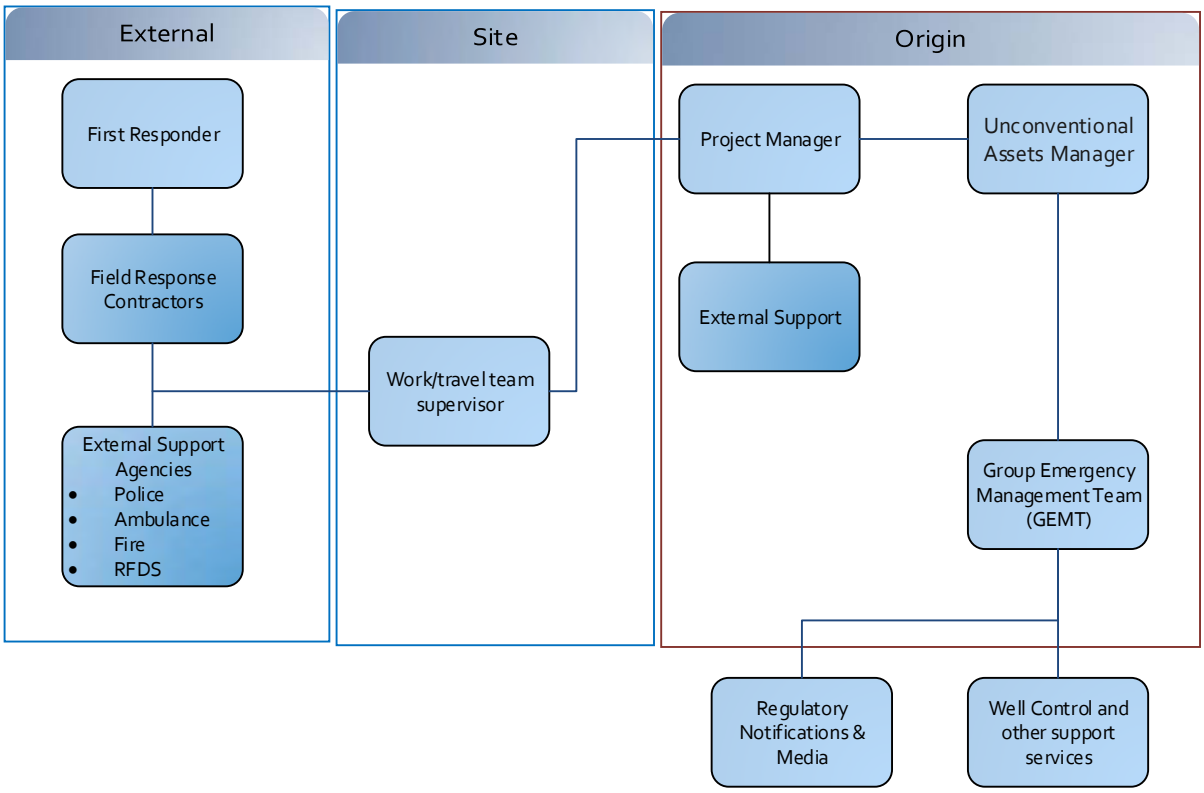


Figure 6: Communication flow

6. Emergency Management and Control

After an emergency is detected, the following emergency management stages will be used to control and contain the incident and return to business as usual.

- Raise the alarm
- Isolate and secure
- Communicate and Escalate
- Respond and Recover

6.1 Raise the alarm

One or more of the following methods can be used to raise the alarm:

- in person
- radio (Digital, UHF, VHF etc)
- phone (mobile, satellite or landline)
- Emergency alarm

6.2 Isolate and Evacuate

- Stop all work and make sure the worksite is safe
  - Secure the well, or impacted area
  - stop vehicle and mobile plant operations
- If you need to abandon vehicles and mobile plant
  - pull over and park in a safe area
  - ensure access and egress to the site is not impeded
  - switch off and leave the keys in the ignition
- Plan a safe route to the muster point and avoid movement through unsafe areas
- Account for all people
- Stand by at the muster point until stood-down or instructed to evacuate

6.3 Communicate and Escalate

- Gather information – where is the emergency, what has happened, who is affected, is anyone missing, where are the safe areas etc
- Advise and update the Site Safety Manager
- Call Emergency Services (police, fire, ambulance) if required
- Identify meeting points for responders (Origin Medical Providers, ERT etc) and Emergency Services
- SEMT activates if required

6.4 Respond and Recover

- Apply first aid to injured people (if safe to do so)
- Activate ERT
- Consider Simultaneous Operations (SIMOPS), advise nearby work groups and if on an IG Asset, the Asset SEMT-L
- Assist Emergency Services
- Follow response procedures

6.5 Meeting Emergency Services

Where Emergency Services such as Ambulance, Police and Fire Services dispatched by road or air, an Origin employee or contractor, whenever possible, will meet the Emergency Service at a designated location and direct them to the incident site.

Meeting points with Emergency Services should be pre-identified if practicable and communicated to the Emergency Services on call out.

6.6 Hazard awareness

Any person arriving at the emergency site (Origin responders, Origin medical providers, Emergency Services) will be made familiar with:

- Hazards generated by the incident (fire, heat radiation, chemical exposure etc)

- Known hazardous areas
- Known safe locations and distances
- Appropriate PPE (if known)

6.7 Shift changeover during an emergency

Shift changeovers are required for continuity of emergency management. The SEMT-L is responsible for change over of personnel involved in the emergency. Effective changeover will be achieved by:

- Staggering changeover times
- Avoiding changeovers during critical periods
- Having changeovers in daylight, where possible
- Briefing incoming personnel

6.8 Termination of emergency and recovery actions

The SEMT-L will declare when the response phase will stop and determine the recovery strategy and resources required in consultation with the GEMT-L if GEMT is activated.

All activities required to terminate an emergency and conduct recovery operations are located in Paragraph 8 of this document.

7. Post Emergency Actions

The following post emergency actions must occur in order to ensure the Asset, and Business as a whole, successfully learns from the incident and returns to pre-incident state operations.

7.1 After Action Review

A debrief or After Action Review (AAR) is to be held after each emergency in accordance with the After Action Review Procedure CDN 8189619 and using the After Action Review Form CDN 13853829. An AAR is designed to discuss strengths and weaknesses and necessary improvements for this plan and related procedures. All AAR's shall be entered in to OCIS along with any action items identified within the corresponding Incident tab.

7.2 Incident investigation

All incident investigations should be conducted in accordance with the Integrated Gas Manage Incidents and Learning Core Process found within ProMapp. The following steps should also be considered:

- Secure the incident site, restrict access and do not disturb anything until investigators have finished and handed back control of the site.
- Gather any evidence that may assist the investigations (list of people involved, response logs, situation boards, photographs etc).

The incident reporting system 'Origin Collective Intelligence System' (OCIS) will be used to record all incidents and actions arising from the emergency.

7.3 Recovery Actions

Prior to resuming work, develop a recovery plannthat considers the following:

- Check plant and equipment for structural, physical and electrical/instrumentation integrity
- Ensure all active detection and protection systems are restored
- Replenish emergency response equipment as required
- Replace or return any third party emergency equipment

In addition, consider the following points:

- People who were involved may require counselling, depending on the nature of the incident
- People should be debriefed, with all relevant information captured for a 'lessons learnt'
- Conduct a tool box talk on specific start up activities before restarting work

- Consider the potential for loss of confidence or potential IR issues following the incident or the response to that incident
- Emergency response plans and training may need to be revised before resuming normal activities.

7.4 Post Incident Clean-Up

Post incident clean up must be done using the following guidelines:

- Conduct an initial inspection to identify the extent of equipment and plant damage
- Assess potential decontamination needs (removal of chemicals/oil/foam from plant/equipment, contaminated soil etc.)
- Store all contaminated material in proper containers, pending offsite disposal by licensed hazardous waste contractors
- Repair or replace damaged equipment and plant
- Inspect and test affected equipment
- Attend to commissioning and site reinstatement

8. Training and Capability

IG emergency response competency based training is managed by Organisational Capability. Training is captured in People Central on the Origin Intranet (Source). Managers and supervisors are responsible for identifying and organising training for people required to perform emergency response roles. All personnel must be given specific instructions and training on how to respond to emergencies and in the correct use of emergency equipment available.

Emergency training may be in the form of:

- Competency based training
- Simulated exercises
- Desktop exercises
- Toolboxes
- Practical drills
- Resource and equipment checks

8.1 Drills and Exercises

The Emergency Exercise Planning and Reporting Procedure AUS-1000-SAF-PRO-00010 CDN/ID 3674898 details the minimum requirements for the planning and conduct of exercises.

All drills and exercises require an After Action Review to determine what worked well and what requires improvement. All actions are to be recorded in OCIS and reviewed until close out.

Figure 7 details the Beetaloo Assets annual exercise program.

In addition to this schedule the IG Well Control Standard (INT-1000-35-TS-001) mandates emergency response exercises to be conducted as follows:

- For continuous operations, IG D&C related activities shall conduct two Well Control Emergency response exercises per year to evaluate the effectiveness of the response of all stakeholders
- For projects that are campaign based, a Well Control Emergency Response Exercise shall be held at the start of the campaign involving all stakeholders. Subsequent exercises shall be conducted on a minimum twice annual basis if applicable.

		Jan	Feb	Mar	Apr	May	Jun
		1st Qtr			2nd Qtr		
Shift 1 and 2	Primary	HAZMAT	Fire	Personnel safety	Environmental	Security	Personnel safety / SBRWAME
	Secondary	Environmental	Personnel safety	Equipment failure	HAZMAT	Structural failure	Environmental

		Jul	Aug	Sep	Oct	Nov	Dec
		3rd Qtr			4th Qtr		
Shift 1 and 2	Primary	Environmental	Personnel safety	Fire	Structural / Equipment failure - Water	Fire	Structural / Equipment failure - Gas
	Secondary	Security	HAZMAT	Security	Fire	Personnel safety	Fire

Figure 7 – Exercise Schedule

8.2 Training Requirements

The Site ER job task analysis and Site Supervisor/Wellsite Representative job task analysis identifies the minimum requirements for trained personnel for specific roles that comprise the ERT and SEMT. It is the Contractor / Site Manager responsibility to maintain minimum levels of trained staff to meet their sites requirements.

8.3 Training and Competency

- All parties must be familiarised with the contents of this ERP.
- All personnel identified to fulfil emergency response roles within this ERP must be competent
- Minimum one remote first aid trained person per work party or travelling team.

9. Response Resources

The following response resources may aid in the preparation for, and management of, emergencies by the Beetaloo Asset.

9.1 Planning and Preparation

Enabling activities, such as ensuring minimum training and ensuring hardware maintenance, which are required to be carried out to support this plan are detailed in the:

- Beetaloo Basin Groundwater Monitoring Bore Installation Environmental Management Plan,
- Bushfire Management Plan
- Spill Contingency Management Plan
- Civil Construction Environmental Management Plans, and the
- Drilling, Completion, Hydraulic Fracture Stimulation and Well Testing Environmental Management Plan, in 21onjunction with the requirements of the Origin Integrated Gas HSEMS.

The Operations Manager is responsible for ensuring that any staff mobilised to conduct work for OE in the Beetaloo Basin have been appropriately briefed, completed appropriate inductions and completed the nominated minimum training as applicable to the work conducted.

9.2 Equipment and Unmanned Phase

During operations, emergency response equipment available at each Site, and their layout, will be detailed and provided within contractor specific ERPs.

Emergency response assistance will be provided by PPP Contracting within an unmanned aspect.

9.3 Incident Response Procedures Flip Charts

Emergency Scenario Flip Charts CDN 3676134 are intended to provide further assistance to each role in dealing with various pre–defined emergency scenarios. The charts define the key roles and

responsibilities to ensure essential response actions are undertaken. The flip charts can be found in Core Process Manage Incidents and Learning.

9.4 Spill Response

The Beetaloo Spill Management Plan (NT-2050-15-MP-030) provides specific information on how to manage and handle spill response within the Beetaloo Asset (included spills located off tenure). This document should be referenced for all non emergency spill response scenarios. For managing spills, Emergency Scenario Flip Charts CDN 3676134 and Appendix C should be utilised to manage Spills.

9.5 Chemical Response Procedures

The Chemical Response guidelines (QLD-1000-SAF-PRO CDN 4411922) provide specific information for specific chemicals that are used on Origin sites. The guidelines provide information on:

- PPE requirements
- Chemical details and description
- First Aid requirements
- Evacuation considerations
- Fire and spill management

Whilst this document was developed for QLD based Integrated gas sites it can be used on other sites if the same chemicals are present and the SDS lists the same response requirements. Any differences between the Chemical Response Procedures and the SDS must be risk assessed with appropriate controls adopted.

Chemical Response Procedures (CDN 4411922)

9.6 SEMT and OSC Toolkit

The link below identifies forms and procedures that can be used to help the OSC or SEMT in an emergency situation. These include:

SEMT and OSC Toolkit	
Duty Cards	SEMT Duty Cards
Initial Emergency Response Actions for All Incidents	Checklists
OSC Forms	SEMT Forms
OSC Worksheets	SEMT Worksheets
Checklists	ECR Equipment and Layout
Landing of Careflight Helicopter in The Field	ECR Status Boards

SEMT and OSC Toolkit (AUS-IGMS-SAF-GDL- CDN 6893451)

9.7 Bushfire Management

The following link can provide technical advice in developing Bushfire Management processes as it provides access to Prevention and Response resources such as:

- IG Bushfire Standard
- Bushfire Preparedness Tool
- Generic Bushfire Asset Protection Zone (APZ) Guide
- Beetaloo Bushfire Management Plan
- https://www.pfes.nt.gov.au/incidentmap

Bushfire Management Source Bushfire Page Link

9.8 Flood Management

In the preparation and response to a flood event, the following resources have been developed to help the site prepare for and manage a flood response

- Camp Isolation Readiness Check sheet (Appendix H).
- Flood Mapping via OLIMAPS (where available)

Betaloo Assets teams can use the above tools to develop site Specific Flood Plans. The plan should take into consideration:

- Sources of flooding i.e. rivers, dam over flows etc.
- Fixed and temporary assets affected by flooding
- Access roads that are cut off and at what levels.
- Seasonal Preparedness – Activities at a minimum to prepare site for a flood
- Flood Warning or Watch
- Need to isolate equipment affected by flooding
- Flood Recovery requirements

9.9 Security Toolkits

In addition to the Emergency Response Flip Charts (QLD-1000-SAF-PRO- CDN 6893451) the following documentation supports response to different security scenarios:

- IG Security Management Plan CDN 8278592
- Wellsite Safety and Security Level Classification Procedure
- Regional Protest Plan CDN 7654911

Security Toolkits Source Security Page

9.10 Aviation Resources

Specific aviation resources can be sourced for use during an emergency. The IG Aviation Management Plan INT-1000-SAF-PLN-00007 can help to develop site specific aviation appropriate emergency response actions for the business unit's area.

Additionally, the Beetaloo Aviation Management plan provides further guidance for specific aviation practices within the Asset.

Further tools can be found at the IG Transport and Aviation Source Page

The plan identifies

- Aviation Tasking Process
- Aviation Bookings (fixed and rotary winged aircraft)
- Landing Site Management including approved Airfields and Helicopter landing site requirements

.

Aviation Management Plan

Integrated Gas Aviation Management Plan

In addition to the aviation management plan the below link provides details on the following:

- Helicopter Landing Sites technical inspection report form
- Helicopter Landing site design plate

- Helicopter Landing Site Officers
- Approved Helicopter Landing Site Register and requirements
- Aerial Firefighting
- Helicopter Landing Site Officer operators manual

Aviation Resources

http://source.originenergy.com.au/Business/Gas/hse/risk/Pages/Transport.aspx

9.10.1 Helicopter Landing Site Officer (HLSO)

If a helicopter is required for an emergency situation a designated / trained Helicopter Landing Site Officer (HLSO) should be sourced (where available) to support ground activities. It is the responsibility of the HLSO to ensure that they are familiar with the landing locations and the requirements associated with the Helicopter Landing Site Officer Operations Procedure – Integrated Gas (CDN/ID 7983075) .

Landing Site Coordinates should be identified in either the Emergency Response Notification (ERN) document that is prefilled by the rig when moving to a new well location or if conducting a Campaign then nominated in the campaign specific bridging document.

9.11 Emergency Control Room

The Emergency Control Room (ECR), manned by the Growth Assets SEMT, is the coordination centre and “communication hub” for Beetaloo Asset based emergency incidents. The ECR must be activated to help assist the affected site oversee the operational emergency response and well-being of personnel involved in, or affected by, the emergency. The Beetaloo Asset ECR is located in 180 Ann Street in room 29:12 and contains appropriate tools, documents and stationery to support a response.

