Department of Environment and Resource Management

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sch4p4(6) Personal information

Application form

Environmental Protection Act 1994

Amendment of environmental authority (chapter 5A activities)

OFFICIAL USE ONLY

DATE RECEIVED:

FILE REF:

DEEDI (QME) DISTRICT:

DERM REGION:

PROJECT REF:

FORM: ☐ COMPLETE FEE: ☐

ENTERED BY [SIGNATURE]:

DATE:

ACCOUNT CODE:
EDZYNAAY02/43212

Guide for applicants

Information about the environmental regulation of chapter 5A activities can be found on the Department of Environment and Resource Management (DERM) website at www.derm.qld.gov.au.

If you have any queries about how to complete this form correctly please contact Permit and Licence Management on 1300 130 372.

This is the approved form for making an application for amendment of an environmental authority (chapter 5A activities) under section 310S of the *Environmental Protection Act 1994*.

A holder of an environmental authority (chapter 5A activities) may wish to make an amendment application to:

- add a new resource authority to a chapter 5A activity project;
- add an additional chapter 5A activity proposed to be carried out as part of a chapter 5A activity project;
- change a relevant chapter 5A activity for the environmental authority from a level 1 chapter 5A activity to a level 2 chapter 5A activity;
- amend conditions of an environmental authority (chapter 5A activities). If a condition of a code compliant authority is amended, a non-code compliant authority must be issued;
- complement an application under the *Petroleum and Gas (Production and Safety) Act 2004* (P&G Act), chapter 4, part 6 to amend a relevant pipeline licence; and/or
- if a relevant resource authority is an authority to prospect under the P&G Act and the holder has, under chapter 2, part 2, division 2 of that Act, made an ATP-related application for a petroleum lease.

To correct a clerical or formal error, an amendment application is not needed. Simply advise or discuss the issue with the administering authority and the correction may be made as long as the proposed amendment does not adversely affect the interests of the environmental authority (EA) holder, or anyone else.

The administering authority or Minister may decide whether an EIS is required for an amendment application. An EIS must not be required for the application if the relevant resource authority for the application is, or is included in, a significant project.

For an amendment application for an environmental authority (chapter 5A activities) for a level 1 chapter 5A activity, a public notice requirement may be made if the administering authority is satisfied there is likely to be a substantial increase in the risk of environmental harm under the amended environmental authority (chapter 5A activities) because of a substantial change in either: (a) the quantity or quality of contaminant authorised to be released into the environment; or (b) the results of the release of a quantity or quality of contaminant authorised to be released into the environment.

An increase of 10% or more in the quantity of a contaminant to be released into the environment is taken to be a substantial change as is an amendment application for an environmental authority (chapter 5A activities) for a chapter 5A activity project where the application is to add a level 1 chapter 5A activity to the authority.

The amendment process is outlined in the guideline titled *Environmental impact assessment process for petroleum projects*.

Refer to Appendix B for a glossary of terms used in this application form.

Please submit the completed form, together with the required fee, to Permit and Licence Management, Department of Environment and Resource Management, GPO Box 2454, Brisbane Qld 4001.

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Question 1

The applicant must be the holder of the environmental authority (EA), unless the applicant is the proposed transferee for the EA and a transfer application has been lodged.

The holders of the EA may, by a signed notice from all of them to the administering authority appoint one of them as the principal holder of the EA. The principal holder may, for all holders of the EA, give the administering authority a notice or other document relating to the EA.

1. Applicant details

☒ Where there are several applicants, joint applicants may appoint a principal holder by completing *Appendix A: Appointment of principal holder*. The administering authority can then make its dealings with all holders by dealing with the principal holder.

NAME & ABN:	REGISTERED BUSINESS ADDRESS (OR RESIDENCE) & POSTAL ADDRESS:
1. OME Resources Australia Pty Limited ABN: 27100280662 PRINCIPAL HOLDER ☐	Level 30, 275 George Street, BRISBANE, QLD 4000
NAME & ABN: 2.	REGISTERED BUSINESS ADDRESS (OR RESIDENCE) & POSTAL ADDRESS:
NAME & ABN: 3.	REGISTERED BUSINESS ADDRESS (OR RESIDENCE) & POSTAL ADDRESS:

2. Contact person for the applicant

NAME, POSITION & COMPANY:

s.73 irrelevant information

ADDRESS:

GPO Box 3107

Brisbane, QLD

4001

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3. The environmental authority

ENVIRONMENTAL AUTHORITY NUMBER:	RELEVANT RESOURCE AUTHORITIES (TYPE & NUMBER):
PEN200013707	ATP806
ISSUE DATE (ATTACH COPY): 5/10/2007	NAME OF PROJECT: Emerald District

☒ Please attach a copy of the current environmental authority

Environmental authorities for level 2 chapter 5A activities

Question 4

If the amendment is made, the authority will become a non-code compliant authority.

4. Do you wish to amend your code compliant authority to become a non-code compliant authority or impose an additional condition on a code compliant authority?

☒ No → Go to Question 5

☐ Yes → Outline proposed amendment below or attach additional information

5. Do you wish to amend a non-code compliant authority?

☐ No → Go to Question 6

☒ Yes → Outline proposed amendment below or attach additional information

Amendment of Condition 4 - Environmentally Sensitive Areas.

Please see attached supporting information

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Environmental authorities for level 1 chapter 5A activities

Question 6

A change from a level 1 chapter 5A activity to a level 2 chapter 5A activity is possible if, for example, the threshold for an ERA being conducted changes from having an aggregate environment score to having no aggregate environmental score as prescribed under schedule 2 of the *Environmental Protection Regulation 2008* .

6. Do you wish to change a relevant chapter 5A activity from a level 1 chapter 5A activity to a level 2 chapter 5A activity?

☒ No → Go to Question 7

☐ Yes → Outline proposal below or attach additional information

Question 7

The addition of a level 1 chapter 5A activity to the authority is considered to be a substantial amendment, and may be considered to cause an increase in the risk of environmental harm. The administering authority may, within five business days after the application date for the amendment application, make a public notice requirement.

An increase of 10 percent or more in the quantity of a contaminant to be released into the environment is considered to be a substantial amendment, and may be considered to cause an increase in the risk of environmental harm.

The administering authority may, within five business days after the application date for the amendment application, make a public notice requirement.

The application must be supported by enough information to allow the administering authority to decide the application.

7. Do you wish to make any of the following amendments to an environmental authority for a level 1 chapter 5A activity?

Add a new resource authority to a chapter 5A activity project;	☒ No	☐ Yes - Detail below
Add one or more environmentally relevant activities with an aggregate environmental score to a chapter 5A activity project;	☒ No	☐ Yes - Detail below
Substantially change the quantity or quality of a contaminant to be released into the environment;	☒ No	☐ Yes - Detail below
Amend conditions of an environmental authority.	☒ No	☐ Yes - Detail below
Other	☒ No	☐ Yes - Detail below
Outline the proposal and attach an amended environmental management plan		

If you answered "Yes" at Question 7, complete the following Question 8. Otherwise proceed to Question 9.

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Question 8

Question 8 will be used to help decide whether an EIS is required for the project.

If you tick 'yes' for any of questions 8(a) to 8(f), describe how the criterion is triggered in an attachment to your application.

(a) Category A and B environmentally sensitive areas are listed in sections 26 and 27 of the *Environmental Protection Regulation 2008*. A free map service that details these areas is available on the DERM website www.derm.qld.gov.au/ecoaccess/petroleum/

(b) The astronomical tide is the highest level of the tides that can be predicted to occur under average meteorological conditions. Further information can be located on www.derm.qld.gov.au under storm tide monitoring.

If the proposed chapter 5A activities are likely to trigger a matter of national environmental significance, it is to be referred, by the applicant, to Environment Australia. Further information is available at www.erin.gov.au/epbc/index.htm

8. Determination of whether the proposed chapter 5A activities will require an EIS

Tick the relevant boxes below to show the scope of the proposed chapter 5A activities. Will the proposed chapter 5A activities–

	NO	YES	IF YES – DESCRIBE AND SUPPORT WITH ATTACHED EVIDENCE HOW THE CRITERION IS TRIGGERED, INCLUDING DETAILS OF THE POTENTIAL IMPACT IF NO – DESCRIBE AND SUPPORT WITH ATTACHED EVIDENCE WHY THE CRITERION IS NOT TRIGGERED
a) Have a significant impact on Category A or B environmentally sensitive areas?	☐	☐ →	
b) Involve activities in a marine area?	☐	☐ →	
c) Involve activities less than 500m from highest astronomical tide?	☐	☐ →	
d) Involve the construction of a new pipeline of more than 150km under a petroleum authority?	☐	☐ →	
e) Include an environmentally relevant activity with an aggregate environmental score of greater than 165?	☐	☐ →	
f) Involve activities under a GHG injection and storage lease under the GHG Storage Act?	☐	☐ →	

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Question 9

Information on the fees can be located in the information sheets:
Fees for permits for environmentally relevant activities (ERAs) http:///
and
Summary of annual fees for environmentally relevant activities (ERAs),
available at www.derm.qld.gov.au or through Permit and Licence Management (phone 1300 130 372).

A payment notification form, which is the final page of the *Information sheet: Paying fees to the Department of Environment and Resource Management (DERM) by EFT* is required to be attached to this application.

9. Payment

The applicable fee is:	$257.50

There are several ways to pay for your application including via cheque, money order, credit card or via electronic funds transfer (EFT). To pay by EFT you will need to refer to the *Information Sheet: Paying fees to the Department of Environment and Resource Management (DERM) by EFT*.

Select payment method below:

☒ Payment by cheque or money order (attached)

☐ Payment by EFT:

- Date of payment by EFT: _____
- Identification code: _____ / _____
- Payment was for:
  - ☐ This application only; or
  - ☐ This and other applications.

☐ A payment notification form was sent to DERM and a copy is attached

☐ Payment by credit card

Card type: ☐ Visa ☐ Mastercard

Card number: _____

Valid to date: _____/_____

Name on card _____

Telephone contact number of cardholder: _____

Cardholder's signature: _____

Note: An incomplete application (including applications that do not include the fee or sufficient detail to show that the fee has been paid where fees are paid by EFT) may be invalid. Invalid applications will be returned without processing and will only be processed if resubmitted with all invalidating issues addressed.

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Question 10 & Certification

[1] This statement applies to anyone who is involved in the management of the applicant company, and relates to their current position and any other management positions they may have held in other companies. Suitability inquiries may be made.

[2] Corresponding law means under a law that provides for the same or similar matters as the *Environmental Protection Act* 1994.

[3] It is an offence, under the *Environmental Protection Act 1994*, to give the administering authority information that is false, misleading or incomplete in any material particular.

Information supplied on or with this application form may be made available to others upon request, subject to the provisions of the *Right to Information Act 2009*.

10. I/We (the applicant/s) certify that (*select each to certify*):

- ☒ I/we am/are: the holder/s of the environmental authority identified in Question 3 or applicants for amendment of the environmental authority identified in Question 3;
- ☒ I/we am/are suitable applicant/s[1] for the environmental authority, and have not been convicted (pleaded or found guilty) of an offence against, nor held an environmental authority that has been cancelled or suspended under, the *Environmental Protection Act* 1994 or a corresponding law[2] in Queensland or another jurisdiction;
- ☒ A copy of the current environmental authority is attached;
- ☒ A copy of the responses required in Question 8 is attached;
- ☒ The fees are enclosed or a copy of the payment notification form is attached if paying by EFT;
- ☒ The application is accurate, complete and not misleading[3]; and
- ☒ I understand that an incomplete application (including applications that do not include the fee, or sufficient detail to show that the fee has been paid where fees are paid by EFT) may be invalid. Invalid applications will be returned without processing and will only be processed if resubmitted with all invalidating issues addressed.

Certification

APPLICANT NAME / COMPANY: OME Resources Australia Pty Limited	
SIGNATORY NAME & POSITION: s.73 irrelevant information	SIGNATURE: s.73 irrelevant information DATE: 14/12/10

APPLICANT NAME / COMPANY:	
SIGNATORY NAME & POSITION:	SIGNATURE: DATE:

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Department of Environment and Resource Management

Application form

Amendment of environmental authority (chapter 5A activities)

Certification

APPLICANT NAME / COMPANY:	
SIGNATORY NAME & POSITION:	SIGNATURE: DATE:

APPLICANT NAME / COMPANY:	
SIGNATORY NAME & POSITION:	SIGNATURE: DATE:

If you have any queries about how to complete this form correctly please contact Permit and Licence Management, Department of Environment and Resource Management, on 1300 130 372.