Emergency Control Room ECR Tools

9.12 Emergency Equipment

A detailed list of Beetaloo major ER equipment is located in Appendix XX.

10. Stakeholder Management

An emergency will be coordinated and supported by the SEMT at the ECR and SEMT at site. The bridging document or the ERN will contain site specific contacts that can be contacted in an emergency.

10.1 Group Emergency Management Team (GEMT)

The GEMT provides support to an emergency situation and manages the higher level requirements to assist the SEMT whilst dealing with regulators, media, legal and industry partners. For every activation of the SEMT, the SEMT-L must contact the on call GEMT-L and advise of the situation. The GEMT-L will determine whether the GEMT will be activated. The SEMTL and GEMTL must be familiar with the levels of incident management categories located within the Emergency response Assessment and Escalation procedure (CDN 8629094)

When an incident has escalated to include the GEMT, the SEMT-L, having consulted with the OSC, will communicate regularly with the GEMT Operations Lead to provide updates and make requests for support.

Group Emergency Management Plan (INT-IGMS-SAF-PLN CDN 6522903)

10.2 Emergency Services

First Responders must notify the OSC and in turn the SEMT-L if they call Emergency Services. Once notified, the OSC is responsible for all communications back to the SEMT.

Upon arrival, Emergency Services may take control of the emergency or leave the control to Origin to manage, depending on the type of emergency and the assistance that is required. In most circumstances Emergency Services will require assistance from Origin for local and technical knowledge and for additional resources to manage the incident.

Where Emergency Services take control of the incident it must be remembered that they are not able to command Origin personnel or resources, this command must still be managed by an Origin representative such as the OSC. This same control over the Emergency Services personnel and resources must be managed by the Emergency Services representative, such as the Incident Controller or senior officer.

10.2.1 Emergency Manifest

A hard copy Emergency Manifest, identifying notifiable quantities of hazardous substances, should be located on arrival at permanent field locations in an easily accessible and identifiable place An Emergency Service Manifest template found in Open Text X Templates (and CDN 5362370) can be used to develop the Emergency Manifest.

10.3 Next of Kin

In the event of a death, serious injury or other emergency, involving Origin personnel, advice to relatives about the condition of a person or about the incident will be coordinated by People and Culture (P&C) through the GEMT.

During or after an emergency, the SEMT-L will refer any queries or concerns from relatives to People and Culture. P&C may also activate Employee Assistance Program (EAP) providers to support site personnel or relatives affected by an incident.

Principal Contractors and Contractor companies are responsible for management of next of kin communication in consultation with Police services, and EAP management in accordance with their emergency response plans and relevant State obligations. Where Contractors do not maintain their own EAP provider, P&C may extend EAP services as determined by the GEMT-L and P&C GEMT representative.

10.4 Landowners / Pastoralists

Contact with local landowners can be initiated by the SEMT-L in extreme circumstances; however Land Relations Advisors are to be used in the first instance. When activated, stakeholder communications will be handled by the GEMT and are addressed in the Group Emergency Management Plan (INT-IGMS-SAF-PLN-00004). Refer to Appendix A for contact details.

10.5 Regulatory Notification

A regulatory notifiable incident is an incident or non-compliance with an External Mandatory Obligation or External Voluntary Obligation that requires notification or reporting to a Regulator as prescribed by applicable Laws and Regulations. HSE regulatory notifiable incidents required to be reported to a regulator are listed in Appendix A.1.

Any regulatory incident notification to joint venture parties must follow the contractual arrangements specified in the joint venture agreement.

The Origin Energy joint venture representative must be consulted to determine Origin Energy's contractual obligations for incident notification and reporting.

Any correspondence between Origin Energy and joint venture partners must be conducted through the joint venture representative unless other arrangements have been agreed.

Verbal Notification	**Written Notification**
Risk Assurance Compliance and Process Safety Team On-call number 0475 813 986	IntegratedGasCompliance@upstream.originenergy.com.au

Integrated Gas management of Regulatory Notifiable Incidents (INT-IGMS-BUS-PRO-00001 CDN/ID 5814101)

10.6 Dealing with Media Enquires

During an emergency event, media attention may occur at the affected site. All communications with the media must be in accordance with the Origin Media Policy (ORG-CGOV-POL-005). If personnel receive an enquiry from a journalist or reporter, whether in person or by phone and are asked about Origin, they should say:

"I am not in a position to comment but if you give me your name and telephone number I will organise for the most appropriate person to call you."

Always ask for:

- the journalist / reporter's name;
- publication / media outlet;
- contact phone number and / or email, and
- publication deadline.

The SEMT-L will advise the GEMT-L on call and External Affairs managers at the earliest opportunity of any media contact or enquiry. Refer to Appendix A – Table 3 for External Affairs contact details.

It is important to remember that there is no such thing as "off the record". Even if you are speaking informally, you could be quoted at any time.

11. Review and update

The ERP will be reviewed and updated as necessary in response to one or more of the following:

- annually
- when major changes have occurred which may affect the Emergency Response coordination or capabilities
- following routine testing of the plan
- after an actual emergency or
- before installing and commissioning new plant and equipment equipment.

During the review, the following aspects are also to be considered:

- lessons learned from an emergency
- changes in legal requirements
- improvements to effectiveness in terms of response strategy, management and communication
- developments in the latest techniques and technology in handling an emergency
- changes to, or movement of people within our organisation
- changes to contact numbers of internal and external organisations

revisions to existing, or availability of, emergency management tools and equipment and resource suppliers and contractors.

12. Associated Documents

Document	Document Reference
Incident Response Procedures	QLD-1000-SAF-PRO-00041
Chemical Response Procedures	QLD-1000-SAF-PRO-00095
SEMT Toolkit	AUS-IGMS-SAF-GDL-00002
Emergency Response Exercise Planning Form	AUS-1000-SAF-FRM-00012
IG Group Emergency Management Plan (GEMP)	INT-IGMS-SAF-PLN-00004
Crisis Management Plan	ORG-RMS-PLA-001
Emergency Response Exercise Planning and Reporting Procedure	AUS-1000-SAF-PRO-00010
Risk Management Policy	ORG-RISK-POL-001
Origin Risk Toolkit	ORG-RSK-TOOL-001

13. Document information and history

DOCUMENT CUSTODIAN GROUP

Title	Name/s
General Manager – Growth Assets	Tracey Boyes

DOCUMENT AUTHOR

Position	Name
HSE Lead – Growth Assets	Lucas Fulford

STAKEHOLDERS AND OTHER CONTRIBUTORS

Position	Name
Emergency Response and Security SME – HSE, Risk and Compliance (RAC)	Bruce Baldwin
Operations Manager – Growth Assets	Matthew Hanson
D&C Project Manager – Growth Assets	Ed Wong
Environmental Specialist – Growth Assets	Matt Kernke

DOCUMENT HISTORY

Rev	Date	Changes made in document	Reviewer/s	Consolidator	Approver
A	25/03/2019	Consolidation of previous Beetaloo campaign ER plans, unmanned ERP to align with Integrated Gas ERP requirements to form Asset ERP.	B Baldwin	L Fulford	
0	29/04/2019	Issued for Use	B Baldwin M Hanson Ed Wong	L Fulford	T Boyes
1	17/06/2019	Update references around regulatory reporting requirements based on NT regulator DNER feedback.	M Kernke	L Fulford	T Boyes
2	21/06/2019	Update from NT police comments	M Kernke	L Fulford	T Boyes

Appendix A Contact lists

External Agencies		
Role	**Name**	**Primary**
Local Emergency Services	Police, Fire, Ambulance	000 (or 112 from mobile)
Hospital	Katherine Hospital	(08) 8973 9211 Kintore Clinic Katherine (08) 8972 1677
Field response contractor / intial inspections	PPP	[redacted]
Remote Well Monitoring Assistance	Cory Giefer Operations Support Manager MPC Kinetic	[redacted]
Bushfires NT	Fire control officer	Katherine (08) 8973 8871
Volunteer Bushfire brigade		(08) 8975 9936
Regional Shire Council	Roper Gulf Shire	08 8972 9000 or 1300 366 208
Regional Shire Council	Barkley Shire	
Police (non-emergency)	Police Link	131 444 Elliott - (08) 8969 2010
Poisons Information Centre	n/a	13 11 26
Bureau of Meteorology	Cyclone Warnings Forecasts & Warnings	1300 659 211 08 8920 3826
NT DPIR's Petroleum Operations Team	after-hours	+61 1300 935 250
NT DNER		08 8973 8871 or 08 8973 8872 or 08 8973 8870 **DENR** Note, also required to notify landholder
NT EPA Pollution Hotline	n/a	1800 064 567
NT WorkSafe	n/a	1800 019 115 ntworksafe@nt.gov.au
Department of Main roads	n/a	1300 654 628
NT power and water	n/a	1800 245 090
Well Control supplier (for lev3)	Boots & Coots Services Well Control and Prevention	[redacted]

Origin Beetaloo contacts		
Role	**Name**	**Primary**
Group Emergency Management Team (GEMT) Leader On-Call	[redacted]	+ [redacted]
[redacted]	[redacted]	[redacted] or [redacted]
Construction Supervisor – Growth Assets [Weeds officer]	Robert Wear	[redacted]
Operations / Project Manager – Growth Assets	Matthew Hanson	
General Manager – Growth Assets	Tracey Boyes	
Ed Wong – D&C Project Manager – Growth Assets	Ed Wong	
HSE Lead – Growth Assets	Lucas Fulford	
Environmental Specialist – Growth Assets	Matt Kernke	
Corporate Affairs - Growth Assets	Stephanie Stonier	
Senior Petroleum Engineer – Growth Assets	Alex Cote	
Rig Superintendent – Asset Services	James Boorman	
Field Manager – Asset Services (Beetaloo Stage 2 campaign)	Troy Beetson / Josh Fisher	
External Affairs Manager - IG → direct media enquires	Chris Zipf Or Tony Hancox	
Process Safety SME – HSE RAC - Origin	Liana Bonnette	
Emergency Response and Security Specialist – HSE RAC - Origin	Bruce Baldwin	

Neighbouring Properties			
Property Name	**Contact Name**	**Phone**	**Direct Neighbouring Properties**
Amungee Mungee	[redacted]	[redacted]	Nutwood Downs –North Tanunbirini – East Hayfield – West Beetaloo – South
Beetaloo	[redacted]	[redacted]	Amungee Mungee – North Hayfield/Shenandoah – N/W NCW – West NCW – South (Tandi/Uchar)
Sturt Plains Hayfield/Shenandoah	[redacted]	[redacted]	Buchannan – West Kalala – North Amungee Mungee – East Beetaloo – East NCW – South
Hidden Valley	[redacted]	[redacted]	Sunday Creek – North Kalala – East Buchannan – South
Kalala	[redacted]	[redacted]	Sunday Creek – West Maryfield – North Nutwood Downs – East Hayfield/Shenan – South Hidden Valley - West
Newcastle Waters	[redacted]	[redacted]	Hayfield – North Beetaloo – North
Nutwood Downs	[redacted]	[redacted]	Kalala – West Amungee Mungee – South
Tanunbirini	[redacted]	[redacted]	Amungee Mungee - West

A.1. Incident Notification Matrix – Northern Territory

Integrated Gas Regulatory Incident Notification Guideline (NT regulatory notification matrix)				
Legislation	**Incident**	**Way report must be given**	**When report must be given**	**Contact Details**
Work Health and Safety (National Uniform Legislation) Act 2014 ***Sections 35 - 39***	A PCBU must notify the regulator as soon as they become aware of a death, serious injury or illness or dangerous incident that arises out of the conduct of the business or undertaking. A *dangerous incident* includes: • Uncontrolled escape, spillage or leakage of a substance, gas or pressurised substance • Uncontrolled implosion, explosion or fire • Electric shock • Fall or release from height of plant, substance or thing • Collapse, overturning, failure or malfunction of, or damage to, any plant/equipment/structure/excavation • In-rush of water, mud or gas in an underground excavation tunnel or interruption of ventilation in said tunnel A serious injury or illness means that results in: • work related injury • immediate hospital treatment as an in-patient • immediate treatment for serious injuries (for example amputation, scalping, a spinal injury, loss of a bodily function or a serious laceration, burn, head injury or eye injury), or • medical treatment within 48 hours of exposure to a substance.	by telephone	Immediately after becoming aware	1800 019 115 Worksafe ntworksafe@nt.gov.au
Schedule of Onshore Petroleum Exploration and Production Requirements 2017	An incident involving death or serious injury (reports shall be in addition to, and not take precedence over reports required by NT WorkSafe) A serious injury is one which requires immediate attention by a medical practitioner	by telephone AND in writing	immediately As soon as practicable	1300 935 250 DPIR Petroleum.Operations@nt.gov.au
	An incident involving serious damage (other than Environmental Harm) including loss, destruction or damage to property exceeding $50k or when any person dies or suffers serious injury	by telephone AND in writing	immediately As soon as practicable	1300 935 250 DPIR Petroleum.Operations@nt.gov.au
	An incident involving or could potentially involve the injury to a person or serious damage to property that is professionally considered to have been caused by an event that is not in the normal or ordinary course of an operation (Potentially Hazardous event)	by telephone AND in writing	immediately As soon as practicable	1300 935 250 DPIR Petroleum.Operations@nt.gov.au
	An incident where damage to property occurs (<$50k) that is not serious damage to property but which results in a significant loss of structural integrity or load bearing capacity in the property damaged or results in some other significant unsafe condition	by telephone AND in writing	immediately As soon as practicable	1300 935 250 DPIR Petroleum.Operations@nt.gov.au
	An incident that is considered to be an emergency	by telephone	Immediately (after 000)	1300 935 250 DPIR Petroleum.Operations@nt.gov.au

Integrated Gas Regulatory Incident Notification Guideline (NT regulatory notification matrix)

Legislation	Incident	Way report must be given	When report must be given	Contact Details
Petroleum Act 2016 **and associated Regulations**	**Applicable to ON TENURE SPILLS (note Off tenure spills under Waste Management and Pollution Control Act 1998):** **Reportable Incident:** An incident, arising from a regulated activity, that has caused or has the potential to cause material environmental harm or serious environmental harm. *Material environmental harm* means harm that: (a) Is not trivial or negligible in nature; (b) Consists of an environmental nuisance of a high impact or on a wide scale; (c) Results, or is likely to result, in not more than $50k or the prescribed amount (whichever is greater) being spent in taking appropriate action to prevent or minimise the environmental harm or rehabilitate the environment; or (d) Results in actual or potential loss or damage to the value of not more than $50k or the prescribed amount (whichever is greater). *Serious environmental harm* means environmental harm that is more serious than material environmental harm and includes environmental harm that: (a) Is irreversible or otherwise of a high impact or on a wide scale; (b) Damages an aspect of the environment that is of a high conservation value, high cultural value or high community value or is of special significance; (c) Results or is likely to result in more than $50k or the prescribed amount (whichever is greater) being spent in taking appropriate action to prevent or minimise the environmental harm or rehabilitate the environment; or (d) Results in actual or potential loss or damage to the value of more than $50k or the prescribed amount (whichever is greater).	by telephone OR in writing AND in writing	As soon as practicable (not later than 2 hours after the incident) <24 hours after oral notice (written notification) 3 days after the incident (initial report) 90 days intervals from the date of the initial report (interim reports) 30 days after clean up or rehabilitation (final)	1300 935 250 DPIR Petroleum.Operations@nt.gov.au
	Recordable Incident: An incident that has resulted in an environmental impact or environmental risk not specified in the current plant for the activity; or has resulted in the contravention of an environmental performance standard specified in the current plan for the activity; or is inconsistent with an environmental outcome specified in the current plan for the activity; and is not a reportable incident.	In writing	15 days after each 90 day period after then day on which the environmental management plan is approved.	1300 935 250 DPIR Petroleum.Operations@nt.gov.au

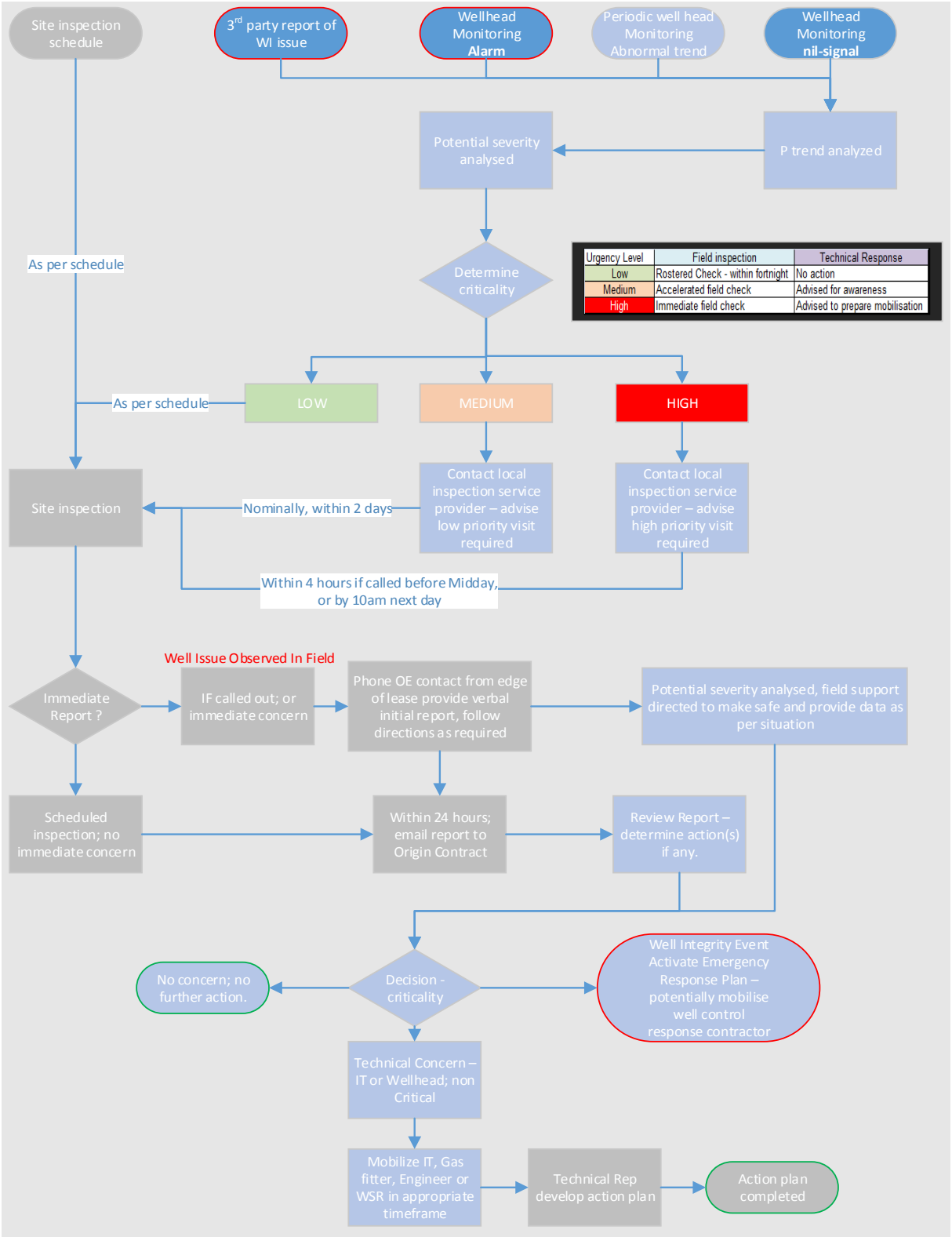
Integrated Gas Regulatory Incident Notification Guideline (NT regulatory notification matrix)

Legislation	Incident	Way report must be given	When report must be given	Contact Details
Waste Management and Pollution Control Act** 1998 **and associated Regulations	Duty to notify of incidents causing or threatening to cause pollution. **Applicable to off tenure related spills (note ON tenure spills under Petroleum (Environment) Regulations):.** (1) Where: (a) an incident occurs in the conduct of an activity; and (b) the incident causes, or is threatening or may threaten to cause, pollution resulting in material environmental harm or serious environmental harm, the person conducting the activity must notify the NT EPA in accordance with subsection (3) as soon as practicable after (and in any case within 24 hours after) first becoming aware of the incident or the time he or she ought reasonably be expected to have become aware of the incident." An incident that causes, or is threatening or may threaten to cause, pollution resulting in material environmental harm or serious environmental harm. Refer to the definition of *material* and *serious environmental harm* provided in *Petroleum Act* section above. *Pollution* means: (a) A contaminant or waste that is emitted, discharged, deposited or disturbed or that escapes, or (b) A contaminant, effect or phenomenon, that is present in the environment as a consequence of an emission, discharge, deposition, escape or disturbance of a contaminant or waste. Note: does not apply to incidents confined within petroleum activities land (including air and water above or below) – see the EMP for the area of petroleum activities land	by telephone	Aas soon as practicable after (and in any case within 24 hours after) first becoming aware of the incident or the time he or she ought reasonably be expected to have become aware of the incident."	**NT EPA Pollution Hotline, 24 hour hotline** NT EPA Pollution Hotline: 1800 064 567 Pollution@nt.gov.au
Environmental Protection Biodiversity Conservation Act	Incidents considered to have an impact to Matters of National Environmental Significance	in writing	within 5 business days of becoming aware	Compliance@environment.gov.au
***Energy Pipelines Act 2015* and associated Regulations**	A reportable incident that involves: • Death or serious injury (or the potential to cause) • Significant damage to a pipeline (or potential to cause) • Immediate investigation	By telephone AND In writing	As soon as practicable As soon as practicable	1300 935 250 DPIR Petroleum.Operations@nt.gov.au
	A significant pipeline accident event that: • Is connected with work carried out on or in relation to a pipeline • Causes, or has the potential to cause human death	By telephone AND in writing	As soon as practicable As soon as practicable	1300 935 250 DPIR Petroleum.Operations@nt.gov.au
Environmental Assessment Act 2013 and associated Regulations	Alteration of action in such a manner that the environmental significance of the proposed action may be changed	in writing	As soon as practicable after the alteration	08 8924 4218 **NT EPA** ntepa@nt.gov.au
Bushfires Act 2016 and associated Regulations	Unable to control a fire on the land	All reasonable steps	Following the fact	08 8973 8871 or 08 8973 8872 or 08 8973 8870 **DENR** Note, also required to notify landholder
Heritage Act 2016 and associated Regulations	Discovery of archaeological places and objects	In writing	As soon as practicable (within 7 days of discovery)	08 8999 5039 **DTC - Heritage Branch** heritage@nt.gov.au

Integrated Gas Regulatory Incident Notification Guideline (NT regulatory notification matrix)				
Legislation	**Incident**	**Way report must be given**	**When report must be given**	**Contact Details**
Weeds Management Act 2013	(a) First becoming aware of a declared weed that has not previously been, or known to have been, present on the land.	Not specified	14 days of becoming aware	08 8999 4567 **DENR** weedinfo@nt.gov.au
***Dangerous Goods Act 2012* and associated Regulations**	Becoming aware of theft, loss of, or unauthorised interference with explosives.	Not specified	Immediately after becoming aware	08 8973 8000 Katherine Police
Internal Contacts				
The on call phone number is 0475 813 986 and is monitored 24/7 by the Integrated Gas Regulatory Compliance Team	integratedgascompliance@upstream.originenergy.com.au			
1. Work Health & Safety Incident Notification form	*http://www.worksafe.nt.gov.au/LawsAndCompliance/Pages/incident-reporting.aspx*			
2. Pollution Report Form	*https://ntepa.nt.gov.au/waste-pollution/hotline/pollution-report-form* *http://im.originenergy.com.au/otcs/cs.exe/properties/7486053*			
3. Aviation Accident or Incident Notification Form	*https://www.atsb.gov.au/mandatory/asair-form.aspx?*			

Appendix B Well Inspection and Monitoring Protocol

The flow chart below shows triggers and response protocols for wellhead Monitoring. Note red text link to Well Issue Observed in Field in body of the ERP.



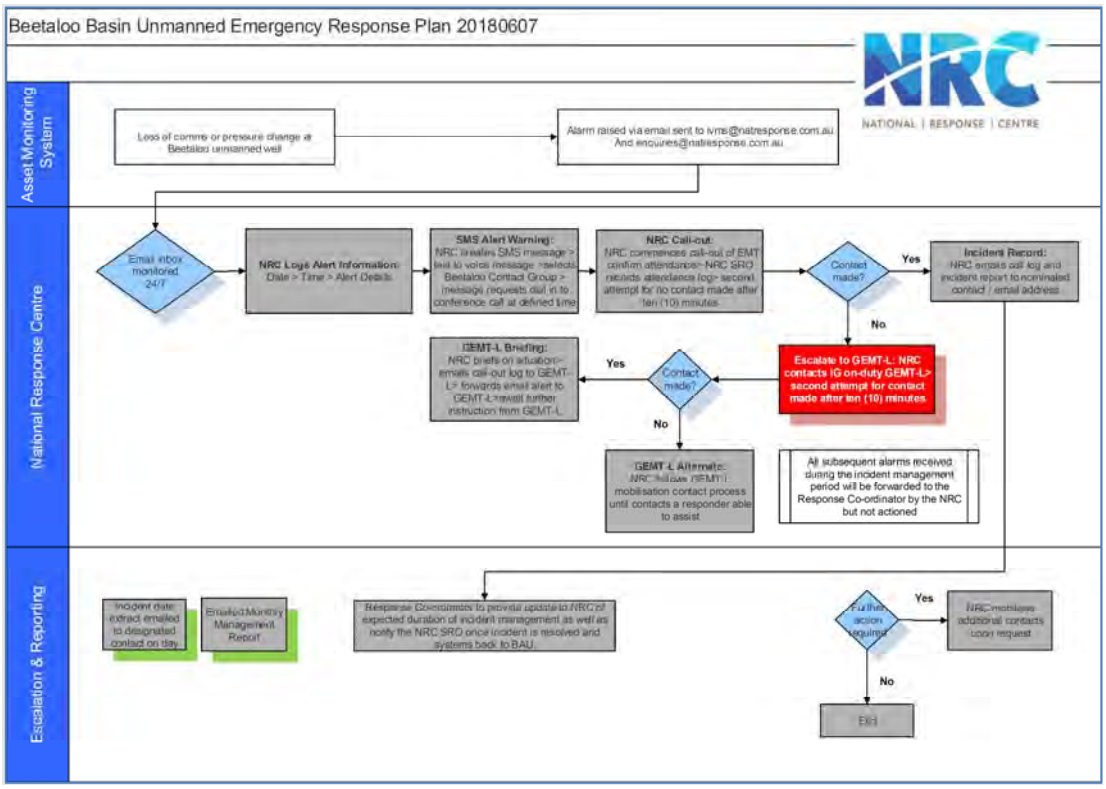
B.2. Well Pressure Remote Monitoring

The Amungee NW-1H well is suspended at surface for monitoring and recording of the reservoir pressure buildup. Real time pressure monitoring exists and a pressure anomaly or loss of communications to site will trigger an email alarm to a minimum of 7 people (listed below) and to a 24/7 monitored email at the Origin's National Response (NRC) centre. The NRC will send a further SMS and text to voice message to the notification list to alert the team of the alarm. The SMS will include time details to call into a conference call number at a set time (nominally 10 minutes time – but to be stated in the message). NRC will start the the conference call however if NRC was unable to contact any one on the list by phone before the call, and no one joins the conference call they escalate to GEMT.

The group on the conference call can then decide if the site requires inspection and agrees on the person (the nominated SERT-L) to deploy Triple P or other services to site. NRC will continue on the conference call maintaining notes of discussions. NRC will follow the below process flow when activated from an alarm.

Conference call number to be used.

1800 062 923
Host PIN 6700 4855 4873
Guest PIN 6700 4855 3024



Current list of people receiving notifications. All people on this list should have this list of people in their contacts to facilitate quick communications.

Role	Name	
Construction Supervisor – Growth Assets	Robert Wear	[redacted]
Operations / Project Manager – Growth Assets	Matthew Hanson	
General Manager – Growth Assets	Tracey Boyes	
D&C Project Manager – Growth Assets	Ed Wong	

Senior Petroleum Engineer – Growth Assets	Alex Cote	[redacted]
Senior Project Engineer	Mitch Roll	
HSE Lead – Growth Assets	Lucas Fulford	

If it is determined there is an unexplained pressure change in the well or unrecoverable communications issue then Triple P is deployed to site to assess the situation. The site person shall only deploy to site if it is possible to do so and travel in daylight hours. The requirement is to be at site within 6 hours. This in practice means that they should only be deployed to site if the event occurs before noon. If the event occurs after noon they should notified so as to be on site as early as possible the next morning. Triple P will follow the procedure detailed in the "Well Control" Section B3.

Once on site Triple P will use the satellite phone to call back the person that deployed them to report the situation on site and received further instructions. If the information received from Triple P is that the situation on site is not normal then this triggers an emergency event and Triple P becomes the On Scene Command (OSC) and the Project Manager (or the senior person in the group which has responded to the alarm) will be the SERT-L and notifies the Group Manager Growth Assets (Tracey Boyes 0475949668). Other key stakeholders, specifically Stepanie Stonier (0475940931) and any of the alarm monitoring team not already invovled, should then be notified as soon as possilble.

- Triple P
  - Gordon Jackson
  - Susey Jackson
  - Sat Phone
  - Email

[redacted]

Well control incidents may require the mobilisation of specialised response contractors.

B.3. Well Control (unmanned)

In the event of an uncontrolled release from a wellhead (being observed in the field):

- Move out of harm's way. Find safe upwind location.

  Considerations:

  - Determine wind direction.
  - Always pay attention to Fire, fumes, electrical, ignition and Health Risks.
  - What is the type of Leak and source?
  - Consider shutdown of all potential ignition sources.
  - Monitor bleed down of leak and keep all non-essential personnel and ignition sources away from the hazardous area. (secure location)
- Alert others near-by
- Assess the situation – determine the level of the immediate threat.

If a report is received from any source (for instance tourists travelling along highway see the well on fire) that an incident has occurred then the response for a pressure change in the well, exaclation is to be immediately initiated.

If the responding group are reasonably certain that loss of containment has occurred then Triple P should be sent to site to secure access from the highway and confirm the situation on site and escalation through GM Growth Assets to GEMT should occur with the recommendation to notify Well Control Services to prepare to deploy, or deploy if the report is very credible. If there is a high level of doubt about the information, Triple P contracting should be deployed to obtained reliable information from site.

Note: After consultation with the Project Manager and/or Well Integrity team representative - and you if are competent, confident – and i**f it is safe** to do so; **contain the incident** by shutting in the well – if flow is through wellbore; then activation of the self actuation UMV may be appropriate; of if escape is evident to be from an annular space, it may be possible to isolate via a manually operated valve.

Well control incidents may require the mobilisaiton of specialised response contractors.

Please refer to Appendix B for Well Inspection and alarm flow chart or NT-2050-35-MN-0001 Amungee NW-1H Remote Pressure Monitoring trouble shooting manual for well integrity monitoring and data transmission details.

B.4. Well Control Incident Classification

In the event that a Well Control Incident exceeds level 1 and 2, the site supervisor will activate the SEMT who in turns, notifies the GEMT-L and the involvement of a contracted third party specialist to handle the well control integrity event.

The Well Control specific incident response plan is detailed within Appendix G.

The Table below explains the different levels of well control.

Level 1 **(an uncomplicated kick or a low risk production / well integrity event)**	**Level 2** **(a kick with some complications or a low - moderate risk well integrity event)**	**Level 3** **(complete loss of well control or a moderate - high risk well integrity event)**
Generally, these are events that commonly occur during drilling and workover operations. Additionally covers low risk well integrity events during the production phase. Emergency interfacing is limited due to pressure and flow containment. Personnel and equipment are not threatened, and there are no injuries or fire involved. Thus, the situation can be handled using resources and procedures available on-site (or readily mobilisable in the case of a well integrity event). The situation is managed immediately by the Driller who will keep the rig manager informed of the situation. Caution: Level 1 incidents can escalate quickly to a more serious and threatening level if not handled properly.	A Level 2 event can be defined as an abnormal well control event during drilling and workover operations involving some sort of complication in which: • Well control has NOT been lost at the surface • Resources beyond the normal capabilities of the rig crew or production operations staff may be required • Outside well control consultation, materials, equipment or personnel may be required Includes low - moderate risk production events (e.g. noticeable leak or significant annular pressure). There are no injuries or fires associated with this incident level since control has not been totally lost. The situation is typically managed by the Rig with the OSC liaising. The SEMT is on Standby but not activated. The incident is generally not sufficiently threatening to activate the GEMT to deal with the situation.	A Level 3 emergency denotes a complete loss of well control at surface during drilling and workover operations with no opportunity to restore it using all the resources available on-site. Includes moderate – high risk well integrity events during the production phase. Level 3 Incidents require the SEMT to activate including notification to the GEMT to effectively deal with the situation. External Well Control support (i.e. Boots & Coots, Wild Well Control, Cudd, etc.) must be activated upon confirming that the well is out of control at surface and measures must be immediately taken to protect people, the environment and material assets. These emergencies, although serious at the outset, have the potential to escalate further during control attempts. Such escalation may cause serious structural damage or total loss of the facility, rig, BOP stack and wellhead due to explosion, fire, loss of buoyancy or location subsidence and could affect nearby wells & infrastructure.