Applicant checklist

- ☐ Question 1 – Appendix A: Appointment of principal holder (if applicable)
- ☒ Question 3 – Copy of current environmental authority
- ☐ Question 4 – Additional information (attached)
- ☒ Question 5 – Additional information (attached)
- ☐ Question 6 – Additional information (attached)
- ☐ Question 7 – Amended environmental management plan (attached)
- ☐ Question 8 – Assessment against EIS triggers (attached)
- ☒ Question 9 – Fees or payment notification for EFT payment (enclosed)
- ☒ Supporting information attached (if applicable).

Please return your completed application to:

Permit and Licence Management
Implementation and Support Unit
Department of Environment and Resource Management

GPO Box 2454
BRISBANE QLD 4001

Enquiries: 1300 130 372 Facsimile: (07) 3896 3342
E-mail: palm@derm.qld.gov.au

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Appendix A – Appointment of principal holder

We, being joint applicants for the amendment of the environmental authority (chapter 5A activities) identified in Question 3, hereby appoint _____

(print name of principal holder)

as the principal holder for the environmental authority (chapter 5A activities) following the approval of this amendment application.

List all joint applicants

APPLICANT NAME / COMPANY:		
SIGNATORY NAME & POSITION:	SIGNATURE:	DATE:

APPLICANT NAME / COMPANY:		
SIGNATORY NAME & POSITION:	SIGNATURE:	DATE:

APPLICANT NAME / COMPANY:		
SIGNATORY NAME & POSITION:	SIGNATURE:	DATE:

APPLICANT NAME / COMPANY:		
SIGNATORY NAME & POSITION:	SIGNATURE:	DATE:

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Note:

The administering authority may, under section 312T of the EP Act:

- Give a notice or other document relating to the environmental authority to all the holders by giving it to the principal holder; or
- Make a requirement relating to the environmental authority of all the holders by making the requirement of the principal holder.

The principal holder may, for all holders of the environmental authority (chapter 5A activities), give the administering authority a notice or other document relating to the environmental authority.

The holders of the environmental authority (chapter 5A activities) may, by a signed notice from all of them to the administering authority, cancel the appointment of a principal holder (section 312S(2)(b)).

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Appendix B - Glossary

TERM	MEANING
Aggregate environmental score	Aggregate environmental score is the relative impact related to an average operation or activity on a single site, wherever located. It is expressed in terms of a calculation derived from the average emissions of contaminants from a particular environmentally relevant activity and the risks associated with other attributes of the site where the activity is undertaken.
Chapter 5A activity	A chapter 5A activity includes the following activities– a) greenhouse gas storage activities; and b) petroleum activities.
Chapter 5A activity project	A chapter 5A activity project is all chapter 5A activities of the same type under the same resource legislation carried out, or proposed to be carried out, under 1 or more relevant resource authority for that type of chapter 5A activity, in any combination, as a single integrated operation.
GHG	GHG means greenhouse gas.
GHG Storage Act	GHG Storage Act means the *Greenhouse Gas Storage Act 2009*.
Greenhouse gas storage activities	Greenhouse gas storage activities means— (a) activities that, under the GHG Storage Act, are authorised activities for a GHG authority; or (b) rehabilitating or remediating environmental harm because of an activity mentioned in paragraph (a); or (c) action taken to prevent environmental harm because of an activity mentioned in paragraph (a) or (b); or (d) activities required under a condition of an environmental authority for activities mentioned in paragraph (a), (b) or (c); or (e) activities required under a condition of an environmental authority for activities mentioned in paragraph (a), (b) or (c) that has ended or ceased to have effect, if the condition— (i) continues to apply after the authority has ended or ceased to have effect; and (ii) has not been complied with.
Level 1 chapter 5A activity	A chapter 5A activity stated in schedule 5, column 1 of the *Environmental Protection Regulation 2008* is a level 1 chapter 5A activity.
Level 2 chapter 5A activity	A level 2 chapter 5A activity is a chapter 5A activity other than a level 1 chapter 5A activity.
Petroleum activities	Petroleum activities means: (a) activities that, under the *Petroleum Act 1923,* are authorised activities for a 1923 Act petroleum tenure under that Act; or (b) activities that, under the *Petroleum and Gas (Production and Safety) Act 2004,* are authorised activities for a petroleum authority under that Act; or (c) exploring for, exploiting or conveying petroleum resources under a licence, permit,

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	pipeline licence, primary licence, secondary licence or special prospecting authority granted under the *Petroleum (Submerged Lands) Act 1982*; or (d) rehabilitating or remediating environmental harm because of an activity mentioned in paragraphs (a) to (c); (e) actions taken to prevent environmental harm because of activities mentioned in paragraphs (a) to (d); (f) activities required under a condition of an environmental authority for activities mentioned in paragraphs (a) to (e); or (g) activities required under a condition of an environmental authority mentioned in paragraphs (a) to (e) that has ended or ceased to have effect, if the condition- (i) continues to apply after the authority has ended or ceased to have effect, and (ii) has not been complied with.
Petroleum authority	A petroleum authority granted under the *Petroleum and Gas (Production and Safety) Act 2004* includes the following types of authorities: (a) an authority to prospect; (b) a petroleum lease; (c) a data acquisition authority; (d) a water monitoring authority; (e) a survey licence; (f) a pipeline licence; (g) a petroleum facility licence.
Resource authority	Resource authority means– (a) any of the following under the GHG Storage Act– (i) a GHG exploration permit (also called a GHG permit); (ii) a GHG injection and storage lease (also called a GHG lease); (iii) a GHG injection and storage data acquisition authority (also called a GHG data acquisition authority); or (b) a 1923 Act petroleum tenure granted under the Petroleum Act 1923; or (c) a petroleum authority granted under the *Petroleum and Gas (Production and Safety) Act 2004*; or (d) a licence, permit, pipeline licence, primary licence, secondary licence or special prospecting authority granted under the *Petroleum (Submerged Lands) Act 1982.*

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Parma Nand
Manager
Petroleum and Gas Unit
Department of Environment
GPO Box 2771
BRISBANE QLD 4001

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20 December 2010

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Dear Parma,

Bowen Basin EA Amendments 2011 Seismic Program

Following from the pre-design conference meetings held between QGC and the DERM, QGC is submitting 5 level 2 Environmental Authority amendment applications:

- ATP 806
- s.73 irrelevant information

Please find enclosed Application Forms, the relevant fees and supporting information.

If you wish to discuss any further matters regarding this submission please contact myself on 07 3020 7356.

Kind regards,

s.73 irrelevant information

Encl.

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EPA SOUTHERN REGION
Correspondence No. BNE2011/12
File No. BNE44652 PART 1
Action Officer

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Support Information

Bowen Basin Exploration Program EA Amendment

Rev 0

November 2010

Uncontrolled when printed

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Bowen Basin Exploration Program

DOCUMENT INFORMATION SHEET

TITLE: Support Information: Bowen Basin Seismic Program

PURPOSE AND SCOPE:

The purpose of this document is to provide information to support a number of EA amendment applications to facilitate the Bowen Basin Exploration Program (including seismic and drilling)

DOCUMENT VERIFICATION

Responsible:

Signature:		**Position:**	s.73 irrelevant information
Name:	s.73 irrelevant information	**Date:**	

Accountable:

Signature:	s.73 irrelevant information	**Position:**	s.73 irrelevant information
Name:		**Date:**	7/12/10

Consulted:

Enter name/position of those who have reviewed the document

s.73 irrelevant information

Informed:

Enter name/position of those who shall receive the completed document and any subsequent revisions

s.73 irrelevant information

Endorsed:

Signature:	s.73 irrelevant information	**Position:**	s.73 irrelevant information
Name:	Andrew Wharton	**Date:**	14/12/10

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RACIE Terms

R	**Responsible:**	the person who actually produces the document
A	**Accountable:**	the person who has to answer for the success or failure of the quality and timeliness of the document
C	Consulted:	those who must be consulted before the document is published
I	Informed:	those who must be informed after the document is published
E	Endorsed:	the person who must approve the document before publication

Revision Record

Issue	Date	Reason for Issue	Responsible	Accountable
A	3/11/2010	Issued for Internal Review	s.73 irrelevant information	
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1.0 INTRODUCTION

QGC Pty Limited, a BG Group business holds a number of Authority to Prospect (ATP) tenements within the Bowen Basin area. There are a number of activities going forward in the exploration phase of these tenements that will require increased work within these areas. The two main activities that will cause some impacts within the areas are seismic surveys and exploration drilling.

The exploration activities will be focused on the following tenements:

- Authority to Prospect ATP806, s.73 irrelevant information

Tenement	Environmental Authority
ATP806	PEN200013707
s.73 irrelevant information	

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The 2011 seismic program will commence in April 2011 and cross all of the above listed tenements. The current exploration drilling program is currently predominately focused upon ATP 806 however is likely to include the above tenements in the near future.

The purpose of this document is to provide information to DERM to support amending conditions which appear in a number of Level 2 Environmental Authorities within the Bowen Basin. The current conditions preclude any petroleum activities from being undertaken within Category A or Category B ESA's and their buffers. These areas include areas of endangered and of concern regional ecosystems. Due to the nature of seismic activity and the need for a continuous line survey to get a useable subsurface image it is not always possible to entirely avoid these areas. QGC has where possible in the planning stages placed lines to avoid Category A and Category B areas.

This support information seeks outlines the methods used for these proposed exploration activities within these areas and the additional management or mitigation measures to the activity to prevent or minimise environmental harm. To accommodate these low impact activities within these areas this environmental authority amendment application also proposes a set of conditions that would be considered appropriate.

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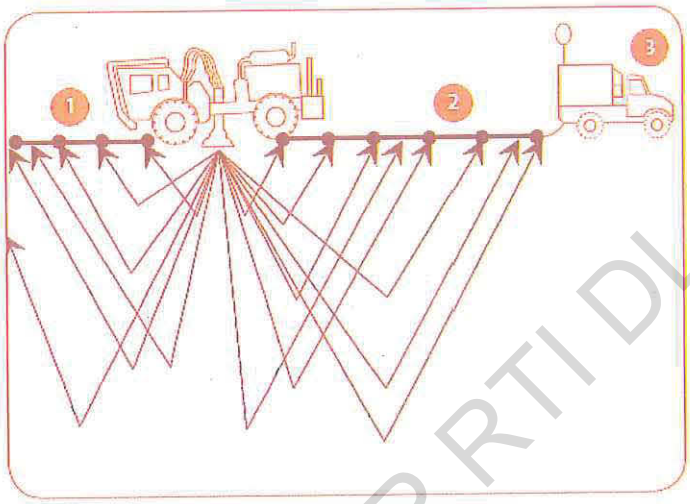
2.0 DESCRIPTION OF SEISMIC ACTIVITIES

2.1 Description of activity

Seismic surveys are widely used around the world to produce a detailed image of the geology beneath the earth's surface. Oil and gas companies use this information to accurately plan the location of gas wells. This helps keep land disturbance to a minimum.

Oil and gas companies use seismic surveys to produce a detailed image of the geology beneath the earth's surface. Data from the surveys are used to plan well locations, allowing companies to avoid drilling unnecessary wells. This helps insure we keep land disturbance to a minimum.

Seismic surveys have two main components. In the first, vibroseis trucks vibrate the earth's surface to send acoustic waves into the earth. This is done for about eight to 12 seconds every 10 to 15 metres along straight lines. If you stood next to a truck you may feel a tingling in your toes. These vibrations are rarely felt more than 30 metres from the truck.



In the second step, receivers pick up and record a reflected signal. The receivers are connected to a central recording truck by wires that run along the seismic line.

Vibroseis trucks send acoustic waves into the earth. The waves are reflected back and recorded by sensors which are in turn connected by up to 10km of cable. A recording truck connected to the cable receives the signal.

Initially, the location and route selection of the seismic lines is done in the office, using maps, satellite images and aerial photographs. It is important for data quality that the lines are kept as straight as possible.