Appendix C Site Specific Information

C.1. Location data – Existing Exploration Wells

Permit Area(s)	EP98, EP117
Well name	Kalala South - 1
Well location (Lat/Long)	16° 17' 37.7" S / 133° 36' 44.3" E
Nearest Town	Daly Waters
Nearest Major Road	Carpentaria Highway
Nearest Airports	Daly Waters: 25 min/25km Elliot: 2hrs / 165 km
Nearest Hospital	Katherine Hospital 3hrs drive
Well name	Beetaloo West-1
Well location (Lat/Long)	17° 7'13.82"S / 133°45'43.63"E
Nearest Town	Elliot
Nearest Major Road	Stuart Highway
Nearest Airport	Daly Waters: 1.5hrs/100km Elliot: 1.75hrs,110km
Nearest Hospital	Katherine Hospital: 4hrs drive
Well name	Amungee North West-1H (Velkerri 98 N1 - same location)
Well location (Lat/Long)	16°20'51.034"S / 133°53'4.403"E
Nearest Town	Daly Waters
Nearest Major Road	Carptentaria Highway
Nearest Airport	Daly Waters: 1hr /61km Elliot 2.5hrs /202km
Nearest Hospital	Katherine Hospital: 3.5hrs drive

C.2. Location data – Proposed Exploration Wells

Permit Area(s)	EP76, EP98
Well name	Kyalla 117 N2
Well location (Lat/Long)	16°50' 29.01"S; 133°39' 0.16"E
Nearest Town	Daly Waters
Nearest Major Road	Stuart Highway
Nearest Airports	Daly Waters: 1hr /92 km Elliot: 1.5hrs /117 km
Nearest Hospital	Katherine Hospital: 4.5hrs drive
Well name	Velkerri 76 S2
Well location (Lat/Long)	16°51' 20.13"S; 134°23' 39.85"E
Nearest Town	Daly Waters
Nearest Major Road	Stuart Highway
Nearest Airport	Daly Waters: 2.5 hr /190 km

	Elliot: 3.0 hrs /198 km
Nearest Hospital	Katherine Hospital: 5.5 hrs drive

C.3. Location data – Waterbore locations

Permit Area(s)	EP76, EP98 and EP117
Water Bore Lease	**Velkerri 98 E1-1**
Well location (Lat/Long)	16°27' 14.28"S; 134°12' 30.84"E
Nearest Town	Daly Waters
Nearest Major Road	Carpentaria Highway
Nearest Airports	Daly Waters: 2 hrs /70km Elliot: 3hrs / 250 km
Nearest Hospital	Katherine Hospital 5 hrs drive
Water Bore Lease	**Kyalla 98 W1-1**
Well location (Lat/Long)	16°28' 50.85"S; 133°44' 5.33"E
Nearest Town	Daly Waters
Nearest Major Road	Carpentaria Highway
Nearest Airport	Daly Waters: ~2.5 hrs /95km Elliot: 4hrs / 250 km
Nearest Hospital	Katherine Hospital 6 hrs drive
Water Bore Lease	**Velkerri 76 S1-1**
Well location (Lat/Long)	17°3' 48.91"S; 134°17' 21.05"E
Nearest Town	Daly Waters
Nearest Major Road	Stuart Highway
Nearest Airport	Daly Waters: 2.5 hr /183 km Elliot: 3.0 hrs /198 km
Nearest Hospital	Katherine Hospital: 5.5 hrs drive
Water Bore Lease	**Velkerri 76 S2-1**
Well location (Lat/Long)	16°51' 20.13"S; 134°23' 39.85"E
Nearest Town	Daly Waters
Nearest Major Road	Stuart Highway
Nearest Airport	Daly Waters: 2.5 hr /190 km Elliot: 3.0 hrs /198 km
Nearest Hospital	Katherine Hospital: 5.5 hrs drive
Water Bore Lease	**Velkerri 117 E1-1**
Well location (Lat/Long)	16°59' 45.09"S; 134°19' 54.12"E
Nearest Town	Daly Waters
Nearest Major Road	Stuart Highway
Nearest Airport	Daly Waters: 2.0 hrs /175 km Elliot: 2.5hrs /190km
Nearest Hospital	Katherine Hospital: 5.5hrs drive

Water Bore Lease	Kyalla 117 N2-1
Well location (Lat/Long)	16°50' 29.01”S; 133°39' 0.16”E
Nearest Town	Daly Waters
Nearest Major Road	Stuart Highway
Nearest Airport	Daly Waters: 1hr /92 km Elliot: 1.5hrs /117 km
Nearest Hospital	Katherine Hospital: 4.5hrs drive
Water Bore Lease	**Kyalla 117 W1-2**
Well location (Lat/Long)	17°7' 13.74”S; 133°45' 35.75”E
Nearest Town	Daly Waters
Nearest Major Road	Stuart Highway
Nearest Airport	Daly Waters: 1.5hr /91 km Elliot: 1.5 hrs /83 km
Nearest Hospital	Katherine Hospital: 4 hrs drive
Water Bore Lease	**Kyalla 117 W2-1**
Well location (Lat/Long)	17°6' 7.10”S; 133°40' 6.06”E
Nearest Town	Daly Waters
Nearest Major Road	Stuart Highway
Nearest Airport	Daly Waters: 2 hr /98 km Elliot: 1.5hrs /76 km
Nearest Hospital	Katherine Hospital: 4.5hrs drive

C.4. Campaign specific information

Exploration campaigns have the following specific information, this information is approximate only and should be utilised to provide guidance on approximate personnel data per exploration campaign activity:

C.4.1 Civil activity

Civil	Various Civil contruction activities (Road/track upgrades, lease builds)
Average Personnel #	1-20
Fuel Capacity	Dual walled, self bunded diesel 26.4m3 tank

C.4.2 Drilling activity

Rig	Rig to be contracted for each campaign
Average Personnel #	8-14
Fuel Capacity	Dual walled, self bunded diesel 26.4m3 tank

C.4.3 Hydraulic Fracture Stimulation spread (Fracspread)

Rig name	Fracspread
Average Personnel #	40-60
Fuel Capacity	Dual walled, self bunded diesel 26.4m3 tank

C.4.4 Completion activity specific data

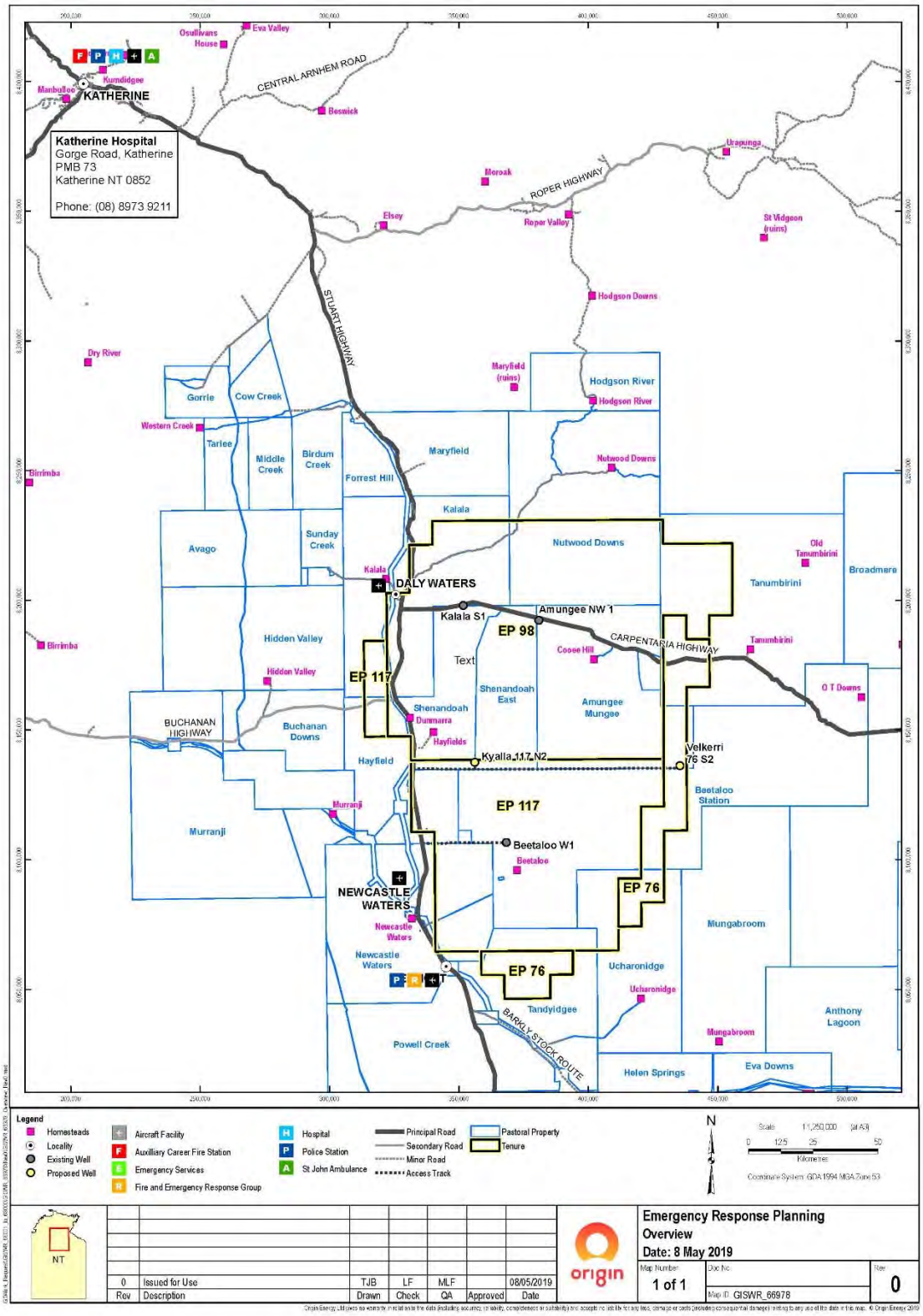
Rig name	Rig to be contracted for each campaign
Average Personnel #	8-12
Fuel Capacity	Dual walled, self bunded diesel 26.4m3 tank

C.4.5 Well Testing spread specific data

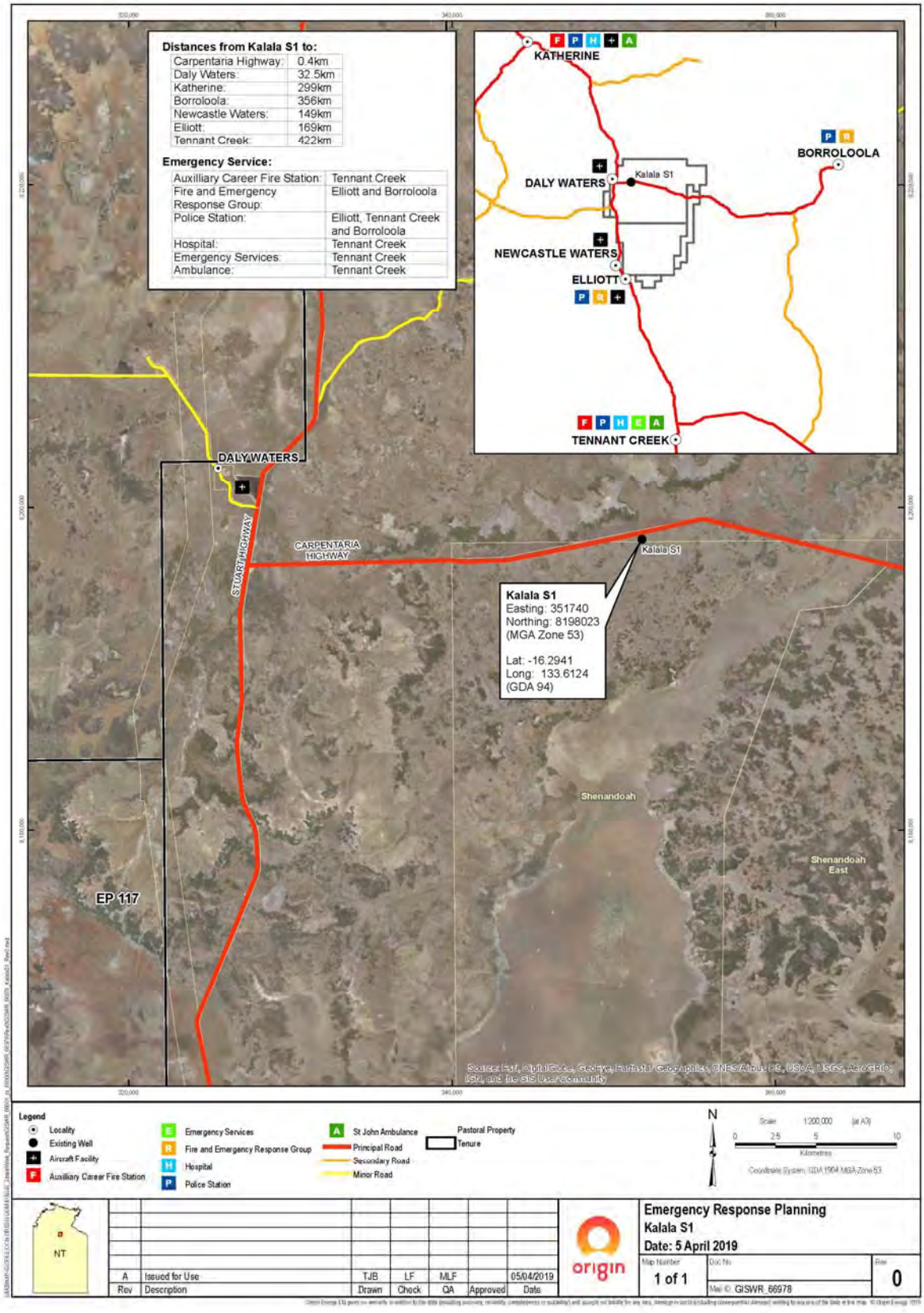
Rig name	Extended Production Test – EPT (Well Test)
Average Personnel #	2-6
Fuel Capacity	Dual walled, self bunded diesel 26.4m3 tank

C.5. Emergency Response Locality maps

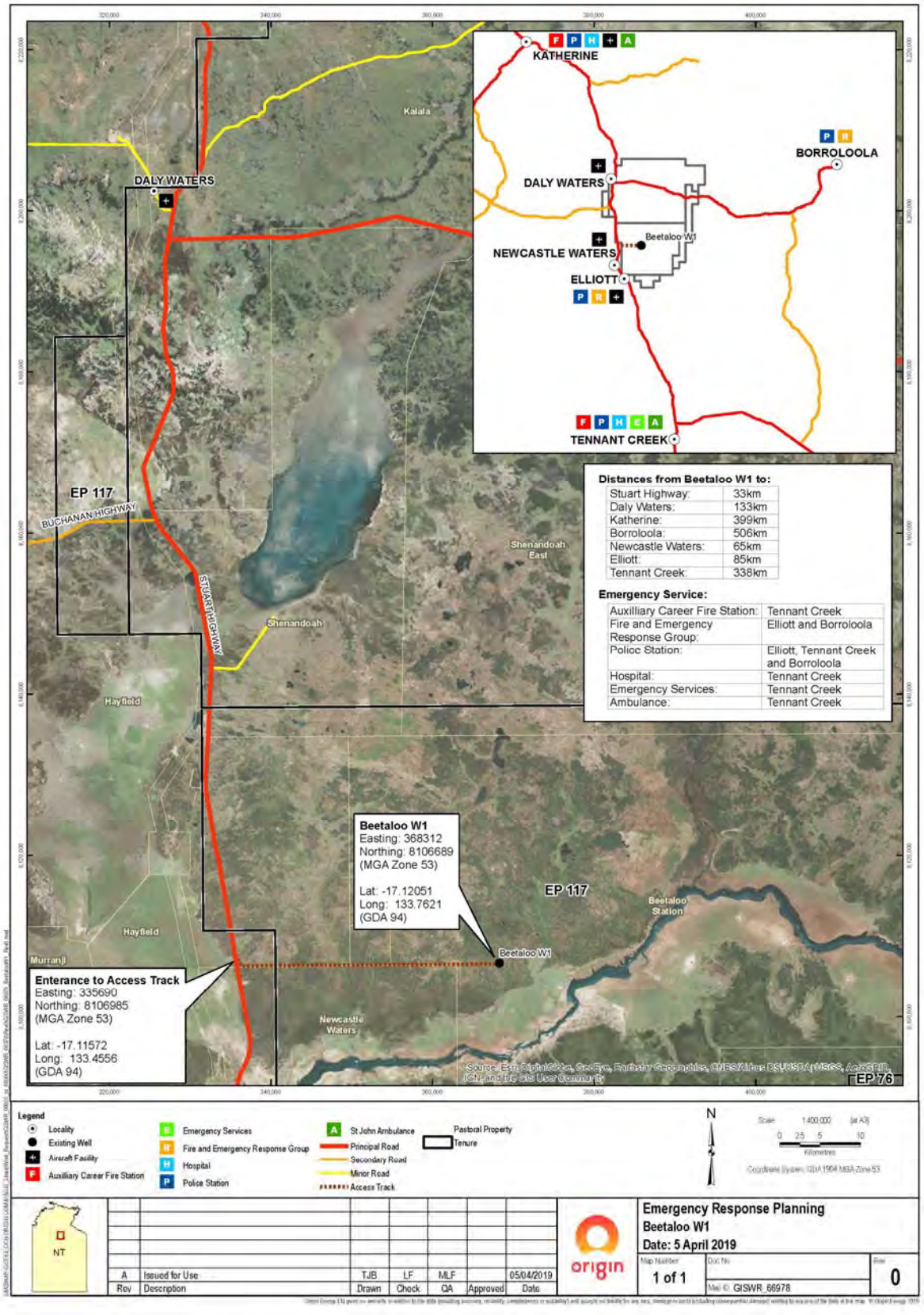
Overview maps for all existing Petroleum Wells



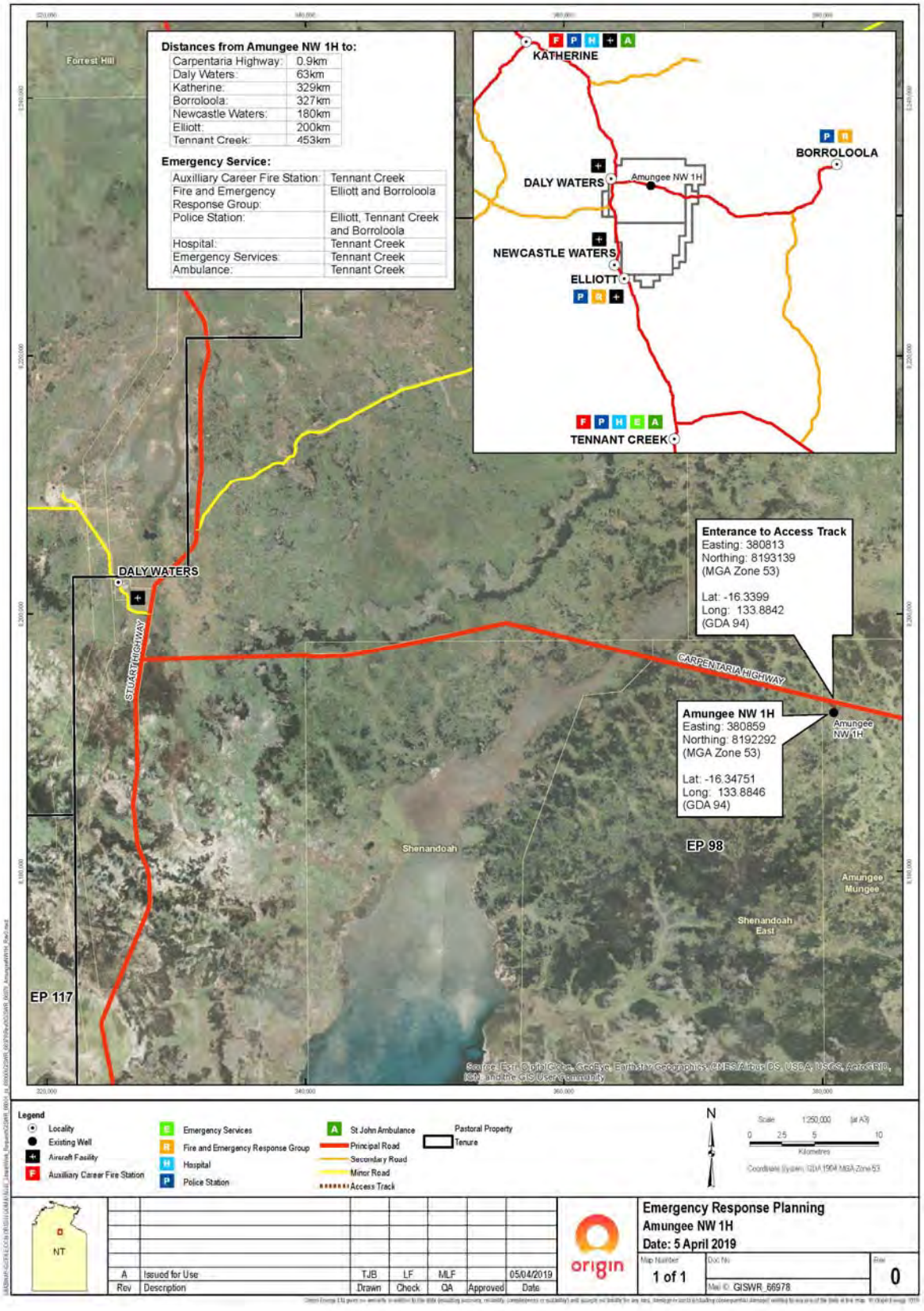
C.5.1 Kalala S1



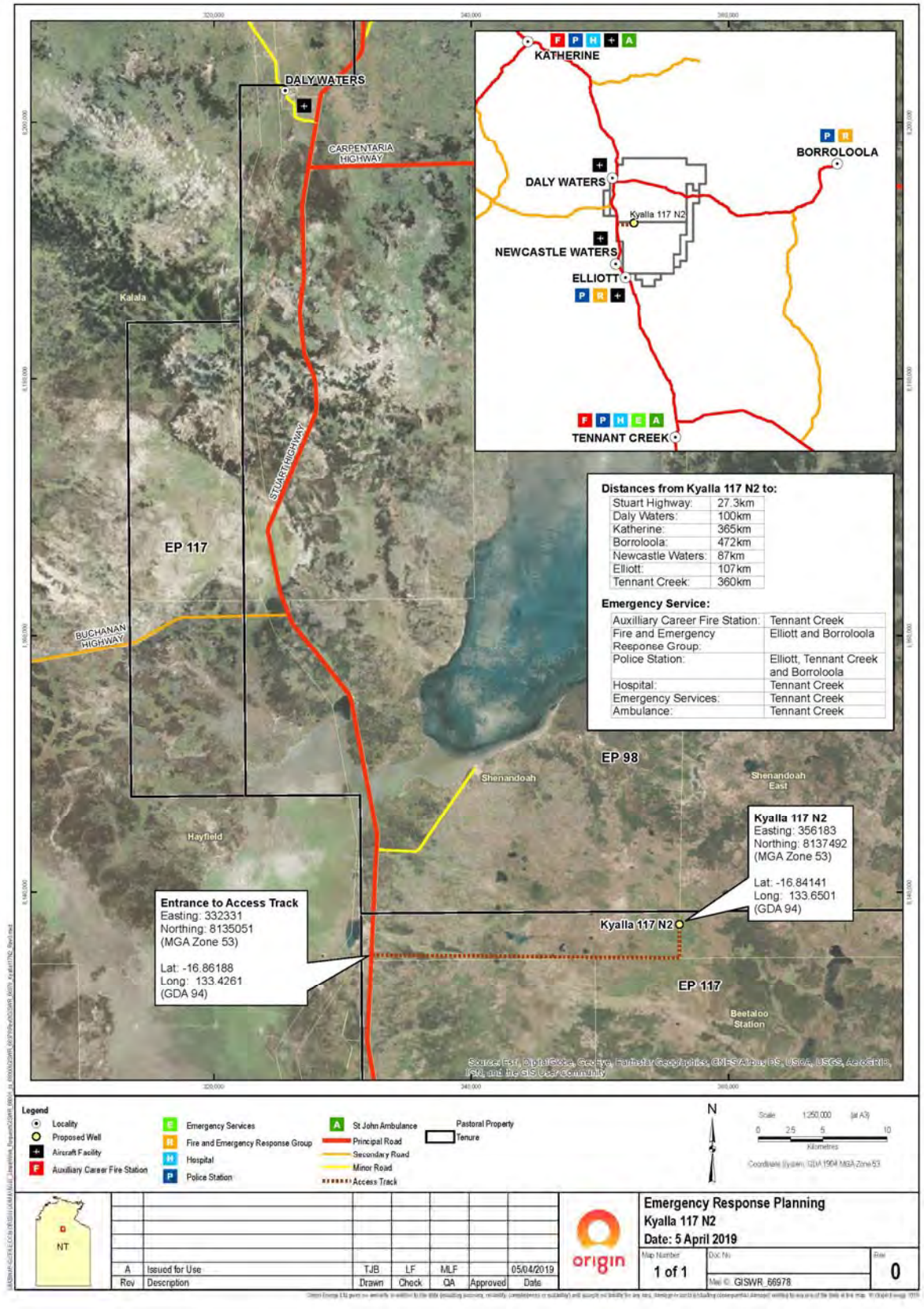
C.5.2 Beetaloo W1



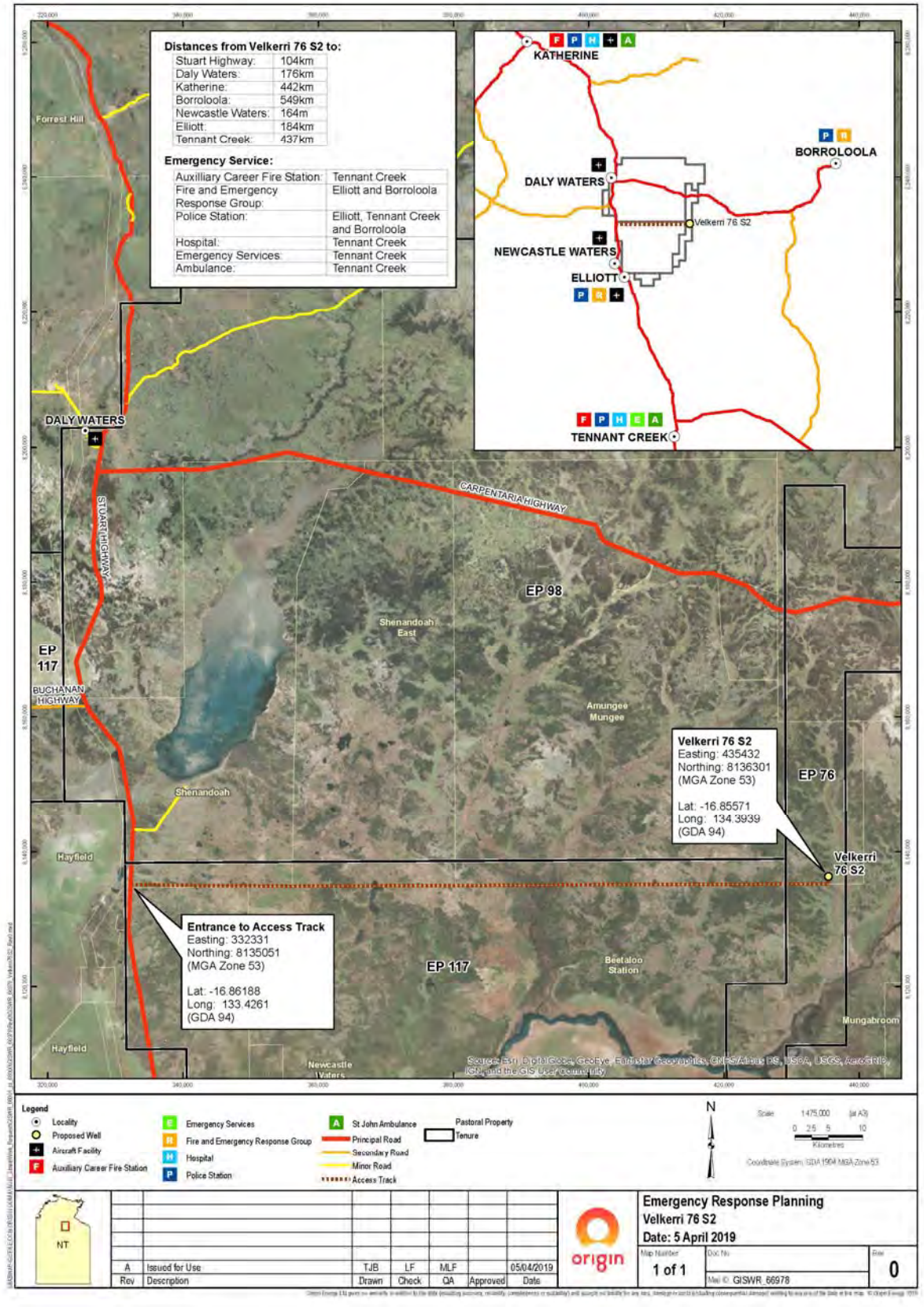
C.5.3 Amungee NW 1H



C.5.4 Kyalla 117 N2



C.5.5 Velkerri 76 S2



Appendix D Definitions

Term	Definition
CMP / T	Crisis Management Plan / Team
DPIR	Department of Primary Industry and Resources
DENR	Department of Environment and Natural Resources
EPA	Environmental Protection Agency
SEMT	Site Emergency Management Team
ER/P/T	Emergency Response / Plan / Team
GEMP/T	Group Emergency Management Plan / Team
GEMT-L	Group Emergency Management Team Leader
SEMT-L	Site Emergency Management Team – Leader
OE BU	Origin Energy Business Unit
DA	Development Area
D&C	Drilling and Completions
ECR	Emergency Control Room
ER&S	Emergency Response and Security, Senior Advisor
PC ERT	Primary Contractor Emergency Response Team
PC IMT	Primary Contractor Incident Management Team
FR	First Responder
OE	Origin Energy
OSC	On scene Commander
PC	Primary Contractor

Appendix E Emergency Services Manifest

To be completed within 2 weeks of occupation of Site.

Screen shot of example: Emergency Services Manifest Template.

origin

Integrated Gas
Emergency Services Manifest
Insert Site Name
Decommissioning e.g. QLD 1000 SAF REG

Purpose	A manifest of notifiable quantities of hazardous substances held at this site facility under section 347 of *'Work Health & Safety Regulation 2011, Queensland'*
Reference	Hazardous Materials Management - LNG Division - 3676149 Risk Management Directive - ORG-RISK-DVE-001
Records	Hard copy to be housed in the locked 'Hazmat' Red box located at the front of the site facility and electronic copy to be available on the Sharepoint H&S team site for monitoring of updates and future audit purposes.

Section 1 - General Site Information

Occupier of Facility: Origin Energy Pty Ltd
Site Address: <insert address>
<insert address>
<insert address>

Section 2 - Emergency Contacts

Name	Position	Contact Details			
		Business Hours	Mobile	UHF Radio	After Hours
Upstream Emergency Phone Number (24/7 After Hours) 1800 076 251					

Section 3 - Bulk Storage Locations

Note: Bulk storage includes vessels with a capacity of >500L. Gas tank capacity must be in Water Capacity (L), not gas capacity (m^3).

Location / Equipment ID Number	Type	Capacity	Tank Diameter (Flammable liquids only)	Correct Shipping Name	UN Number	DG Class	Quantity
e.g T3600-001	*Aboveground tank*	*20,000L*		*Petroleum distillates N.O.S*	*1268*	*3*	*20,000L*

Section 4 - Package and IBC Storage Locations

Note: Packages include containers with a capacity of <500L or IBCs of 1,000L capacity. Cylinder quantities must be in Water Capacity (L), not gas capacity (m^3).

Storage Location	Correct Shipping Name	Package type	UN no.	Class	Max. Qty
e.g. Warehouse	*Hydrochloric Acid*	*Drum*	*1789*	*8*	*3,000L*

Appendix F Site Specific Emergency Response Equipment

To be developed within 2 weeks of site occupation to display the following areas:

- Person in Charge (PIC)
- Muster Areas
- First Aid Treatment Areas
- First Aid Kit locations
- Fixed Fire Extinguishers and Blankets
- Evacuation Routes
- Helicopter Landing Sites
- Emergency Services Meeting Points
- Hazardous / Restricted Areas
- Emergency event PPE Locations
- Spill Kit

Northern Territory – Daly Waters

- Daly Waters Airport

Appendix G Emergency Response Flipcharts

The following scenario responses have been reproduced from the Origin Incident Response Procedures CDN 3676134

Appendix G1 – Bushfire

Appendix G2 – Flood

Appendix G3 – Spill

Appendix G4 – Loss of Containment

G.1. Bushfire

Bushfire

Considerations

1. Is there a need to activate the Emergency Response Team (ERT).
2. Is there adequate fire fighting capability?
3. Is there an adequate water source available?
4. Bushfire - Is based on a region wide fire event where access roads will directly affect evacuation. Refer to Bush Fire Preparedness Tool for response actions, web links (i.e. BOM) and evacuation considerations.