In some sensitive areas, where vibroseis trucks cannot reach, other means may be used to generate acoustic waves. These include hand held vibrating equipment similar to that used to tamp road works. Another technique involves using small explosive devices planted in covered bores one to two metres deep.

The route of the seismic lines takes into account areas of subsurface interest and existing seismic line locations. To minimise the impact on land holders, the sides of roads, power line easements and fence lines are used as much as possible. It is not possible to route all lines so that they avoid private or leasehold land.

After the seismic line is determined in the office, it is checked in the field. When it has been checked on the ground and a provisional route selected, QGC's land access team seeks the formal consent of landholders for access. This agreement is known as a "consent to entry". When consent to entry is granted, and rules of access agreed, QGC and the landholder will scout the most acceptable route for the seismic line.

The route is then inspected by traditional owners of the land to check for cultural heritage sensitivities. An environmental scientist will also check for rare plants and animals, weed infestations and other environmentally

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sensitive areas. A surveyor then marks each receiver and source position on the seismic line with a wooden stake. Access routes are marked with coloured flags.

QGC compiles a detailed map of the route which is then used to calculate compensation due to the landholder. This calculation is attached to a formal agreement and signed by the landholder and QGC. Throughout the seismic survey, QGC's land access team will advise when activities will commence and will remain the point of contact with landholders. All seismic crew will be made fully aware that they must comply with landholders' access rules while on their land.

Note that the drilling of shallow holes on the seismic line approximately 10km apart is sometimes necessary during a seismic survey. These holes are about 100 to 150 metres deep and are used to determine the velocity of seismic waves in the near surface. After the hole has been drilled and velocity measurements taken, the hole is immediately filled and rehabilitated.

Where land access agreements require it, QGC will ensure that all equipment used in seismic surveys is washed down and certified by qualified third-party experts before leaving one property and entering another.

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2.2 Equipment

Seismic data acquisition starts when the final route of the seismic line has been agreed and the recording equipment is deployed. Up to 10km of seismic cable is laid out on the ground at any one time, usually deployed by a group of about 19 people.

To help reduce environmental impacts along the seismic line, QGC uses modified equipment carriers to minimise impact on vegetation that has been cleared by a mulcher. Equipment may include utility vehicles with wider tyres or lighter John Deere Gator vehicles.

Clearing may be necessary if some sections of the seismic line are inaccessible due to excessive foliage or rough terrain. In such cases, equipment is carried by hand and the vehicles, including the vibrating equipment, follow the easiest path, even if this means they are some distance from the cable line.

QGC uses mulchers which can cut a path through vegetation close to the surface without damaging the root system. This allows plants to rapidly regrow and return to their original state. The use of graders and bulldozers is kept to a minimum and is a last resort in rough terrain.

Seismic sensors have a highly sensitive moving coil magnet encased in plastic with a 5cm metal spike that allows them to be buried just below the surface in lines 1.5 metres apart. The strings of sensors are in turn connected to a line cable that sends data to a recording truck.

The line is powered by 12 volt batteries. When the seismic line crosses roads or tracks, cables are either put in rubber mats or buried to protect them from traffic.

The vibroseis truck starts at the beginning of the line, vibrating the ground at points marked by wooden stakes. Two trucks constitute one group and each group will vibrate the ground either once or twice per vibration point.

The trucks cover about 10km a day and operations are restricted to daylight hours only. As the ground equipment is continually cycled from the back of the seismic line to the front at the same speed, most

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landholders will have equipment on their properties for only three or four days, unless the project is suspended due to bad weather. Sufficient rainfall may mean activity is suspended to prevent vehicle movements from damaging the ground.

2.3 Stages of Seismic Program

A. Desk top route selection

The route of seismic lines is initially determined through GIS mapping from a desk top survey. The routes are chosen taking into account areas of subsurface interest and existing seismic line locations and obvious surface obstructions. The environment team will be required to review the proposed alignment to determine the most appropriate route with the least impact to environmental sensitive areas.

B. Land access and landholder acceptance

The Land Access Consultants will head into the field to gain access with the relevant landholders known as consent to entry. Once consent to entry is given by the landholder the survey team will work with the landholder to incorporate any landholder route preference where possible.

C. QGC divisions sign off on route selection

The proposed route will be inspected by the Environmental and Cultural Heritage divisions of QGC to ensure the routes selected are within compliance of the relevant authorities and company requirements. The environmental officer will be required to check the route for plant species, fauna, weed assessment and other environmentally sensitive areas to ensure that the activity is performed with minimum disturbance to the surrounding environment. The final route will be pegged with consultation with the Environment Team, Cultural Heritage and landholders.

D. Line clearance

Any areas that will require vegetation disturbance or clearance will be completed using a tracked mulching machine. Where seismic lines require vegetation to be cleared the mulcher will be used, but only in extreme cases where it is impossible for the seismic vehicles to drive over the existing vegetation. Any vegetation clearing will be conducted in the presence of a field environmental officer and in compliance with the appropriate management plans that form a part of the Bowen Basin Seismic EMP. No clearing will be undertaken within any Category A or B areas. Pre-existing tracks or disturbed areas will be used if present, if there is no pre-existing disturbed access routes all seismic in these areas will be undertaken by walking the cables through the area.

E. Recording

The recording crew will follow after the pegging and line clearances have been completed. Cables and geophones will be laid along the lines. Vibroseis trucks will travel along the lines stopping at each peg, and then vibrating the surface area, sending energy into the ground while the geophones attached to the cables record the reflected data. The impact of these vibrations is minimal and would only be felt up to a maximum of 30 - 50 metres away depending on the vibrator being used. Two types of vibrator will be used in the Bowen basin. The Envirovibe Vibroseis vehicle (approximately 8 tonnes and only 2.5 metres in width) and the Hemi 60 Vibroseis vehicle (approximately 40 tonnes and 3.0 metres in width). These vehicles will only traverse a Cat A or B area if an existing track is present, if no track present then these vehicles will not enter these areas.

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The cable will be on the ground at any given location for two to four days. It is expected to record about 10 kilometres a day. The cables will be dropped off at regular intervals by 4 wheel drive utilities. Stock should be excluded from paddocks containing receiver lines during recording to stop tangles and protect the cables. Where it is not practical to exclude stock temporary fencing should be erected.

F. Restoration

As soon as practical after the recording, a restoration crew will travel along the lines, repairing any possible damage, removing the pegs, repairing fences and ensuring rehabilitation requirements are met. As this is only low impact seismic it is not envisioned that any rehabilitation other than removing cables and repairing any landholder fences moved for access would be required.

3.0 LOCATION OF ACTIVITY

The survey will take place within the Bowen Basin. The areas to be surveyed in the Bowen Basin are:

- Authority to Prospect ATP806 s.73 irrelevant information approximately 750km along the Dingonose of 2D seismic;
- s.73 irrelevant information

These tenements are located on properties predominately owned by private landholders. A large number of fields will be examined under the seismic program. **Figures 1 – 3** show the seismic survey lines proposed. These tenements or fields may have current exploration wells in place and the seismic activity is being produced for assessment and planning of future field development. During the planning stage QGC have whenever possible avoided entering in Category A and B areas by placing seismic lines where possible outside these areas.

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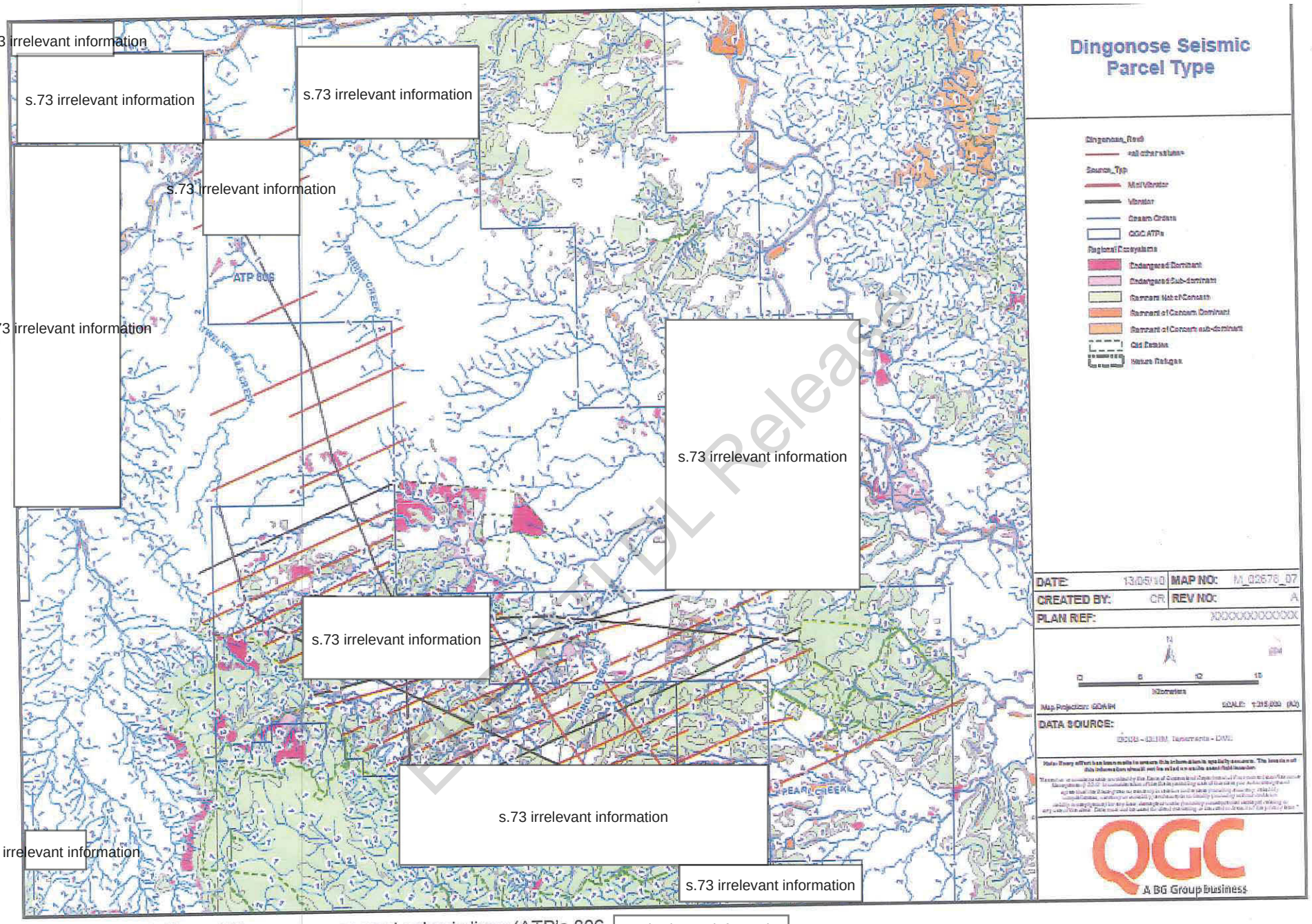

Figure 3: Map of Dingonose proposed seismic lines (ATP's 806, s.73 irrelevant information

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The attached Bowen Basin Seismic Environmental Management Plan demonstrates the Environmental commitments that have been made to ensure the seismic activities are upheld to the highest standard.

1.1 Seismic management commitments of activities within the ERE areas and buffer zones:

Where QGC will be required to enter into Category A or B areas we will take all reasonable measures to reduce the impacts on these areas.

- No drilling or bore holes will be located within the Endangered or Of concern ecosystem areas;
- The scouting parties operate on foot and include a surveyor, field environmental officer and land access consultant. The scouting crew evaluates the best path for the line to minimise and clearing and endeavour to go around any sensitive areas where possible.
- Where it is not possible to go around sensitive areas, the seismic acquisition crew will use any existing tracks or hand carry equipment (cables and geophones) through any sensitive areas. Vehicles and vibrators will go around.
- The seismic crew will follow the scouting notes provided by the surveyor and the environmental clearance reports submitted by the field environmental officers.
- The seismic program is designed to be least impacting as possible and is considered very much a low impact survey by industry standards. QGC seismic will not cause any disturbance to creeks (no line preparation is done and the creeks are not disturbed, vehicles will go round or find designated crossing points), roads (least disturbance/damage as practical, using specialised low ground pressure vehicles where applicable, operating only when tracks/roads are dry etc).

In summary, we will comply with the EMP which avoids ESA's as much as possible or in limited circumstances hand carrying equipment through without disturbance. (Please see attached EMP).

In regards to the management of weed spread impacts to these areas the follow management measures will be undertaken:

- A seismic line is scouted by a qualified survey and environmental field officer that maps a corridor through the property and the EFO produces a report (SECR – Seismic Environmental Clearance Report) with regard to what weeds are present within this corridor and classifies it by risk (low-high).
- Where prescribed weeds or high risk areas have been identified weed wash down of all vehicles will occur after going through such a rated area and before proceeding into a buffer area or a pre-disturbed area of an endangered or of concern regional ecosystem.
- QGC has two dedicated portable wash down units with the crew at all times and with certified inspectors.

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4.0 DESCRIPTION OF DRILLING ACTIVITIES

The drilling of CSG exploration wells usually requires a well lease area of 100m x 100m however, this can be reduced in more sensitive environmental areas where it is safe and practical to do so. The well lease area includes a hardstand area, flare pit, flare line from the well head to the flare pit and a mud pit.
The lease area needs to accommodate a skid or trailer mounted rig, along with auxiliary support equipment. This pad area allows for the safe placement of site offices, stored pipes and other associated temporary infrastructure a sufficient distance away from the drill rig. The drilling site office will be located in a trailer. On-site sewage will be contained by a portable toilet and disposed of off-site or treated in an approved manner.

Once a well lease is proposed the site will undergo a desktop review for environmental values and constraints. If it is an appropriate location the site will then undergo a field survey whereby an environmental clearance is obtained and any habitat trees or important environmental values marked and appropriate control measures provided to the construction and exploration teams.
After the drilling and construction of the well, the lease areas are rehabilitated. An approximately 0.5ha hardstand area is left for the operational phase of the well. Once the well is depleted, the holes will be plugged and abandoned in accordance with the requirements of Schedule 3 of the *Petroleum and Gas (Production and Safety) Regulation 2004* (P&G Reg) and the land appropriately rehabilitated in accordance with the EA requirements.

Currently QGC's well drilling and maintenance activities include the following contracted operating plant:

- drilling rigs;
- work-over and completion rigs;
- top-hole rigs;
- core rigs;
- auger rigs; and
- hydraulic fracturing equipment.

The key environmental impacts associated with the construction and operation of gas wells are:

- vegetation clearance;
- noise from drilling;
- land access;
- waste products such as oily water and chemicals;
- Coal Seam (CS) water production (water extracted from the coal seam during gas production); and
- progressive rehabilitation.

Some wells will be required to have a well stimulation technique known as Hydraulic fracturing is used to create fractures that extend from the borehole into coal formations, which are typically maintained by a proppant, a material such as grains of sand that prevents the fractures from closing. The method is informally called "fracing".

Hydraulic fracturing generally involves the establishment of a frac pond directly adjacent to the well. All frac ponds will be HDPE lined, and once their useful life is past they will be rehabilitated so that they do

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not present a contamination risk. Frac ponds, and associated topsoil/ spoil will be contained to an area of 1 hectare (additional to the wells).

All hydraulic fracturing activities are targeted to fracture coal seams as the primary target.

QGC propose to undertake exploration drilling within these tenements. Exploration drilling often involves finding a location that geologically is suitable to drill while still ensuring all environmental and cultural

heritage commitments are upheld. The drilling activities have not yet been fully determined as they are heavily reliant upon the data acquired in the seismic data acquisition, and preliminary well drilling.

5.0 LOCATION OF DRILLING ACTIVITIES

The locations of all exploration drilling activities are not yet fully determined. QGC are working to appraise the CSG potential of ATP 806 will be the initial focus with further exploration drilling locations to be determined after further investigations and data acquisition from these wells. For these reasons a full drilling schedule detailing where wells are proposed to be drilled is not possible.

6.0 ENVIRONMENTAL MANAGEMENT OF DRILLLING ACTIVITIES

As this is a Level 2 Environmental Authority Area QGC works to achieve high standards of environmental performance. EA conditions are applied to the works that occur in the area and it has become necessary for some pilot production tests to encroach into endangered regional ecosystem buffer zones.

Ground truthing is conducted and an environmental professional has to approve all sites prior to any disturbance occurring. Often (but not always) when endangered regional ecosystems are encountered in these areas they are isolated to areas surrounding watercourses, or roads. A majority of the properties have these endangered regional ecosystems adjacent to cleared paddocks used for grazing land.

Entering within the buffer zone with strict adherence to the conditions proposed below in these areas is not seen to cause environmental harm. DERM has applied this precedent to other tenements that QGC holds and QGC requests that this precedent is applied here and limited petroleum activities are allowed within the ERE buffer zones.

Environmental management of Drilling activities occurs in a controlled and environmental control centre. Environmental management of drilling activities in the Bowen Basin remains in line with the current QGC activities that are occurring in the Surat Basin. Although a full environmental management plan has not yet been developed for the Bowen Basin area QGC still applies the environmental management techniques that are applied in the Surat Basin tenements in these areas.

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6.1 Proposed Conditions:

These are a set of proposed conditions that QGC request to be included into the relevant Environmental Authorities. It is understood that due to the age of these EA's some other conditions within the EA may be required to be changed to facilitate this amendment.

QGC understand that DERM may propose alternative conditions to those listed below and QGC are happy to negotiate appropriate conditions with DERM. The below conditions reflect what has been applied to QGC's other tenements in the past.

There is however a request that the definition of limited petroleum activities is changed to include hydraulic fracturing ponds (frac ponds). These facilities are required to be installed next to a well where it is to be hydraulically fractured. All QGC frac ponds are HDPE lined which acts to prevent any release of the contained water to the surrounding environment. All QGC frac ponds are also monitored on a regular basis to ensure they are appropriately managed.

Condition 3 – Seismic Survey Program Implementation

The holder of this environmental authority must implement the seismic survey program as per the following QGC Pty Ltd documents:

(a) *Seismic Survey Information Flyer*, April 2010; and

(b) *Environmental Management Plan Surat Seismic Survey*, Rev 0 March 2010.

Condition 4 – Category A, B and C Environmentally Sensitive Areas (ESA)

The holder of this environmental authority must ensure that limited petroleum activities:

(a)are not conducted in any Category A, B or C ESA;

(b)are not conducted within 200m of any category A, B or C ESAs (protection zone); and

(c)do not involve activities other than **limited petroleum activities** within 1km of a category A ESA, or within 500m of a listed category B or C ESA (buffer zone).

Note: Indicative ESA mapping is available on the Department of Environment and Resource Management website at http://www.derm.qld.gov.au/ecoaccess/maps_of_environmentally_sensitive_areas.php.

Condition 5

Limited petroleum activities carried out in accordance with Condition 4 (c) must be preferentially located in pre-existing areas of clearing or significant disturbance to the greatest practicable extent.

Condition 5A

Despite Condition 4, seismic survey activities may be undertaken within 200m of, or in the following specified Category C ESAs:

(a) 'Of Concern' regional ecosystem (RE);

(b) State Forests;

(c) Timber Reserves;

provided that they do not overlap with any other Category A, B or C ESA or associated protected zone.

Condition 5B

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Where seismic survey activities are proposed to be undertaken within 200m of, or in the Category C ESAs specified in Condition 5A, the holder of this environmental authority must:

(a) be able to demonstrate that no reasonable or feasible alternative exists; and

(b) where the ESA is a State Forest or Timber Reserve:

(i) obtain written approval from the authority responsible for the administration of the *Forestry Act 1959*;

(ii) comply with all restrictions and conditions contained within the approval required under Condition 5B, subsection (b) (i);

(iii) where the conditions of the approval required under Condition 5B, subsection (b) (i) conflict with the conditions of this environmental authority, comply with the conditions of this environmental authority; and

(iv) provide a copy of the written approval required under Condition 5B, subsection (b) (i) to the administering authority upon request.

Condition 5C

Where limited petroleum activities are undertaken within 200m of, or in the Category C ESAs specified in Condition 5A, seismic survey activities must only be located and carried out in areas according to the following order of preference:

(a) pre-existing cleared areas or significantly disturbed areas less than 200m from a Category C ESA;

(b) undisturbed areas less than 200m from a Category C ESA;

(c) pre-existing areas of significant disturbance within a Category C ESA (e.g. areas where significant clearing or thinning has been undertaken within a RE, and/or areas containing high densities of weed or pest species which has inhibited re-colonisation of native regrowth).

Condition 6- Conducting seismic activities within Endangered RE, Endangered RE Buffer and Of Concern RE

When undertaking seismic activities within 'Endangered' RE, 'Endangered' RE buffer and Of Concern RE on DAA 9, the holder of the environmental authority must:

(a) not cause disturbance and/or clearing of vegetation within the 'Endangered' RE, 'Endangered' RE buffer and Of Concern RE;

(b) use existing access and fence line tracks and other disturbed areas;

(c) not construct new access tracks;

(d) conduct seismic activities by foot where there are no existing access tracks;

(e) not clear or stick rake in any Endangered RE;

(f) utilise existing vehicular crossings for seismic activities in watercourses and where vehicular crossings do not exist, either:

(i) deploy and retrieve geophones and cable through the crossing by foot; or

(ii) skip acquisition over the watercourse and restart on the other side.

(g) not establish exploration camps within the Endangered RE, Endangered RE buffer or Of Concern RE;

(h) commence rehabilitation of lines as soon as practicable but not more than one (01) month after completion of line acquisition; and

(i) monitor lines following rehabilitation at intervals not longer than three (03) monthly for the first 12 months, or until demonstrated that:

(i) the landform is stable and similar to that of the surrounding undisturbed areas; and

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(ii) surface drainage lines are re-established; and
(iii) vegetation is successfully re-established.

Definitions:

Limited Petroleum Activities: means activities including geophysical surveys (including seismic activities), well sites, well pads, sumps, flare pits, *hydraulic fracturing ponds,* flow lines and supporting access tracks. Limited petroleum activities do not include the construction of production infrastructure for processing or storing petroleum or petroleum by-products, dams (excluding temporary hydraulic fracturing ponds), compressor stations, camps/workforce accommodation, power supplies, waste disposal or other supporting infrastructure for the project.

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ENVIRONMENTAL MANAGEMENT PLAN
Bowen Basin Seismic Program

Rev 0 July 2010

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Bowen Basin Seismic Project

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DOCUMENT INFORMATION SHEET

TITLE: Bowen Basin Seismic Program Environmental Management Plan

PURPOSE AND SCOPE:

The purpose of this document is to outline the environmental standards and requirements that must be followed when undertaking the Bowen Basin Seismic Program.

Responsible:

Signature:	s.73 irrelevant information	**Position:**	s.73 irrelevant information
Name:		**Date:**	07/07/10

Accountable:

Signature:	s.73 irrelevant information	**Position:**	s.73 irrelevant information
Name:		**Date:**	07/07/10

Consulted:

Enter name/position of those who have reviewed the document

s.73 irrelevant information

Informed:

Enter name/position of those who shall receive the completed document and any subsequent revisions

s.73 irrelevant information

Endorsed:

Signature:	s.73 irrelevant information		
Name:	Section 78B, Section 78B(2)(c) - individuals privacy	**Date:**	7/6/10

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RACIE Terms

R	Responsible:	the person who actually produces the document
A	Acco untable:	the person who has to answer for the success or failure of the quality and timeliness of the document
C	Consulted:	those who must be consulted before the document is published
I	Informed:	those who must be informed after the document is published
E	Endorsed:	the person who must approve the document before publication

Revision Record

Issue	Date	Reason for Issue	Responsible	Accountable
A	19/0510	Issued for review	s.73 irrelevant information	
B	29/06/10	Revised document issued for review		
0	07/07/10	Issued For Use		

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1.0 INTRODUCTION

QGC Pty Limited, a BG Group business is planning to perform a seismic survey that will provide imagery of the subsurface geology thus improving the understanding of the deposition coal seam measures with regard to potential gas production in the Bowen Basin. The areas to be surveyed in the Bowen Basin are predominately situated on: Authority to Prospect ATP806, s.73 irrelevant information

The Environmental Authority (EA) conditions for these areas will be reinforced throughout this Environmental Management Plan (EMP). A copy of the Environmental Authority for ATP806 is attached in Appendix A; this has standard code compliant conditions which are generally replicated on all the Environmental Authorities listed below:

Tenement En	vironmental Authority
ATP806	PEN200013707
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Each individual EA for an area must be referred to prior to conducting seismic activities as there are some differences between the licenses. This EMP seeks to highlight specific environmental issues that potentially may arise throughout the seismic project. This document assigns appropriate management or mitigation measures to the activity to prevent or minimise environmental harm and ensure environmental commitment to the activity. This document will delegate direct responsibility to the relevant stakeholders.