First Responders

1. Raise the Alarm?
2. If there is a casualty provide First Aid (DRSABCD). Continue until either physically unable to do so, relieved or the patient is pronounced deceased by a doctor or paramedic.
3. Refer to the Bush Fire Preparedness Tool.
4. Be vigilant. Watch for flying embers and small fires starting on site.

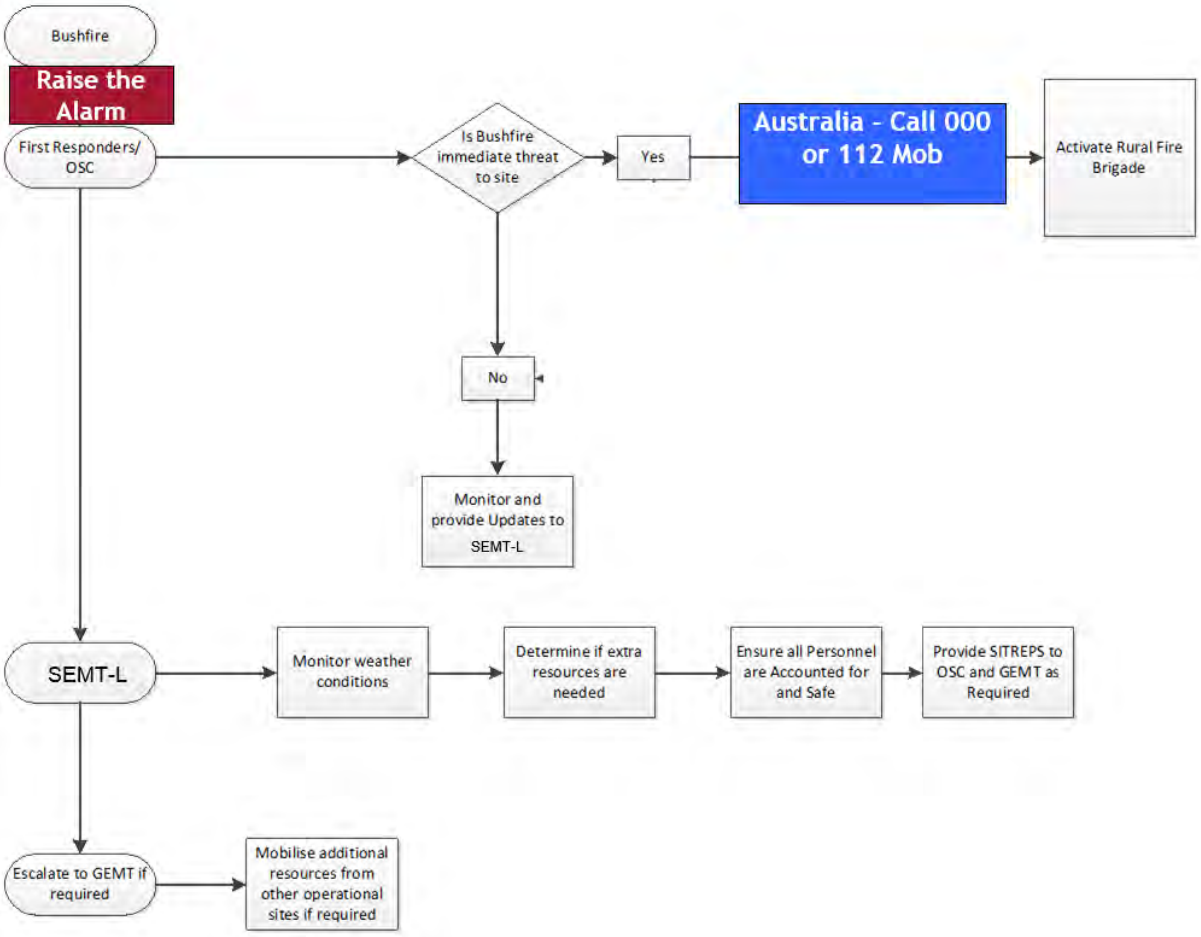
On Scene Commander (OSC)

1. Mitigate Hazards to ensure personnel safety.
2. Contact the Site Emergency Management Team Leader (SEMT-L).
3. Activate Emergency Response Team (ERT) response.
4. Muster personnel and evacuate as required.
5. Contact Emergency Services if required.
6. Prepare for the arrival and briefing of Emergency Services.

Site Emergency Management Team Leader (SEMT-L)

1. Notify Origin Site Representative of emergency in the region.
2. Australia - Call 000 or 112 Mob or Fire Agencies (if available).
3. Identify available fire fighting assets (aerial, ground, mutual aid).
4. Conduct planning for evacuation and determine triggers.
5. Coordinate whole of site actions.
    1. Give preparatory orders for securing the site against the bushfire.
    2. Isolate hazardous energy and make equipment safe.
    3. Provide support to the OSC.
    4. Coordinate Emergency Services.
    5. Ensure isolation of hazardous energy and make safe (e.g. Central Control Room).
    6. Consider mobilization of Civil Maintenance to assist with fire break preparation, asset protection/earthen barriers.
6. Notify Group Emergency Management Team Leader (GEMT-L)?
7. Confirm incident terminated – use Incident Termination Checklist
8. Confirm incident investigation and gathering of facts initiated
9. Mobilise counselling services and support by the Employer Assistance Program (EAP) if required.
10. Don't return to work until all facilities and damage have been declared as safe.

Bushfire


Bushfire
Raise the Alarm
First Responders/ OSC
Is Bushfire immediate threat to site
Yes
Australia - Call 000 or 112 Mob
Activate Rural Fire Brigade
No
Monitor and provide Updates to SEMT-L
SEMT-L
Monitor weather conditions
Determine if extra resources are needed
Ensure all Personnel are Accounted for and Safe
Provide SITREPS to OSC and GEMT as Required
Escalate to GEMT if required
Mobilise additional resources from other operational sites if required

G.2. Flood

Flood

Notification

Level 1
- Once a creek starts to flow over any of the access roads.

Level 2 (Consider Evacuation)
- Creek level reaches 100mm for unsealed roads, or
- Creek level reaches 200mm for sealed roads.

Level 3 (Consider Evacuation and/or Demobilising)
- Creek level reaches 300mm for unsealed roads, or
- Creek level reaches 400mm for sealed roads.
- Consider duration of weather event and prolonged effects on site.

Considerations

Level 1
- Commence prep of site for shut down and evacuation.
- Secure chemicals and toxins.
- Check supplies of food and water.

Level 2
- Non-essential personnel evacuated.
- Track personnel movements and account for all staff at all times.
- Prepare to secure / isolate infrastructure.
- Maintain communications at all times.
- Ensure sufficient food and water available on site if personnel are stranded.

Level 3
- Shut down, secure and evacuate.
- Track personnel movements and account for all staff at all times.

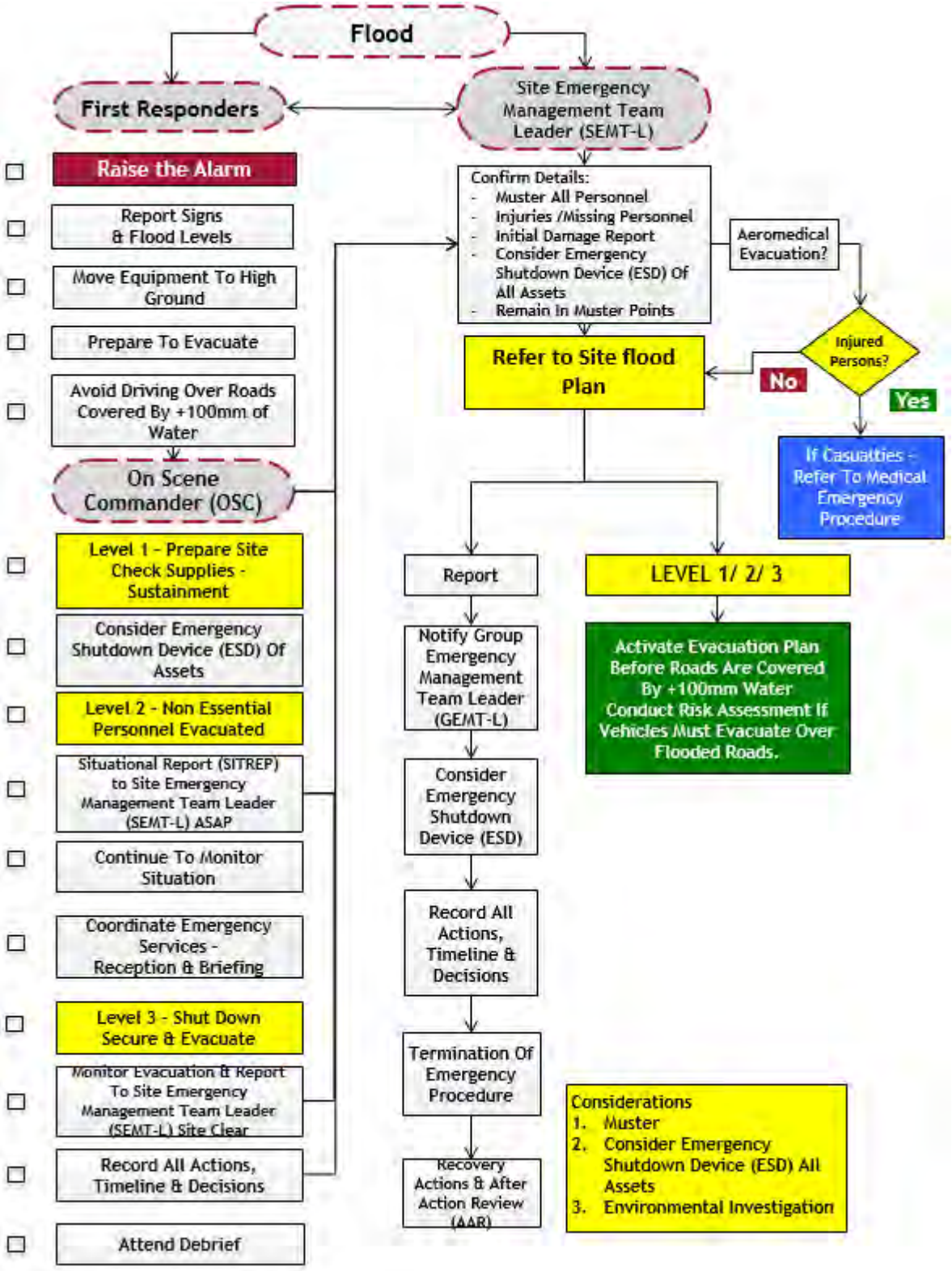
Don't put yourself at risk.

AVOID DRIVING OVER ROADS THAT HAVE MORE THAN 100mm OF WATER OVER THEM.

Driving over flooded roads in an emergency must be risk assessed by the Site Emergency Management Team Leader (SEMT-L).

Prior to Flood Waters Reaching Site:

1. Refer to these tools to identify assets and roads that will flood to certain levels:
   a. Flood Plan,
   b. Flood Mapping, and
   c. Hazard visualiser.
2. Closely monitor weather reports and flood predictions from the Bureau Of Meteorology (BOM).
3. Confirm triggers, evacuation plans and routes. What preparatory actions are required at site? Construction of protective banks takes time and may require additional equipment (plant) to be transported and deployed.
4. Whenever possible, mitigate environmental damage by undertaking appropriate action.
5. Evacuate mobile worksites as early as practicable?.



G.3. Spill

Spill

Considerations

1. Activate the Emergency Response Team (ERT).
2. A pollutant spill may be on permeable ground and encompass a wide array of substances, some of which will be toxic and very harmful to the environment.

First Responder

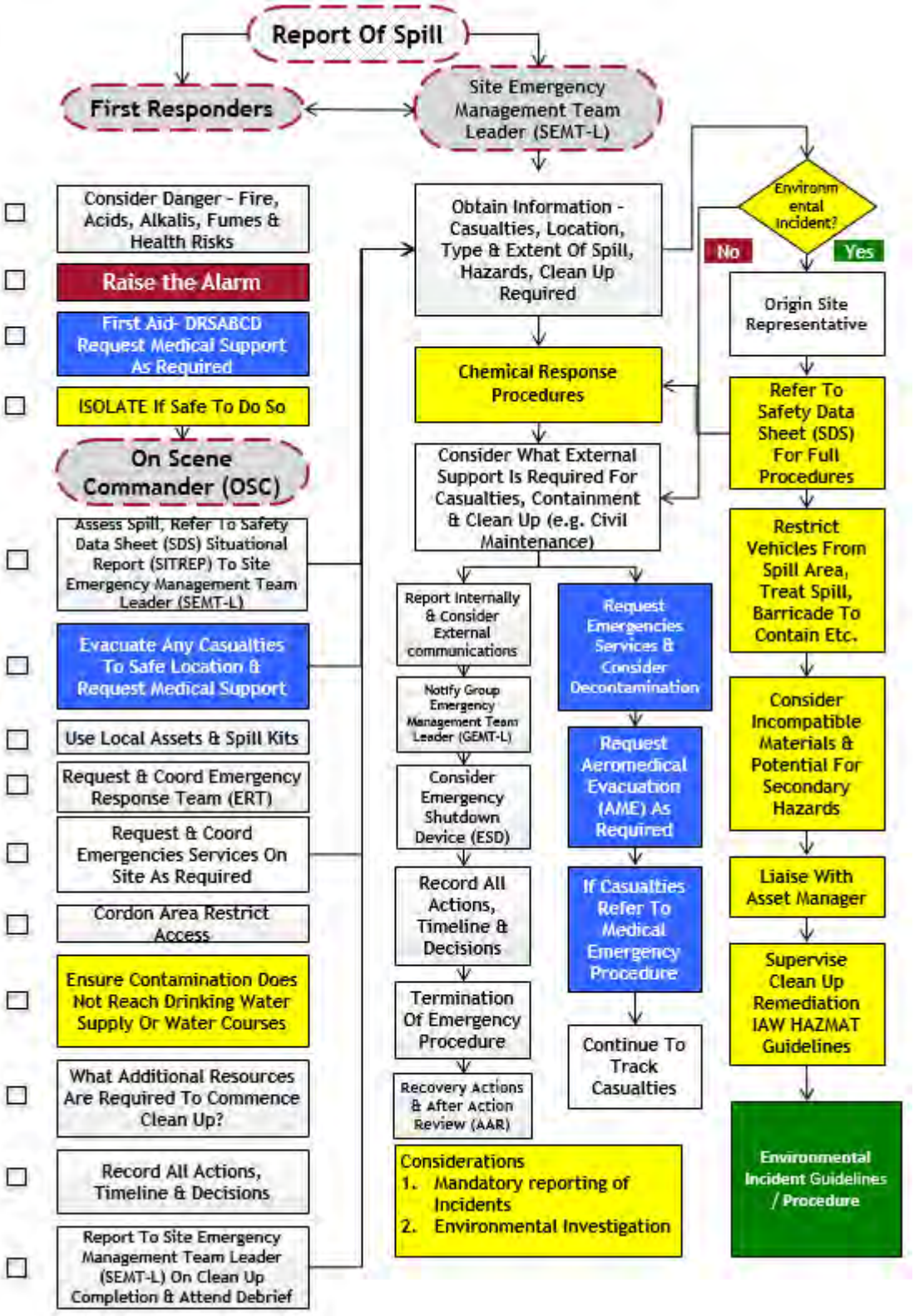
1. Raise the Alarm?
2. Is there a need to activate the Emergency Response Team (ERT)?
3. Always pay attention to fire, fumes, electrical, ignition and other health risks.
4. Activate containment operations immediately to prevent spill from reaching a surface watercourse or ground water.
5. Do not flush the spill down clean drains or other inlets.

On Scene Commander (OSC)

1. Mitigate Hazards to ensure personnel safety.
2. Consider the effects of toxic spills – refer to Safety Data Sheets (SDS).
3. Use appropriate spill kits.
4. Consider type of spill, type of ground and what is the most effective method of containing with the minimum impact on personnel and the environment.
5. Consider how to prevent entry to area and spread of contamination.
6. Engage the Origin Site Representative to help assess the impact and determine appropriate actions for complex or remote incidents.
7. Some chemicals are incompatible and have the potential to increase or alter the hazard – refer to the Chemical Compatibility Chart in the Hazmat section of the site Emergency Response Plan (ERP).
8. For Water Treatment Facilities only - Disposal of diluted material to the ponds is permissible in an emergency but must be approved by the Water Treatment Facility (WTF) Supervisor.

Site Emergency Management Team Leader (SEMT-L)

1. Consider use of Civil Maintenance team for installation of earthen bunds / diversion systems.
2. Consider early engagement with the Origin Site Representative and external agencies through Compliance Team.
3. Consider nature of spill and any decontamination requirements to personnel and or equipment.
4. Consider any logistics that will be required for rapid clean up and /or remediation.
5. Consider advising local land owners and councils as appropriate.
6. Ensure all spills are managed and that environmental impacts are reported correctly within mandated time frames.
7. Consider future prevention measures and better clean up practices.



G.4. Loss of Well Control

Loss of Well Control

Considerations

1. Activate the Emergency Response Team (ERT).
2. Determine wind direction.
3. Determine leak location; subsurface and and type.
4. Well Control Contractor requirement.
5. Consider Emergency Shutdown Device (ESD) (e.g. Central Control Room (CCR)).

First Responder

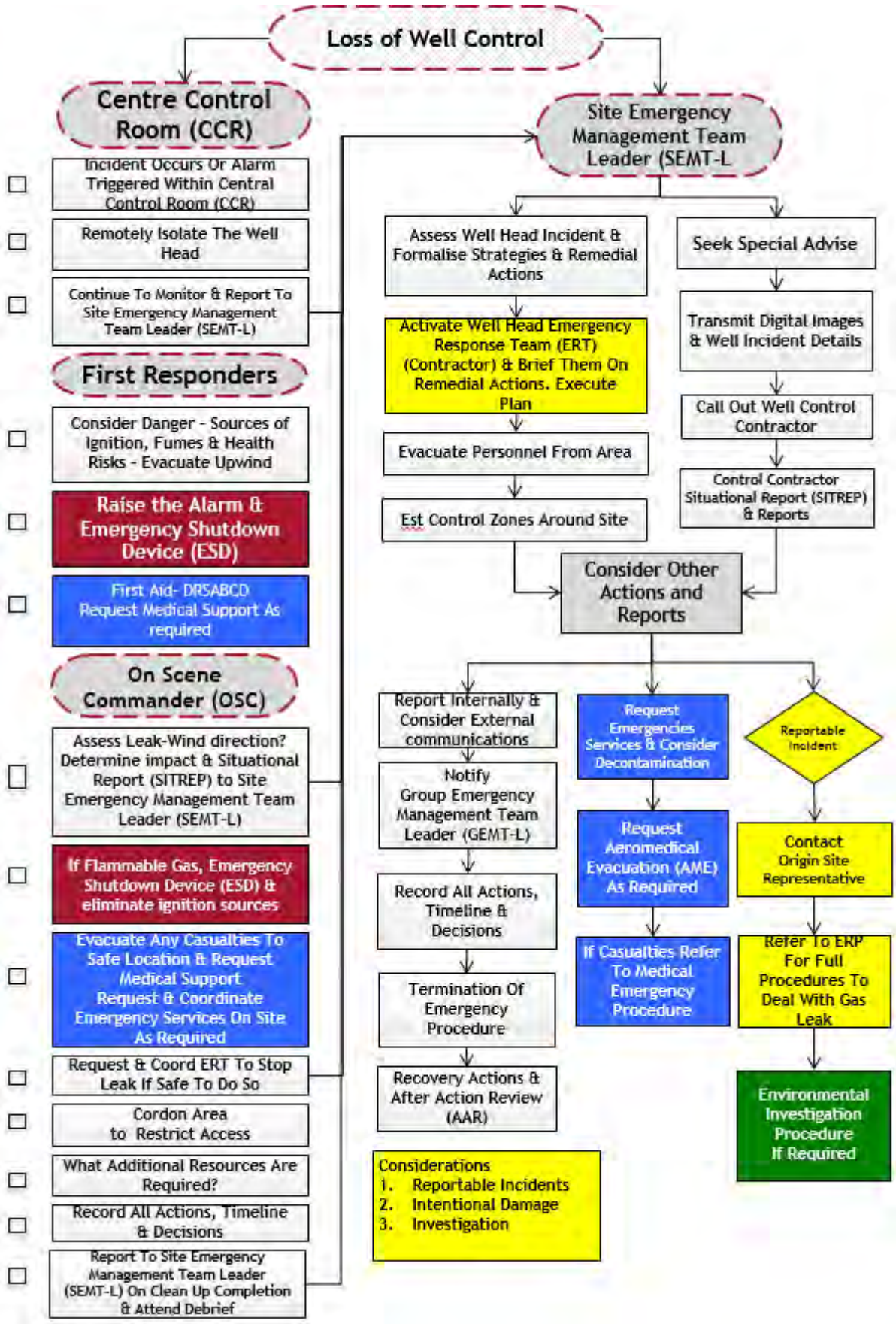
1. Raise the Alarm?
2. Always pay attention to Fire, fumes, electrical, ignition and Health Risks.
3. Muster and evacuate.
4. Secure the scene / Cordon off area.
5. Provide full details to On Scene Commander (OSC) and Site Emergency Management Team Leader (SEMT-L) – particularly:
   - Where is it originating from?; and
   - What is the wind direction?
5. Consider ignition sources as vapour could be flammable.

On Scene Commander (OSC)

1. Mitigate Hazards to ensure personnel safety.
2. What is the type of Leak and source? What is the wind direction?
3. Shutdown all potential ignition sources (liaise with Central Control Room (CCR)).
4. Monitor bleed down of leak and keep all non-essential personnel and ignition sources away from the hazardous area.
5. Make a decision whether a full site evacuation is required.

Site Emergency Management Team Leader (SEMT-L)

1. Consider environmental impacts and reporting requirements.
2. Consider early engagement with the Origin Site Representative.
3. Activate and monitor Well Control Contractor deployment and progress.
4. Consider nature of incident and method of repair and recovery to personnel and or equipment.
5. Consider any logistics that will be required for rapid clean up and or remediation.



Appendix H Camp Isolation Checklist

Screen shot of Camp Isolation Readiness Checklist. For original version go to: [the IG ER&S Flood Source Page]

Purpose	This checklist to be used to verify sustainability of camps in preparation for emergency events such as floods.
Reference	Area Flood Preparedness and Response Plans - http://source.originenergy.com.au/Business/lng/safety/emergency/Pages/FloodMgmt.aspx
Records	This checklist will be completed in October each year in preparation for the flood season. Additional requirements for completion will include forecasted severe storm or flood conditions.
Notes for use:	1. To be completed by the Camp Manager. 2. Additional sections critical supply items can be added in Sections 3 & 4 as required.

Date Checklist Completed	Click here to enter a date.	Prepared by	
Camp Name			
Location			
Type of Access	e.g. Dirt/Sealed Road Access or Single Point of access		
Camp Size	e.g. No of beds at full capacity		
Planning Assumptions	e.g. No of beds as the basis for determining supply/sustainment levels		
Camp Fire Fighting System	Choose an item.		

Section 1 - Food

Non Perishable		Perishables	
Current Holdings	Choose an item.	Current Holdings	Choose an item.
Frequency of Delivery	e.g. Twice Weekly - Mon & Thu	Frequency of Delivery	

Section 2 - Water & Waste Water

Water	Days' Supply	Storage Capacity	Current Holdings	Frequency of Delivery
		e.g. 90,000 Lt	Choose an item.	e.g. 2 Weekly - Mon/Thu
Waste Water	Days' Supply	Storage Capacity	Current Holdings	Frequency of Delivery
			Choose an item.	

Section 3 - Fuels & Chemicals

Diesel	Days' Supply	Storage Capacity	Current Holdings	Frequency of Delivery
			Choose an item.	
Other...	Days' Supply	Storage Capacity	Current Holdings	Frequency of Delivery
			Choose an item.	

Section 4 - Other

Linen	Days' Supply	Storage Capacity	Current Holdings	Frequency of Delivery
			Choose an item.	
Other...	Days' Supply	Storage Capacity	Current Holdings	Frequency of Delivery
			Choose an item.	

Section 5 - Exceptions/Comments

Appendix O Unexpected Finds Procedure

Integrated Gas

UNEXPECTED HERITAGE FINDS PROCEDURE

Beetaloo Asset (Northern Territory)

This documents details the Unexpected Heritage Finds Procedure for the Beetaloo Exploration Program.

Revision	Date	Description	Originator	Checked	Approved
0	31/03/2019	Unexpected Heritage Finds Procedure	Luke Kirkwood	Alana court	MK

Table of contents

1. Purpose

The purpose of this procedure is to set out the actions to be undertaken by Origin staff and contractor if a suspected find of Aboriginal and non-Aboriginal cultural heritage is made during civil construction activities.

2. Scope

This procedure covers the requirements associated with:

- The identification of cultural heritage artefacts or areas within the Beetaloo Permit Area.
- The assessment of the risk and control measures to be taken if a suspected Indigenous and non-Indigenous cultural heritage find is discovered; including investigation, notification, recording and reporting, means of communication, measures to avoid cultural heritage and dispute resolution.

It applies to all fieldwork conducted in the Beetaloo Basin.

3. Responsibility

These personnel are responsible for the following activities:

Corporate Affairs Manager	Heritage specialist and regulator engagement
Project Manager	Procedure issue and maintenance
Construction Superintendent	Implementation of this procedure
Heritage Specialist	Third party engaged to provide specialist heritage advice.
All Employees / Contractors	Complying with this procedure

4. Requirements

The following management measures will be implemented for all unexpected heritage finds and are to be included as part of toolbox discussions during civil cosnturciton activties.

4.1 Unexpected Discovery- Aboriginal Cultural Heritage

Unexpected Aboriginal heritage finds can include the following:

- Stone artefacts (sharp edged rocks that have identifiable features demonstrating evidence of human modification. See attached information sheet)
- Scarred Trees (trees with symmetrical scars that might demonstrate evidence of removal of bark for use in coolamons, shields and huts. See attached information sheet)
- Grindstones (Large sandstone items (either fixed in bedrock or mobile) that have manmade grooves in them demonstrating use. See attached information sheet)
- Stone Axes (heavy hatchet head like stone items, typically with the leading edge sharpened. See attached information sheet)
- Bone, Shell and Charcoal (potential historical food waste dumps (also known as Middens). See attached information sheet)

If subsurface works encounter shell, charcoal and bone this will typically appear as lens ranging from a centimetre to several metres in depth. Stone artefacts may also be present and contractors must be vigilant for these finds at all times as all Aboriginal archaeological heritage is protected in the Northern Territory

Prior to surface works, civil construction teams should be aware of potential for surface finds of artefacts and avoid impacts to scarred trees. This procedure should be discussed as part of the project kick off meeting:

Procedure in the event of Unexpected Aboriginal Heritage Finds

If an object of potential Aboriginal cultural heritage value is uncovered:

1. All work to cease within 10 metres of the suspected find, and the area to be cordoned off using temporary fencing.
1. The project work crew must record the description, GPS location and photograph the suspect find.
2. Civil Construction Supervisor is to be immediately notified who will then notify the Corporate Affairs Manager.
3. The Civil Construction supervisor will assess where the project work crew can continue to work providing that an appropriate buffer to the site is maintained and that at all times the cultural heritage duty of care is observed.
4. The Corporate Affairs Manager will engage a qualified Heritage Specialist to assess the find and recommend any necessary management measures.
5. The Heritage specialists will provide further directions for managing the suspected find, in accordance with legislative requirements. This may include flagging the discovery, deviating project work around the suspected find (provided the deviation is covered within the existing Environmental Management Plan and AAPA Certificate) or relocating the work front to a new location removed from the suspected find.
6. If the find is determined to be Aboriginal heritage, the Corporate Affairs Manager will notify the relevant Heritage Department and the traditional custodians for the area.
7. Work is not to recommence in the vicinity of the find until direction is provided by the relevant Heritage Department.
8. If the project work cannot deviate around the suspected find and it is necessary to excavate, relocate, remove or harm the suspected find, Origin will seek the advice and consent of the traditional custodians for the area on developing management mitigation measures for the find.

4.2 Unexpected Discovery- Historical Cultural Heritage

Unexpected historical heritage finds can include the following:

- Glass (Coloured glass, bottles (complete or fragmentary etc.)
- Metal (identifiable metallic objects such as cutlery, buckles, farming equipment, woodworking and metal equipment etc.)
- Ceramic (Plates, cups, ink wells, pipes, etc.)
- Wood (identifiable human manufactured wooden items)
- Stone (identifiable human manufactured stone items)
- Bone, Shell and Charcoal (potential historical food waste dumps)

Procedure in the event of Unexpected Histocial Heritage Finds

The following management measures are recommended for unexpected historic finds:

1. All work to cease within 10 metres of the suspected find, and the area to be cordoned off using temporary fencing.
2. The project work crew must record the description, GPS location and photograph the suspect find.
3. Civil Construction Supervisor is to be immediately notified who will then notify the Corporate Affairs Manager.
4. The Civil Construction supervisor will assess where the project work crew can continue to work providing that an appropriate buffer to the site is maintained and that at all times the cultural heritage duty of care is observed.
5. The Corporate affairs manager will engage a qualified Heritage Specialist to assess the find and recommend any necessary management measures.
6. The Heritage specialists will provide further directions for managing the suspected find, in accordance with legislative requirements. This may include flagging the discovery, deviating project work around the suspected find (provided the deviation is covered within the existing Environmental Management Plan and AAPA Certificate) or relocating the work front to a new location removed from the suspected find.

1. If the find is determined to be of heritage importance, work is not to recommence in the vicinity of the find until direction is provided from the relevant Heritage Department.

4.3 Unexpected Discovery-Human Remains

If any suspected human remains are discovered during any activity works, they must be initially assumed under the provisions of the relevant *Coroners Act* to be a crime scene and treated accordingly. The following procedure is to be applied:

1. Do not handle, photograph or collect the remains. Leave in-situ. You may be unwittingly contaminating a crime scene and leaving your DNA on a crime victim.
2. All activity in the vicinity must cease as the find may be part of a larger crime scene and the Site Supervisor to be notified immediately.
3. The Police must be notified immediately of the discovery by the Site Supervisor or appointed supervisor in charge of the works area.
4. The remains must be left in place and protected from harm or damage with a minimum of at least a 50m buffer. It is important to use best judgement and restrict all movement in the immediate vicinity around the discovery until directed otherwise by the Police as this could contaminate a potential crime scene. Likewise do not set up temporary fencing unless directed by the Police.

4.4 Heritage Awareness Training

1. Cultural heritage awareness training must be included in the induction/icebreakers for all Origin staff / contractors conducting project work that may have the potential to harm Aboriginal or historic cultural heritage
2. Origin staff / contractors must be made aware of the conditions set out in the relevant AAPA Certificate (AAPA C2019/039 or other relevant certificate) the obligations of all persons (who enter on, or carry out works or use land on which there is a sacred site) under Part IV of the *Northern Territory Aboriginal Sacred Sites Act 1989*.
3. All Origin staff/ contractors performing civil construction activities are to be made aware of this procedure to ensure any unexpected discoveries are promptly identified and reported

5. Records

The following records should be kept and maintained in order to demonstrate compliance with the requirements of this procedure:

- Staff Training records
- Unexpected Finds Incidents Reporting; records of all finds to be kept on file, including correspondence with the relevant Government Departments.

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6. Definitions

Archaeological places or objects	Archaeological places or objects exist within or in the vicinity of the Origin Permit Areas. All such materials are protected under the *Heritage Act 2011 (NT)*.
Aboriginal Cultural Heritage	Has the same meaning as in the relevant Aboriginal Cultural Heritage legislation. It includes pre-settlement and post-settlement significant Aboriginal areas and significant Aboriginal objects.
Aboriginal Heritage Awareness Training	Training may consist of any of: • Briefings on relevant Aboriginal Cultural Heritage • Briefings on particular arrangements with Aboriginal parties • Identification of aboriginal heritage artefacts • Awareness sessions run for Origin staff by traditional owner/custodian groups
Burial Sites	Possibility of burial sites located within the Permit Area. Under the Northern Territory Criminal Code and *Coroners Act 1993 (NT)* it is an offence to interfere with remains of a deceased person. Under the *Heritage Act 2011 (NT),* it is an offence to interfere with historical human remains (both Aboriginal and non-Aboriginal) without authorization under this Act.
Cultural Heritage Duty of Care	Has the same meaning as due diligence as defined in Aboriginal Cultural Heritage legislation guidelines applicable to the relevant State in which activities are occurring.
Find	Means a significant Aboriginal object or, evidence of archaeological or historic significance of Aboriginal occupation of an area or Aboriginal human remains, found in the course of undertaking an activity covered by the guidelines.
Traditional Custodian	A descendant of an Aboriginal ethnic group that occupied a particular region before European settlement, recognised as being traditionally responsible for cultural heritage of that area
Traditional Owners	A descendant of the Aboriginal ethnic group that occupied a particular region before European settlement, as recognised by Australian law.