1.1 Description of Activity

Seismic activities for the purpose of determining the underlying geological features of an area are accomplished in six distinct stages:

A. Desktop route selection

The route of seismic lines is initially determined through GIS mapping from a desktop survey. The routes are chosen taking into account areas of subsurface interest, existing seismic line locations and obvious surface obstructions. The environment team will be required to review the proposed route to determine the most appropriate alignment with the least impact to environmental sensitive areas. Environmental avoidance or mitigation measures should be employed at this early stage to determine the best route that can be taken that will minimise impacts to the environment.

B. Land access and landholder acceptance

The Land Access Consultants (LAC) will head into the field to negotiate access with the relevant landholders known as consent to entry. Once consent to entry is given and access rules determined in consultation with the landholder the survey team will work with the landholder to incorporate any landholder route preference where possible.

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C. QGC divisions sign off on route selection

The proposed route will be inspected by the QGC Environmental and Cultural Heritage officers to ensure the routes selected are within compliance of the relevant Environmental Authorities and company requirements. The Field Environmental Officer will be required to check the route for plant species, fauna, weed assessment and other environmentally sensitive areas to ensure that the activity is performed with minimum disturbance to the surrounding environment. The final route will be pegged in consultation with the Field Environment Officer (FEO), Cultural Heritage Officer (CHO) and landholders.

D. Line clearance

The seismic line requires clearance of an easement with a width of 10m. Any areas that will require vegetation disturbance or clearance will be completed using a tracked mulching machine. Where seismic lines require vegetation to be cleared the mulcher will be used, but only in extreme cases where it is impossible for the seismic vehicles to drive over the existing vegetation. All clearing of vegetation must be in compliance with the relevant EA for that tenement. Any vegetation clearing will be conducted in the presence of a FEO and in compliance with the appropriate management plans that form a part of this EMP.

E. Recording

The recording crew will follow after the pegging and line clearances have been completed. Cables and geophones will be laid along the lines. Vibroseis trucks will travel along the lines stopping at each peg, and then vibrating the surface area, sending energy into the ground while the geophones attached to the cables record the reflected data. The impact of these vibrations is minimal and would only be felt up to a maximum of 30 to 50 metres away (depending on the vibrator being used). Two types of vibrator will be used in the Bowen Basin; the Envirovibe Vibroseis vehicle is approximately 8 tonnes and only 2.5 metres in width and the Hemi 60 Vibroseis vehicle which is approximately 40tonnes and 3.0 metres in width.

The cable will be on the ground at any given location for two to four days. It is expected to record about 8 to 10 kilometres a day. The cables will be dropped off at regular intervals by 4 wheel drive utilities. Stock should be excluded from paddocks containing receiver lines during recording to stop tangles and protect the cables. Where it is not practical to exclude stock temporary fencing should be erected in consultation with the landholder.

F. Restoration

As soon as practical after the recording, a restoration crew will travel along the lines, repairing any damage, removing the pegs, repairing fences and ensuring rehabilitation requirements are met.

1.2 Location of Activity

The survey will take place within the Bowen Basin. The areas to be surveyed in the Bowen Basin are:

- Authority to Prospect ATP806 s.73 irrelevant information approximately 750km along the Dingonose of 2D seismic;
- s.73 irrelevant information
- s.73 irrelevant information

These tenements are located on properties predominately owned by private landholders. A large number of fields will be examined under the seismic program. **Figures 1 – 3** show the location of the properties and the seismic survey lines proposed. These tenements or fields may have current exploration wells in place and the seismic activity is being produced for assessment and planning of future field development.

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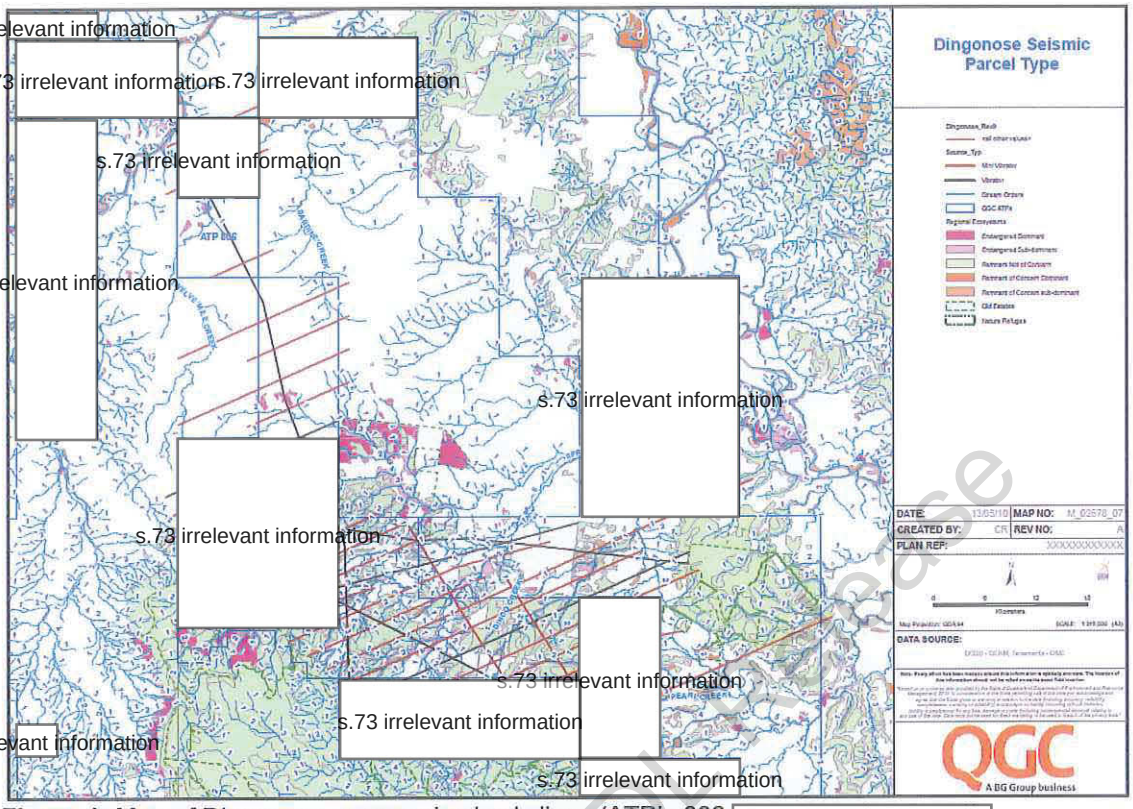

Figure 1: Map of Dingonose proposed seismic lines (ATP's 806, s.73 irrelevant information

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The site traverses a range of environmentally sensitive areas including Category C classed areas (State Forests) and Category B classed areas (Endangered regional Ecosystems-Biodiversity Status). The regional ecosystem identification (RE ID) of the area's to be encountered are likely to include the following endangered regional ecosystems listed in **Table 1** by RE ID:

Table 1 – Regional Ecosystems in Bowen Basin seismic area

Regional Ecosystem Identification (RE ID)	Description
11.3.1	*Acacia harpophylla* and/or *Casuarina cristata* open forest on Cainozoic igneous rocks
11.3.11	Semi evergreen vine thicket on alluvial plains
11.4.1	Semi-evergreen vine thicket ± *Casuarina cristata* on Cainozoic clay plains
11.4.3	*Acacia harpophylla* and/or *Casuarina cristata* shrubby open forest on Cainozoic clay plains
11.4.8	*Eucalyptus cambageana* woodland to open forest with *Acacia harpophylla* or *A. argyrodendron* on Cainozoic clay plains
11.4.9	*Acacia harpophylla* shrubby open forest to woodland with *Terminalia oblongata* on Cainozoic clay plains
11.5.15	Semi-evergreen vine thicket on Cainozoic sand plains/remnant surfaces
11.5.16	*Acacia harpophylla* and/or *Casuarina cristata* open forest in depressions on Cainozoic

Regional Ecosystem Identification (RE ID)	Description
	sand plains/ remnant surfaces
11.5.17	*Eucalyptus tereticornis* woodland in depressions on Cainozoic sand plains/remnant surfaces
11.8.13	Semi-evergreen vine thicket and microphyll vine forest on Cainozoic igneous rocks.
11.9.1	*Acacia harpophylla-Eucalyptus cambageana* open forest to woodland on fine-grained sedimentary rocks
11.9.4	Semi-evergreen vine thicket or *Acacia harpophylla* with a semi-evergreen vine thicket understorey on fine grained sedimentary rocks
11.9.5	*Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks
11.9.10	*Eucalyptus populnea*, *Acacia harpophylla* open forest on fine-grained sedimentary rocks
11.9.12	*Dichanthium sericeum* grassland with clumps of *Acacia harpophylla* on fine-grained sedimentary rocks
11.11.14	*Acacia harpophylla* open forest on deformed and metamorphosed sediments and interbedded volcanics
11.11.18	Semi-evergreen vine thicket on old sedimentary rocks with varying degrees of metamorphism and folding
11.12.21	*Acacia harpophylla* open forest on igneous rocks. Colluvial lower slopes

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It must be noted that the above list of regional ecosystems is not an exhaustive list and other regional ecosystems may occur in the area. All areas are to be assessed through desktop and on ground methods throughout the pegging of the seismic lines.

The Category C environmentally sensitive areas (state forest) areas adjacent to or around the seismic activities includes: Duaringa State Forest, Walton State Forest, Arthurs Bluff State Forest, Dawson Range State Forest. There are also the following Category A environmentally sensitive areas in the areas surrounding the seismic activities; Taunton National Park, and Blackdown National Park, Junee National Park.

Access into State Forest areas can only be with written approval from the regulating agency (Department of Environment and Resource Management (DERM)). These approvals have **not** been obtained at time of publication of this document. Disturbance in State Forests should be restricted to existing access tracks unless approvals are in place. A copy of the written approval is to be scanned and forwarded to QGCenvironment@bg-group.com.

1.3 Environmental Clearance

An environmental clearance (and cultural heritage clearance) of the seismic lines must be conducted prior to any disturbance being caused or seismic activities taking place. The environmental clearance is conducted to ensure compliance with the conditions of the relevant Environmental Authority, as well as ensuring that environmental harm as a result of the activities is avoided where possible. The following points provide an outline of what the environmental clearance entails.

1. Detailed information on the seismic line is to be assessed; this should include as a minimum a review of spatial information on the areas the line crosses including regional ecosystem information, essential habitat and watercourses etc. Further information searches can be conducted using the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC) protected matters search tool and the DERM

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wildlife online search tool (both available online) where necessary. This should be assessed to ensure that compliance with the relevant Environmental Authority is achieved through this assessment.

2. Once a desktop assessment of the areas to be crossed has been completed the field component of the clearance must be conducted. This will involve the environmental professional who has conducted the desktop assessment travelling along the route of the seismic activity to assess any on ground issues that have not been captured on the desktop assessment, and also to validate the desktop findings. This is done to ensure the route taken provides the best environmental outcome possible.

3. The on-ground assessment is to be limited to assessing the 10m width of the easement to be disturbed by the seismic activities with a visual inspection either side of the line without leaving the 10m easement.

4. During the course of the on ground clearance the FEO is to record all details required on the 'Seismic Environmental Clearance Report' and ensure all Environmental Authority requirements will be complied with in conducting the seismic activities.

5. Relevant photographs along the seismic line should be taken and any flora to be retained should be flagged and noted through the use of GPS.

6. Details of watercourse crossings should be noted and details of the proposed method of transit through the area. This will then trigger a coordinate for rehabilitation if disturbance occurs.

7. After the line has been pegged the data collected in the field and the Clearance Document should be typed into a digital copy of the 'HSSE Field Clearance Checklist – Document Number: OPS-T-FRM-00002-HSSE,' printed, dated, supporting information attached and signed by the FEO who completed it. A scanned copy should then be sent, as a .PDF, to: the Projects Environment Coordinator. The original should be filed on site.

   This is a simplified method for conducting the environmental clearance and the actual process may vary however these are the fundamental factors that must be conducted to complete an environmental clearance.

   During the pegging party there are some key management issues that should be addressed consistently throughout the project. These primary risks include the management of vehicles, flora & fauna, weeds, watercourses, noise, vibration, waste which require consistent primary management.

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2.0 ENVIRONMENTAL MANAGEMENT PLANS

2.1 Air Management

Emissions data is collected across all assets by QGC to monitor the impacts to air quality. To enable air emissions reporting the volumes of fuels and gases used during the project must be recorded and provided to QGCEnvironment@bg-group.com . The reporting form is contained within Appendix C to this plan.

Table 2– Air Management Plan

Air Management Plan	
BG Standard – Air Quality Standard (BGA-HSSE-ENV-ST-1507)	
Aim	To complete the operation of the seismic survey in a manner to maintain ambient air quality of the local area.
Performance Targets	• Maintenance of acceptable limits of vehicular and machinery operating emissions. • No complaints from local landholders regarding air quality. • No nuisance caused at a sensitive place. • Avoidance of excessive visual dust cloud during seismic activities. • Dust suppression for seismic lines and access roads being carried out on an as required basis.
Management Strategy	• Vehicles and machinery shall be fitted with appropriate exhaust systems and devices. Such devices will be maintained in good working order. • Regular visual observance of exhaust systems for any defects should occur • Watering of seismic locations/areas will be required if excessive dust occurs and causes the need for containment, using water less than 2000 mg/L total dissolved solids and between 6.0 – 9.0 pH and in compliance with the relevant EA. This would be necessary in areas where excessive mulching is required. • Visual observations of dust emissions during windy/dry periods. • Consult with and advise any residents or landholders who may be impacted by temporary dust emissions before activities start. • A 'drive to the conditions' strategy to limit dust nuisance • Avoid smoke generation by adhering to a strict **no burning** policy.
Monitoring & Reporting	• During operations the entire length of the easement and associated access areas will be regularly inspected to assess the effectiveness of air quality protections. • Regular audits and reviews in accordance with this EMP will be undertaken, with recommendations and corrective actions to be implemented in an efficient timeframe. • Daily and Weekly work reports shall be recorded and reviewed by each supervisor or manager. • Non-compliance and incident reporting will be closed out by senior management to ensure prompt rectification and change management as required. • Landholder complaints will be recorded and reported to the Social Performance Team as soon as practical after receiving the complaint.
Corrective Actions	• Ensure all aspects of this EMP are followed; • Instigate extra dust suppression watering runs where required.
Responsible Person	• Seismic Party Manager

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2.2 Soil Management

The relevant environmental value for the Central Project Area in relation to soil management is primarily the preservation of the depth and quality of the soil to provide a basis for future land use either by agriculture or for environmental conservation. The preservation of soil will limit the potential for erosion and loss of topsoil, which will affect the agricultural use and biodiversity of the land.

Table 3–aSoil Management Plan

Soil Management Plan	
Aim	To avoid contaminating soil from seismic activities. To manage any pre-existing contaminated soils such that extent of contamination is not exacerbated by Project activities.
Performance Targets	• No contamination of soils arising from seismic activities. • No release of contaminates, hazardous substance or dangerous goods to soil. • Identify all pre-existing contaminated soils that are likely to be impacted by seismic activities. • Where pre-existing contaminated soils are identified, and disturbance by seismic activities is unavoidable, develop and implement appropriate management strategies in line with current legislation. • No contamination of soils which limits future land use.
Management Strategy	• Strategies for the prevention of potential land contamination will include: 1. Establishing and maintaining a hazardous material register detailing the location and quantities of hazardous substances including their storage, use and disposal. 2. Induction and training of personnel and implementation of safe work practices for minimising the risk of spillage. • All chemicals and oils will be managed in accordance with the *Dangerous Goods Safety Management Act 2001* (DGSM Act) with respect to Flammable and Combustible liquids, and spill-containment facilities built in accordance with AS1940 and AS3780. • Bunds are required for all liquid chemicals and hydrocarbons in accordance with Australian Standards (bunding will contain 110% of the largest container stored within or 25% of the total liquid stored. The bund will also be made of suitable material for the chemical stored within). • A refuelling procedure will be developed for all mobile equipment and Job Safety and Environmental Analysis (JSEA) completed for selection of on-site refuelling locations. • Bunded collection sumps will be on a graded floor with no connection to sewer or water bodies. • Bunds will avoid rainwater ingress (temporary or permanent roof). • Bunds will not have leaks. • Bunds will be regularly cleaned using a suction truck to remove contaminated wastes, wastes will be removed from the site via a licensed waste removal contractor. • The following mitigation measures will be utilised to prevent or minimise the impacts from chemicals for weed management.

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	– Spraying will not to occur on days where the wind speed exceeds 10 km/h. – Landholders will be consulted about the types and application rates of chemicals that are to be used. – Cattle should remain out of the area to which chemicals have been applied for at least 10 days. – The Material Safety Data Sheet of each chemical will be consulted to determine whether the chemical can be used near riparian areas. • DERM will be notified as soon as reasonably possible of any contamination causing or threatening significant environmental harm from spills. • Spill-absorbent materials (not sand) will be on hand for use on minor spills. • All contaminated absorbent materials will be removed according to the Waste Management Plan. • Any existing contaminated sites that may be encountered will be avoided where practical. • Potential contaminated lands and lands upon which notifiable activities have been carried out will be listed on the DERM Environmental Management Register (EMR). • Contaminated land assessments will be undertaken at sites with a reasonable chance of contamination. • As soon as reasonably possible after contaminant release, work will be stopped, contamination rectified and remediated and recurrence prevented. • Remediation of contaminated land will use the most appropriate available method to achieve required commercial or industrial guidelines. • Validation sampling of any remediated area will be used to establish the site as suitable for intended use as per the relevant DERM *Draft Guidelines for the Assessment and Management of Contaminated Land* and National Environment Protection Measure (NEPM) Guidelines.
Monitoring & Reporting	• The integrity of storage facilities for hazardous materials, wastes and bunded areas will be routinely inspected. • Regular equipment inspections and maintenance will be performed. • Spills will be monitored post clean-up to ensure the site has been remediated. • All incidents of contamination will be recorded and followed up. • All complaints about potential contamination will be recorded and followed up. • Contaminated sites undergoing rehabilitation will be regularly inspected to assess the adequacy of rehabilitation measures • The FEO will keep records of routine visual inspections and will report any contamination incidents to the relevant Manager. • The following will be classified as an incident or failure to comply in relation to soil contamination management: 1. Breach in integrity of bunds. 2. Release of contaminants. 3. Failure to notify relevant authorities on encountering pre-existing contaminated land. 4. Non-compliance with AS 1940 and AS 3780. 5. Should an incident/failure to comply occur in relation to soil contamination management, a selection of the following corrective actions will be considered where relevant: 1. Rectify storage/handling non-compliance.

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	2. Contain and remediate or dispose of contaminated material/contaminants. 3. Investigate and implement measures to prevent recurrence.
Corrective Actions	• If an area of contamination is reported, the cause will be identified and the area of contamination contained. This may involve isolating the source or implementing controls around the affected site.
Responsible Person	• Seismic Party Manager

2.3 Flora and Fauna

The site traverses a range of environmentally sensitive areas including Category C classed areas (including State Forests) and Category B classed areas (including Endangered regional Ecosystems-Biodiversity Status). These areas require special requirements for entry and should be avoided at all times until an approval is in place. **Figures 1 to 3** show the areas along the seismic routes that enter Environmentally Sensitive vegetation zones. An FEO will guide the seismic route in these areas to minimise disturbance.

Prior to conducting the seismic activities the lines to be taken will be surveyed by an environmental professional to ascertain the existence of any rare, threatened or endangered species in the area. This will involve the use of desktop and on-ground information.

The desktop assessments will include flora and fauna studies of publically available information through the use of EPBC Protected Matters searches. The following information has been obtained from the EPBC search of the areas and is not exhaustive. Specific searches are to be conducted relevant to specific seismic lines to understand the true flora and fauna background of the areas.

There are a number of threatened ecological communities (identified under the EPBC act) that may occur in the area that the seismic activities are to occur in, these have been identified as:

- Brigalow (*Acacia harpophylla* dominant and co-dominant) – (Endangered)
- Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin – (Endangered)
- Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bio regions – (Endangered)

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s.73 irrelevant information

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s.73 irrelevant information

Plant species listed on the EPBC protected matters search engine has defined the following species as Vulnerable or Endangered that may occur in the ATP 806 & s.73 irrelevant information regions where seismic activities are to be conducted;

- *Acacia Grandifolia* – (Vulnerable)
- *Aristida annua* – (vulnerable)
- *Cadellia pentastylis* – Ooline (Vulnerable)
- *Cycas ophiolotica* – (Endangered)
- *Daviensia discolour* – (Vulnerable)
- *Dichanthium queenslandicum* – King Blue-grass (Vulnerable)
- *Digitaria porrecta* – Finger Panic Grass (Endangered)
- *Homoranthus decumbens* – (Vulnerable)
- *Leucopogon cuspidatus* – (Vulnerable)
- *Logania diffusa* – (Vulnerable)
- *Macrozamia platyrachis* – (Endangered)

The following fauna species are listed as Rare, Vulnerable and/or endangered that may occur in the ATP 806, s.73 irrelevant information region,

- *Erythrotriorchis radiatus* – Red Goshawk (Vulnerable)
- *Geophaps scripta scripta* – Squatter Pigeon (southern) (Vulnerable)
- *Neochima ruficauda ruficauda* – Star Finch (eastern), Star Finch (southern) (Endangered)
- *Rostratula australis* – Australian painted snipe (Vulnerable)
- *Turnix melanogaster* – Black-breasted Button-quail (Vulnerable)
- *Chalinolobus dwyeri* – Large-eared Pied Bat, Large Pied Bat (Vulnerable)
- *Dasyurus hallucatus* – Northern Quoll (Endangered)
- *Nyctophilus timoriensis (South-eastern form)* – Greater long eared bat (Vulnerable)
- *Onychogalea fraenata* – Bridled Nail-tail Wallaby (Endangered)
- *Delma torquate* – Collared Delma (Vulnerable)
- *Denisonia maculata* – Ornamental Snake (Vulnerable)
- *Egernia rugosa* – Yakka Skink
- *Furina dunmalli* - Dunmall's Snake (Vulnerable)
- *Lerista allanae* – Allan's Lerista (Endangered)
- *Paradelma orientalis* – Brigalow Scaly-foot (Vulnerable)
- *Rheodytes leukops* – Fitzroy River Turtle (Vulnerable)

s.73 irrelevant information

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s.73 irrelevant information

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Table 4 Flora and Fauna Management Plan

Flora & Fauna Management Plan	
Aim	• Maintain abundance, species diversity and distribution of flora and fauna; • Ensure feral animal activity does not increase as a result of seismic operations; • To ensure declared weeds do not infest disturbed land as a result of seismic operations; and • Ensure all activities remain outside exclusion zones.
Performance Targets	• No declared weeds to be introduced to any new areas on site due to seismic activities; • No impacts of weed invasion on surrounding vegetation communities; • Minimise disturbance to vegetation surrounding working areas; and • No harm to native fauna.
Management Strategy	• An environmental clearance must be conducted by a FEO prior to any disturbance; • There are habitat and vegetation species distinctly marked throughout the Environmental clearance and flagged in the field with tiger tape. No vegetation is to be removed unless approved by an FEO. • Unnecessary clearing of vegetation to be avoided. Vegetation to be mulched should be clearly marked; • Clearing activities must as far as practicable only result in the removal of trees

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	and/or shrubs les than 100mm diameter at breast height • Selective trimming of vegetation by handsaw should be first option prior to mulching. • Hollow logs and fauna habitats should be avoided. Any signs of habitat should be flagged during the site pegging party • Mulch will be left spread evenly across the access area • Vegetation outside the footprint of the seismic lines are not to be cleared without appropriate cultural heritage, environmental and land access approvals. • Site access via existing tracks, where practicable; • Plan access roads and work sites to avoid disturbing large and/or mature trees or species that have limited ability to regenerate where practicable; • If weeds and declared pest plants are identified during clearing, the FEO should report abundance, species etc and assess the requirements for weed wash downs • Keep work areas free from food scraps to prevent scavenging animals entering the site; • Fauna spotter to be present during mulching where identified as necessary by FEO. • Store equipment to minimise potential for fauna to be trapped in equipment or confined spaces. • Plant and equipment used for seismic must be operated to reduce impacts on flora and fauna habitats.
Monitoring and Reporting	• Weekly inspections will occur and weed control will be undertaken if necessary in accordance with best practice specific to the species in question; • Should wildlife be encountered prior to clearing, the Site Supervisor or other designated person should report to the FEO, so that the wildlife can be removed and relocated; and • Any wildlife incidents to be reported to the FEO. • If regular incidents with fauna are identified by the FEO, a site specific plan is to be implemented to minimise incidents in accordance with species type, nature of the incident and location of incident. • Review weed wash down process if the presence of declared weeds is identified in the work area.
Corrective Actions	• Remove noxious weeds and implement appropriate remedial action; • Areas of erosion repaired and vegetation established; and • Review flora and fauna management procedures if FEO identifies it necessary.
Responsible Person	• Seismic Party Manager • Seismic HSSE Supervisor

2.4 Pest and Weed Management

The seismic activities will traverse across a large number of properties. The introduction and expansion of noxious pest and weed species is a potential impact throughout the clearing process. The mulching of vegetation and vehicle movements can result in the establishment or expansion of weed propagules.