7. References

1. Northern Territory Aboriginal Sacred sites Act 1984
2. Northern Territory Heritage Act
3. Aboriginal Areas Protection Authority Certificate

Appendix P Environmental Commitment Register

Aspect	Commitment	implementation	Responsibility	When
Air Emissions	-All equipment and machinery to be in good working order and maintained regularly to minimise vehicle exhaust emissions	1. Requirement built into work instructions issued to contractors 2. contractors to include requirements within their own Management Plan 3. Origin to approve Management Plan and implement assurance activities to ensure compliance.	Contractor	Contractor readiness review
Biodiversity	Leases and any open pits to be fenced to prevent stock and fauna ingress	1. requirement built into civil scope	Civil Construction Superintendent	During construction
Biodiversity	Domestic pets and firearms prohibited.	1. Requirement built into work instructions issued to contractors 2. contractors to include requirements within their own Management Plan 3. Origin to approve Management Plan and implement assurance activities to ensure compliance.	Contractor/ Civil Construction Superintendent	Contractor Readiness review and then at all times
Biodiversity	Driving at dawn and dusk to be minimised	1. Requirement built into work instructions issued to contractors 2. contractors to include requirements within their own At all times 3. Origin to approve At all times and implement	Contractor/ Civil Construction Superintendent	Contractor Readiness review and then at all times

Aspect	Commitment	implementation	Responsibility	When
		assurance activities to ensure compliance.		
Bushfires	A bushfire management plan (NT-2050-15-MP033) must be implemented in accordance with the CoP including: -complying with fire bans fitting fire extinguishers to vehicles and equipment -having access to fire fighting equipment during civil works having an Emergency response plan with contingencies covering fire. -using appropriate firebreaks in accordance with the NT Bushfire management Act and NT1 Land Clearing Guidelines Monitoring bushfires during field campaigns	1. Origin to prepare overarching Bushfire management plan 2. Each contractors to adopt BMP and activity in At all times and operating procedures. 3. Origin to approve At all times and implement assurance activities to ensure compliance	Contractor	Contractor Readiness review and then at all times

Aspect	Commitment	implementation	Responsibility	When
Chemicals	-Dangerous goods (chemicals) will be stored, handled, separated and signed as required by the NT Dangerous goods Act and Flammable and Combustible Liquids Regulations and AS1940. -Hazardous goods will have secondary containment and stored in areas away from watercourses. - Refuelling of equipment will not occur within 100m of a water course -Spill kits will be made available where hazardous materials are used and personnel will be trained in correct use.	1. Requirement built into work instructions issued to contractors 2. contractors to include requirements within their own Management Plan 3. Origin to approve Management plan and implement assurance activities to ensure compliance.	Contractor	Contractor Readiness Review and Ongoing
Community	Fly camps will be utilised	Requirement built into contract and Origin management plans approval where camps required	Project Manager	Scope development
Community	All activities to be undertaken in accordance with the *Code of Practice:* Onshore Petroleum Activities in the Northern Territory (and any land access agreement negotiated between Origin and a landholder at later date	1. Requirement built into work instructions issued to contractors	Project Manager	At all times

Aspect	Commitment	implementation	Responsibility	When
Community	Use contractors that have high Indigenous participation in their workforce as much as reasonably practicable.	contractors selected with considerations of an indigenous participation, with specific requirement built into contracts	Project Manager	Contractor evaluation and selection
Complaint management	- Complaints shall be recorded in OCIS, investigated and responded to appropriately.	Complaints kept as per Origin's stakeholder management plan.	Project Manager	At all time
Cultural Heritage and Sacred Site	Origin will comply with conditions as prescribed by the NLC Agreement and AAPA certificates for the duration of the program.	1. Origin to coordinate NLC clearances and AAPA certificates. 2. Restricted Work Areas (RWA's) and other requirements to be included in site layout and activity design within EMP. 3. RWA's and other requirements to be cascaded to contractors via work Instructions 4. Contractors to include controls regarding RWA and other requirements in EMP 3. Origin to approve EMP and implement assurance activities to ensure compliance during the activity.	Project Manager	At all times

Aspect	Commitment	implementation	Responsibility	When
Cultural Heritage and Sacred Site	An unexpected heritage finds stops related work activities within the vicinity of the find (within a 500 m radius) for assessment and direction by an NLC representative.	3. Unexpected cultural heritage finds to be included in work Instruction issued to contractors. 4. Contractors to include controls in management plan 3. Origin to approve management plan and implement assurance activities to ensure compliance during the activity.	Contractor/ Civil Construction Superintendent	Upon identification of a suspected cultural heritage find
Cultural Heritage and Sacred Site	All staff and contractors are inducted and that inductions contain the following areas: - Code of Conduct prepared for social interactions with the community and host Traditional Owners -Waste management -Bushfire management -Spill management -Restricted work areas and AAPA activity constraints -Minimising nuisance (dust, noise and light) -Erosion and sediment control -Land clearance requirements .	1. Origin to develop Beetaloo general induction or direct the contractor to prepare an activity specific induction covering the environmental and cultural heritage requirements.	Contractor/ Civil Construction Superintendent	Prior to commencement of activities

Aspect	Commitment	implementation	Responsibility	When
Dust	Monitor road conditions to ensure deterioration with possible increase in dust creation, does not occur and undertake road rehabilitation as required.	1. Requirement built into work instructions issued to contractors 2. contractors to include requirements within their own management plan 3. Origin to approve management plan and implement assurance activities to ensure compliance.	Contractor	At all times
Dust	Reducing the speed of vehicles on dirt tracks around sensitive receptors such as homesteads, communities or environmentally sensitive areas	1. Requirement built into work instructions issued to contractors 2. contractors to include requirements within their own management plan 3. Origin to approve management plan and implement assurance activities to ensure compliance.	Contractor	At all times
Dust	- Watering of roads when appropriate and agreed with pastoralists.	1. Requirement built into work instructions issued to contractors 2. contractors to include requirements within their own management plan 3. Origin to approve management plan and implement assurance activities to ensure compliance.	Contractor	During earth works

Aspect	Commitment	implementation	Responsibility	When
Erosion and Sediment Control	-Erosion and sediment controls to be implemented as per the ESCP. 1. Stormwater flow across the cleared site will be managed to minimise impacts from erosion and sedimentation. 2. Design all lease pads and access tracks adopting appropriate controls 3. Avoid areas of overland flow 4. minimise erosion of exposed road surfaces within surface water flow paths through the use of bed level coursings and retention of native vegetation.	1. Origin to implement the project wide Erosion and sediment Control Plan (ESCP) NT-2050-15-MP030 2. Requirement for contractors to comply with ESCP built into work instructions issued to contractors 2. contractors to include requirements within their own management plan 3. Origin to approve management plan and implement assurance activities to ensure compliance.	Project manager/ Contractor	During earth works
Incident Management	Emergency response systems will be in place.	1. Origin to implement the overarching Emergency Response Plan (ERP) NT-2050-15-MP024 2. Each contractors to adopt ERP and bridge to their specific ERP 3. Origin to approve contractor ERP and implement assurance activities to ensure compliance	Contractor/ Civil construction superintendent	At all times

Aspect	Commitment	implementation	Responsibility	When
Land Disturbance	When sighting infrastructure, comply with the following requirements: 1. Identify and avoid culturally sensitive areas and critical habitats through field scouting (ecological and cultural heritage) 2. Layout of the site and exact siting of infrastructure will be informed by the environmental sensitivities and mitigation measures identified in this EMP.1. 3.ensure that infrastructure located in proximity to a major public road or locations with a high amenity values that has minimised the long term visual amenity. 4.All exploration activities (wells, camps etc.) to be located away from sensitive receptors with lease layouts designed to minimise visual amenity impacts. 5. Identify and avoid culturally sensitive areas and critical habitats through field scouting 6. lease areas has considered the minimum offset distance of at least 1 km between groundwater	1. Desktop sighting of location to address constraints- includes pastoralist input. 2. Field surveying and final lease orientation of lease with ecologist and Origin construction superintendent to avoid habitat trees and areas of ecological significance- A buffer area around lease included to accommodate NLC changes 3. NLC site clearances undertaken and lease pad 2. Full exploration lease site pegged out with location of monitoring bore determined based on proximity to exploration well location 3. AAPA certificates and archaeological survey completed prior to construction	Project Manager	Scouting (completed)

Aspect	Commitment	implementation	Responsibility	When
	extraction bores and pastoral water supply bores. 7. All petroleum infrastructure including, petroleum wells, must have a setback distance of at least 2km from a habitable dwelling, 8. considering impacts of noise and lighting on sensitive receptors. 9. All infrastructure to be pegged out to avoid confusion and limit illegal clearing			
Land Disturbance	Land clearing must; 1. be kept to a minimum 2.avoid areas of high conservation value 3. avoid large habitat trees 4. use spotter catchers (in high density vegetation) 5. avoid clearing and disturbing watercourses 6. comply with the NT Land Clearing Guidelines 7.minimise disturbing high risk soils 8. Be less than or equal to the approved 6.6Ha	1. Requirement built into work instructions issued to contractors 2. contractors to include requirements within their own management plan 3. Origin to approve management plan and implement assurance activities to ensure compliance.	Contractor/ Civil Construction Superintendent	During clearing activities

Aspect	Commitment	implementation	Responsibility	When
Land Disturbance	The tracks are designed to minimise their environmental footprint, with standards allowing only sufficient width to enable the safe ingress/egress of the rig and associated equipment, materials and service vehicles.	Tracks to be designed in accordance with	Civil engineer	Project planning
Land Disturbance	Records of disturbed areas to be maintained within GIS	1. Requirement built into work instructions issued to contractors 2. contractors to include requirements within their own EMP 3. Origin to approve EMP and implement assurance activities to ensure compliance. 4. Data to be provided to Origin post disturbance 5. Origin to maintain database of disturbance.	Project Manager	Completion of earth works
Land Disturbance	Topsoil stripping of camp and lease pads to reduce risks to topsoil and facilitate rehabilitation.	1. Requirement built into work instructions issued to contractors 2. contractors to include requirements within their own management plan 3. Origin to approve management plan and implement assurance activities to ensure compliance.	Contractor/ Civil Construction Superintendent	During topsoil stripping activities

Aspect	Commitment	implementation	Responsibility	When
Land Disturbance	No off lease driving- traffic to stick to approved lease	1. Requirement built into work instructions issued to contractors 2. contractors to include requirements within their own management plan 3. Origin to approve management plan and implement assurance activities to ensure compliance.	Contractor/ civil construction superintendent	At all times
Rehabilitation	All significantly disturbed land not required for ongoing petroleum activities must be progressively rehabilitated within 12 months following the cessation of petroleum activities. A Rehabilitation plan will be developed and submitted to DENR for approval prior to rehabilitation	1. Rehabilitation plan built into EMP 2. rehabilitation to be triggered by annual asset reviews.	HSE Representative	6 months prior to rehabilitation.
Reporting	Vehicle collisions with fauna reported.	1. Requirement built into work instructions issued to contractors 2. contractors to include requirements within their own management plan 3. Origin to approve management plan and implement assurance activities to ensure compliance.	Contractor/ Civil Construction Superintendent	All activities

Aspect	Commitment	implementation	Responsibility	When
Reporting	Quarterly incident reports to regulator	Origin to prepare incident reports to regulator during the commencement of an activity.	Project Manager	Quarterly
Reporting	Annual Environmental report prepared and submitted to DPIR	Origin to prepare the annual environment report to DENR/DPIR	Project Manager	Annually
Spills	Site to be inspected and confirmed free of waste upon completion of activities	1. Requirement built into work instructions issued to contractors 2. contractors to include requirements within their own management plan 3. Origin to approve management plan and inspect areas prior to demobilisation.	Contractor/ civil construction superintendent	Demobilisation
Waste	Provide waste tracking certificates to DPIR/DENR	1. Origin to provide waste certificated to DPIR/ DENR upon finalisation of activity	HSE Representative	Project close out
Waste	Contractors to develop waste management procedures covering the following aspects: 1.Waste which cannot be recycled will be transported to a designated, approved disposal site. 2. Domestic refuse to be disposed of in accordance with NT waste guidelines. No incineration of wastes on site. 3. Waste registers maintained by contractor	1. Requirement built into work instructions issued to contractors 2. contractors to include waste management procedures requirements within their own management plan 3. Origin to approve management plan and implement assurance activities to ensure compliance.	Contractor	During waste management and disposal activities

Aspect	Commitment	implementation	Responsibility	When
	for the duration of the project. 4. Removal and disposal of hazardous wastes to be in accordance with NT hazardous waste disposal requirements. 5.Designated waste storage and handling area to be provided onsite. 6. Undertake inspection of waste storage areas regularly, or after significant rainfall event (greater than 20 mm in 24-hour period). 7.Appropriate housekeeping standards will be maintained, and the site will be maintained free of rubbish 8. .Provide waste tracking certificates to origin			
Waste	Ensure the availability of spill clean-up equipment for operations.	1. Requirement built into work instructions issued to contractors 2. contractors to include requirements within their own management plan 3. Origin to approve management plan and implement assurance activities to ensure compliance.	Contractor	At all times during construction

Aspect	Commitment	implementation	Responsibility	When
Water resources	Origin will comply with Water extraction Licence GRF10285	1. All extraction to comply with the WEL- 2. Water use levels for civils <20ML 3. All water take will be metered 4. reporting of water extraction volumes quarterly	Project Manager	During water take/ quarterly
Water resources	Surface water will not be used for any activities proposed in this EMP or future operations	1. Requirement built into work instructions issued to contractors 2. contractors to include requirements within their own Management Plan 3. Origin to approve Management Plan and implement assurance activities to ensure compliance.	Project Manager	
Water resources	Provide water use (including bore location) data to DENR	1. Requirement built into work instructions issued to contractors requiring water data to be kept 2. Origin to provide data to DENR as per licence requirements	Project Manager	
Water Resources	Personnel prohibited to interfering with wildlife	1. Requirement built into work instructions issued to contractors 2. contractors to include requirements within their own Management Plan 3. Origin to approve	Contractor/ civil construction superintendent	

Aspect	Commitment	implementation	Responsibility	When
		Management Plan and implement assurance activities to ensure compliance.		
Weed	A project specific weed management plan (NT-2050-15-MP030) must be implemented as a part of the hemp addressing the following NT Weed Management Plan Guidelines: 1. Baseline weed assessments prior to controlled actions. 2. Provision of a dedicated weed officer 3. be consistent with the statutory requirements of other relevant instruments such as the threat abatement plans under the EPBC.	1. Origin to implement the project wide Weed Management Plan (WMP) 2. Requirement for contractors to comply with WMP built into work instructions issued to contractors 2. contractors to include requirements within their own Management Plan 3. Origin to approve Management Plan and implement assurance activities to ensure compliance.	HSE Representative	
Weeds	Origin will implement appropriate controls to prevent the spread of weeds including: 1. All equipment will have certified equipment wash-down completed prior to entry to the field. 2..Machinery to be preferentially sourced	1. Requirement built into work instructions issued to contractors 2. contractors to include requirements within their own EMP 3. Origin to approve EMP and implement assurance activities to ensure compliance.	Contractor/ civil Construction Superintendent/ HSE Representative	At all times

Aspect	Commitment	implementation	Responsibility	When
	locally, with machinery sourced from surrounding areas or Queensland being the 2nd and 3rd preferred option respectively. 3.. Major equipment moves will be planned from weed-free areas to infested areas and not the other way around. 4. Ensuring all material imported to or between sites is free of weeds. 5 Weeds will be actively controlled/ eradicated in cleared/ hardstand areas. 6. Staff members and contractors responsible for preventing, identifying and managing weeds to be appropriately trained. 7. Induction material to contain information on weeds			
Weeds	Weed inspections and reports will be undertaken as per the following: 1. Pre and post wet (February to May) inspections and periodic audits will be conducted to identify and report weed outbreaks. 2. Records of weed	1. Origin to implement weed inspection program	Project manager	6 monthly

Aspect	Commitment	implementation	Responsibility	When
	inspections will be maintained by Origin			