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Weed management is imperative to all operation activities and QGC has a weed management plan in place that outlines QGC commitments towards minimising the risk of our activities. Weed assessment will take place throughout the pegging of the Seismic survey lines and a risk rating will be determined. This rating will determine the measures to be enforced. Two portable weed wash down facilities will be engaged for the seismic project to ensure weed management requirements are being met.

A Class 1 pest is one that has the potential to become very serious problem and must be prevented from being introduced in new areas. The presence of any Class 1 plants must be reported to Biosecurity Queensland on phone: 13 25 23. Declared Class 1 weeds known or expected to occur throughout Bowen Basin QGC tenement areas include but are not limited to:

- Prickly Pear (Opuntia spp. only)
- Harrisia cactus

Class 2 & 3 pests are those already spread over substantial areas but its impact needs to be controlled. Declared Class 2 weeds known or expected to occur in this region include:

- Rubber Vine
- Bellyache Bush
- Parkinsonia
- Sword Pear
- Hymenachne
- Willows Cactus
- Lantana
- Mother of Millions
- Parthenium
- Giants Rat Tail Grass

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Table 5 Pest & Weed Management Plan

Pest & Weed Management Plan	
QGC Operational Weed Hygiene Guideline: QGC-T-GDL-001	
Aim	To prevent the spread and/ or introduction of weed species.
Performance Targets	• No new weed species introduced to a property. • No spread of existing weeds. • No loss of agricultural production capability from land • No loss of biodiversity of native species
Management Strategy	• Two portable wash down facilities will be engaged for the seismic project. • All equipment is to be washed down in accordance with QGC-T-GDL-001, then inspected and approved by qualified weed hygiene personnel; • During the clearing and earthworks machinery and any vehicles entering the right of way must be washed when entering and upon completion of works (See Table

	4). • Should a vehicle or plant travel outside of the right of way (ROW) or designated access tracks, rewashing may be required. These areas are to be available for viewing at the contractor's daily meeting area. • Random inspections by a trained FEO or Land Access Consultant, following which an additional wash down may be required. • A weed declaration will be required in accordance with the QGC Pest and Weed Management Plan. • Site locations with confirmed weed outbreaks will only be accessed in dry conditions to minimise weed spread. • FEO to run through weed wash down requirements prior to entering known weed infested areas. • Chemical controls (where deemed necessary) will be used in accordance with AS 2507 and applied by appropriately licensed personnel. Note the management strategies required in **Table 3** to prevent environmental harm from chemical applications. • Identified areas of weed infestation are to be reported to Land Access.
Monitoring & Reporting	• Monitoring and reporting is to be carried out in accordance with Section 7 of this EMP. • Regular monitoring of sites for pest & weed status should occur by the FEO during the project. • Landholder complaints will be recorded and reported to social performance as per the complaint management system. • Non-compliance and incident reporting will be closed out by senior management to ensure prompt rectification and change management as required.
Corrective Actions	• Weed control measures to be implemented in direct consultation with the environment team if an pest and/ or weed infestation occurs • Work policies and procedures are to be reviewed regularly to ensure continual improvement in performance
Responsible Parties	• Field Environmental Officer • Land Access Consult • Seismic Party Manager • Seismic HSSE Supervisor

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Table 6 - Weed Wash Down locations

Location	Address	Standard	Requirements /comments
Mobile units (2)	On site	Trailer mobile facility	Consent with landholder as to location for use
Emerald	Landmark: saleyards Address: Batts Street	Maximum vehicle size: road train Height limit: no Hose detail: high pressure; low flow hoses; has an oil separator	Contact: John Hooper, Central Highlands Regional Council Telephone: (07) 4982 8333

		Cost: $30 deposit for key available from CHRC officer during office hours OR pre-paid key is $30; $30 for 1 hour	Hours: 24 hours
Duaringa	Landmark: opposite saleyards (golf course, airport) Address: Aerodrome Road Surface: concrete slab	Operational End 2003 Maximum vehicle size: road train Height limit: no Hose detail: high pressure; high volume hose Cost: $2 for 30 minutes	Contact: Don Carrol, Central Highlands Regional Council Telephone: (07) 4935 7101
Bingegang	Landmark: near substation and pump station Address: Mackenzie River Capella Road	Maximum vehicle size: semitrailer Height limit: no Hose detail: high pressure hose Cost: free Surface: concrete slab	Hours: 24 hours
Clermont	Landmark: saleyards (signposted) Address: Herschell Street	Maximum vehicle size: road train type-two Height limit: no Hose detail: n/a Cost: free Surface: bitumen/concrete slab	Contact: Charlie Stranks, Isaac Shire Council Telephone: sch4p4(6) Personal information Hours: 24 Hours
Baralaba	Landmark: near showground and old saleyards Address: Rannes Road	Maximum vehicle size: machinery Height limit: no Hose detail: high pressure; high volume hose Cost: $2 for 15 minutes Surface: concrete slab with tilt	Contact: Banana Shire Council Telephone: (07) 4992 9512
Biloela	Landmark: adjacent to water treatment plant Address: Quarry Road	Maximum vehicle size: road train Height limit: no Hose detail: high pressure; high volume hose Cost: $2 for 15 minutes Surface: concrete slab with tilt Hours: n/a	Contact: Gordon Twiner, Banana Shire Council Telephone: sch4p4(6) Personal information
Dysart	Landmark: Dysart compound Address: n/a	Maximum vehicle size: body truck or semitrailer Height limit: no Hose detail: high pressure spray; gerni on request Cost: free Surface: concrete slab Hours: 7 am to 3 pm	Contact: Graeme Wehmeier, Isaac Regional Council Telephone: (07) 4958 1166; sch4p4(6) Personal information
Glenden	Landmark: council depot Address: Currawong Street	Maximum vehicle size: heavy vehicle Height limit: n/a Hose detail: high pressure; high volume hose Cost: free Surface: concrete Hours: 7.30 am - 3.30 pm (week days)	Contact: Neville Bell, Isaac Regional Council Telephone: sch4p4(6) Personal information
Middlemount	Landmark: Middlemount compound Address: Nolan Drive	Maximum vehicle size: n/a Height limit: n/a Hose detail: garden hose; high pressure spray Cost: free Surface: n/a Hours: n/a	Contact: Gordon Webley, Isaac Regional Council Telephone: (07) 4964 5402
Moura	Landmark: west of town	Maximum vehicle size: road train (also has a	Contact: Gordon Twiner,

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	near water treatment plant Address: Dawson Highway	facility for smaller vehicles) Height limit: no Hose detail: high pressure; high volume hose Cost: $2 for 15 minutes Surface: concrete slab with tilt Hours: n/a	Banana Shire Council Telephone: sch4p4(6) Personal information
Rolleston	Landmark: near sports ground; cattle dip and old saleyards Address: One Mile Road	Maximum vehicle size: semitrailer with prime mover Height limit: no Hose detail: high pressure low volume hose 20 L per minute Cost: $2 per 30 minutes Surface: 23 m concrete slab Hours: 24 hours	Contact: Central Highlands Regional Council Telephone: (07) 4984 1166
Springsure	Landmark: saleyards Address: Dip Road	Maximum vehicle size: semitrailer with prime mover Height limit: no Hose detail: hose on fixed reel Cost: $2 for 20 minutes Surface: 23 m concrete slab Hours: n/a	Contact: Central Highlands Regional Council Telephone: (07) 4984 1166
St Lawrence	Landmark: Council compound Address: Kinnaird Street	Maximum vehicle size: prime mover or body truck Height limit: no Hose detail: high volume, high pressure; guerney on request Cost: free Surface: concrete slab Hours: office hours	Contact: Graham Wehmeier, Isaac Shire Council Telephone: (07) 4964 5400

Source: Queensland Department of Primary Industries & Fisheries

2.5 Noise and Vibration

The machinery associated with the seismic activities will result in an increase in noise and vibration level above that of the natural background. The movement of heavy vehicles on and off site will increase noise levels on local roads. Landholders should be informed/ notified prior to seismic activities being conducted. Many locations will farm a diverse range of species of animal including cattle, sheep, pigs etc. Prior to seismic operations, QGC will notify the land holder to minimise the effects the activities have on sensitive receptors.

QGC will endeavour to restrict noise and vibration levels reaching sensitive receptors to the limits stated in the conditions detailed in Table 8.

Table 7- Noise and Vibration Management Plan

Noise & Vibration **Management Plan**	
Aim	• To keep noise levels from reaching sensitive places and below the levels stated in Table 8 of this EMP.
Performance Targets	• Noise levels at sensitive places below that specified in the conditions; • No complaints from neighbours in regards to excess noise or vibration; • Vehicle and machinery maintained and operated in an efficient and quiet manner; • Operations restricted to the hours of 7am to 6pm, 7 days a week; and • Noise does not cause nuisance at any sensitive or commercial place.
Management	• Provide and maintain low noise generating equipment;

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strategy	• Repair or replace defective mufflers on vehicles and machinery; • Keep seismic operations to the times of 7am – 6pm, 7 days a week. • Various locations may be within close proximity to private landholders. All landholders are to be informed of the activity a minimum of 24 hours prior to the activity. • Neighbours to be notified by QGC of potential adverse weather and operating conditions that may increase the seismic activity impacts.
Monitoring & Reporting	• Noise monitoring shall be completed if required to determine impact of activities following a legitimate complaint; and • Any noise complaints will be recorded along with the actions taken to resolve the complaint. Any noise complaints must be reported to the Manager Environment Operations and Social Performance as soon as possible once the complaint is raised. • Review noise attenuation procedures and equipment; and • Conduct adequate equipment maintenance.
Corrective action	• Instigate noise attenuation measures and ensure that all existing attenuation measures are maintained in an effective and efficient manner. • Complaints are to be addressed promptly with investigations and reporting to DERM if required.
Responsible Person	• Seismic Party Manager • Land and Access Consultant

Table 8- Proposed Noise Limits

Time Period	Noise level at a sensitive place measured as the Adjusted Maximum Sound Pressure Level $L_{A\ max,\ adj,\ T}$
7am –6 pm	30 dB(A)
6pm–10pm	30 dB(A)
10pm–7am	28 dB(A)
Time Period	**Noise level at a commercial place measured as Adjusted Maximum Sound Pressure Level $L_{A\ max,\ adj,\ T}$**
7am– 6 pm	35 dB(A)
6pm–10pm	35 dB(A)
10pm–7am	33 dB(A)

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2.6 Stock Access and Control

The Bowen Basin seismic activities will cross a range of different areas, with a large amount of this land's regular use being for keeping livestock. QGC is committed to ensuring that farming activities are not hindered by the Project activities. Without adequate control of stock movements, the interaction of stock with construction activities may result in:

- injury or fatality of stock;

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- loss or escape of stock; and
- restricted access to pasture.

Unrestricted stock movements may also result in damage to equipment, which, in turn, may endanger personnel.

Table 9 - Stock Access and Control

Stock Access & Control Management Plan	
Aim	• To minimise the impact on stock movements and farming activities.
Performance Targets	• Where necessary, stock access will be restricted from seismic sites. • No stock injured or killed due to seismic activities. • No complaints from stock farmers. • No loss of productivity from stock farming where possible.
Management strategy	• Where there is a risk to stock safety or seismic equipment, stock may be restricted from accessing certain areas. • Landholders will be consulted to determine stock movement requirements. • Agreements will be reached with landholders to restrict access during seismic activities so that stock is not unduly disrupted. • Landholder requirements will be communicated to all relevant QGC personnel. • Upon the conclusion of the seismic activities, sites will be rehabilitated to ensure there is no impediment or potential to cause harm to stock.
Monitoring & Reporting	• All stock injuries or deaths attributable to the Project will be recorded and investigated. • All personnel will be aware of landholder requirements and will communicate any breaches (e.g. fences in need of repair). • Upon decommissioning, sites will be rehabilitated to ensure there is no impediment or potential to cause harm to stock.
Corrective action	• Complaints will be addressed promptly by Land Access Officer and recorded in the incident reporting database if non-compliance with landholder requirements is identified. • Corrective action will be taken to prevent any repeat of stock injuries or deaths attributable to the seismic activities.
Responsible Person	• Seismic Party Manager • Land and Access Consultant

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2.7 Waste Management

Recognition is given to limitations in resource availability and activities shall minimise the use of material and subsequent generation of waste. All unavoidable waste shall be managed in such a way that the risk of harm to human health and pollution of the environment is reduced to a practicable minimum.

QGC requires that 'One-time waste', waste from large 'one-off' activities e.g. construction projects, drilling operations and remediation activities are recorded and routinely compiled and provided to QGC Environment. This data is required to track and communicate performance, identify areas of improvement and to set environmental performance targets.

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Waste Records

This includes all unwanted materials stored or taken off-site for disposal or recycling. It also includes solid wastes disposed of directly by the company on-site (by re-injection, landfill and incineration). Materials range from inert site, platform or construction wastes, scrap metals, oils, sludge and chemicals to excavated material, used fittings and general site and office wastes.

Wastes shall be categorised as Hazardous, General, Metal or Cuttings (broken down according to the OGP (International Association for Oil and Gas Producers) classification groups) and the quantity of waste sent to each disposal route shall be identified.

At the completion of the project information on the amount, type and reuse/disposal of all waste material must be provided to: QGCenvironment@bg-group.com. The Details on waste classifications and disposal routes and the required waste record form is found in Appendix B.

All regulated wastes must be tracked and recorded in **Waste Tracking (Regulated Waste) Procedure (QGC-T-PRC-00001).**

Table 10 – Waste Management Plan

Waste Management Plan	
Reference Documents: 1. QGC Waste Management Plan 2. BG Standard: Resource Use and Waste Management Standard (BGA-HSSE-ENV-ST-1530) 3. Waste Tracking (Regulated Waste) Procedure (QGC-T-PRC-00001)	
Aim	To minimise waste generation and maximise reuse and recycling of construction waste products. To dispose of waste in a manner that does not cause contamination of soils, water or air.
Performance Targets	• Minimal environmental impacts related to waste management. • No evidence of litter or refuse generated from construction related activities following post-phase clean-up program. • Maintain clean and waste efficient sites. • No litter left on or off site after seismic activities/ rehabilitation has taken place. • Records of regulated waste disposal are maintained. • Volumes of waste generated from activities are minimised
	• Waste should be avoided or reduced at the source where possible. • A **no burning** policy must be in place. • Stockpile and salvage reusable and recyclable wastes, such as timber skids, pallets, drums and scrap metals.
Management Strategy	• Collecting and removing waste oil, solvents and other toxic materials from site for recycling, reuse or disposal at approved locations. • Waste oil and chemical storage areas must be suitably bunded in accordance with DERM requirements. Removal must be completed by a licensed contractor and appropriate records must be kept. • Oil filters will be stored in a marked container that allows the oil to drain out but not escape. Oily rags will be stored in a marked oily rag bin • Collection of chemical wastes in 200 litre drums (or similar sealed container), appropriately labelled, for safe transport to an approved chemical waste depot

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	or collection by an approved regulated waste transporter. • Contractor to keep records of all trackable wastes, these are to be accessible to QGC employees. • Collecting and transporting general refuse to local municipal council approved disposal sites. Councils will be consulted about their capacity to receive waste. Waste management facilities will not be overloaded, and wastes will be transported to a facility that can appropriately manage the waste material. • Refuse containers will be located at each worksite. • Where practical, wastes will be segregated and reused/recycled (e.g. scrap metal). • All equipment and facilities will be maintained in a clean and safe condition • Wastes will be segregated and bins or storage areas labeled to ensure the correct items are disposed of appropriately. • All quantities of waste will be recorded to identify better waste minimisation strategies. • Waste management practices will not result in harm to fauna and flora. • Pest species' numbers will be monitored to ensure pest numbers do not increase due to waste management practices. • All personnel shall be instructed in project waste management practices as a component of the environmental induction process.
Monitoring & Reporting	• Housekeeping checks to ensure waste is being stored correctly and no litter occurring. • Review of old work sites after relocation. • Review of operations waste management procedures, and quantity of regulated wastes generated. • Ensure all quantities of waste are recorded and reported to the Manager of Environment Operations
Corrective Actions	• Ensure appropriate waste disposal facilities are made available at all seismic locations. • Ensure site clean up's are effective • Ensure all staff have been trained in appropriate waste disposal requirements that are consistent with this EMP
Responsible Person	• Seismic Party Manager • Field Environment Officer (FEO) • All site seismic employee's

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2.8 Surface Water Management

The removal of vegetation increases the risk of erosion and hence stream sedimentation rates, runoff, stream-flow volumes and velocity.

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Clearing of riparian vegetation will be reduced through minimisation of the number of crossings and clearing widths wherever practical. The majority of the watercourses intersected are ephemeral and it is anticipated that they are likely to be dry at the time of the crossing.

There is potential for sediments, nutrients and pollutants to be transferred to waterways by overland flows and inappropriate placement and management of equipment, materials and wastes. Potential surface water pollutants include spillages from chemical and/or fuel storages, discharges from vehicles and construction equipment.

Clearing of the right of way (ROW) across the watercourse will be the predominant source of potential impacts on surface water due to the excavation and movement of soil. During operations, easements will be rehabilitated and landscaping/hardstand will be used to stabilise exposed areas thus reducing the potential for erosion.

Table 11 – Surface Water Management Plan

Element	Management Plan
Aim	• To minimise the potential impacts on riparian areas and to prevent the release of contaminants that may adversely affect downstream surface water quality.
Performance Targets	• No release of contaminants to surface waters. • No failures of sediment and erosion control techniques leading to unacceptable sediment release. • Disturbance to watercourses minimised wherever possible • Watercourse crossings successfully rehabilitated
Management strategy	**Erosion and Sediment Control Measures** • Minimise access and disturbance to only essential areas. • Minimise areas of exposed soil to avoid erosion, provide hardstanding or soil stabilization to reduce erosion. • Revegetating or rehabilitating disturbed areas as soon as works are completed. • Designing channels/drains and inlet and outlet works to convey water at least up to the design peak flow. • Place sediment control structures such as diversion drains, rock-check dams and silt fences or traps at key locations (swales, stormwater pit inlets, around stockpiles) to capture the suspended sediment. • Placing all water quality and quantity control structures above the riparian zone. • Incorporating run-off control devices to reduce slope length on access tracks and on other disturbed areas of bare ground. • Cleared vegetation is to be mulched and re spread across the seismic line, this is to be done in consultation with the landholder. • Avoid disturbing highly erodible soils where possible. • In areas where the risk of soil erosion is medium or high, the seeding of perennial grass may be required. • Reinstate all drainage pits and clean out accumulated sediment or leaf litter in pits after storm/heavy rain events. • Reinstate all existing erosion-control structures after storm/heavy rain events. • Repair any damage caused directly or indirectly as a result of the proposed works (e.g. to roads, pipes, drains and gutters). • Stabilise soils by revegetating exposed surfaces or by other means such as mulching or jute matting.

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Element	Management Plan
	• Conduct activities during dry weather where possible. • Remove temporary erosion-control structures when no longer required. **Watercourses** • Locate crossing points where turbulence is minimal and away from bends in stream or where two drainage lines meet. • No pulsing is to occur within the watercourse • Ensure there is no active undercutting of either bank and no dumping of sediments within the stream bed. • Minimise the extent of vegetation removal and disturbance by narrowing ROW where possible. • Implement horizontal directional drilling for pipeline construction when disturbance to a watercourse is deemed unacceptable by the Environmental Manager. • Rehabilitate disturbances as soon as possible by refilling and slightly compacting, capping with at least 200 mm of suitable topsoil and revegetating the site. • The clearance path will, where practical, be designed at an angle of 90 degrees to the watercourse in order to limit the extent of clearing. Clearing will be reduced to the minimum safe width required for installation. • Watercourse banks are to be effectively reinstated to prevent scouring. • Watercourse flows should not be significantly altered. • Rehabilitation will be negotiated with landholders, where applicable. River environments will be re-contoured and rehabilitated to allow natural revegetation. Local plant species may be sown to stabilise banks and prevent erosion. • Crossings will, where practicable, be undertaken in no- or low-flow conditions during drier month (e.g. April – October). • Watercourses will be stabilised with, for example, gabions (rock mattresses) or jute matting as required. • Crossings will be completed promptly. • Where practicable, large trees, particularly hollow-bearing trees, will be retained. Root stock will, wherever practicable, be retained for stabilisation of the banks. • For wet crossings, water-quality characteristics will compared to relevant water quality objectives and remedial measures taken where water quality exceeds limits. • Primary settlement and sediment control structures will be installed between the creek and the construction area when wet weather is expected and post - construction.
	• The Construction Supervisor will be vigilant of flood warnings and, where necessary, action will be taken in accordance with the Emergency Response Plan. • Existing layers of cobbles and/or coarse gravel in the bed of the watercourse will be reinstated. • Banks to be reinstated to a slope no steeper than existing site conditions and to a grade compatible with the strength of the site's soil type. **Pollutants**

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Element	Management Plan
	• Provision of appropriate storage areas away from drainage lines for hazardous substances and dangerous goods, with spill clean-up kits. • All relevant personnel trained in appropriate handling of spill materials and spill prevention. • All fuels and chemicals will be stored and handled in accordance with AS 1940 and AS 3780 to minimise the potential for contamination of stormwater runoff from the site. • Contaminated soils (if identified) will be stockpiled in an appropriately lined area on-site prior to remediation or disposal. • Vehicle maintenance and washdown areas, waste storage areas, and other areas as appropriate will be designed in accordance with appropriate Australian standards. •
Monitoring & Reporting	• Visual assessment will be undertaken throughout the seismic area to monitor any impacts from overland flow such as gullying and impacts to sediment and erosion control structures. • Visual inspection of the areas of disturbance will be performed. Where visual inspection indicates a potential impact, testing of soil stability may be required and, if necessary, remediation measures proposed. • Visually inspect problem areas during rainfall events. • Regularly inspect seismic activities to determine whether the application of erosion and sediment controls is adequate. • Rehabilitated watercourses will be monitored in accordance with the Rehabilitation EMP.
Corrective action	• The following will be reported regularly: 1. Contractor compliance with approved erosion and sediment control plan. 2. Incidents of erosion or surface water contamination. 3. Results of routine inspections. • Should an incident/failure to comply occur, the following corrective actions could be considered: 1. Repair soil erosion and sediment controls. 2. Repair stormwater controls. 3. Contain and remedy or dispose of contaminated material/s. 4. Improve level of housekeeping. 5. Review the relevant plans.
Responsible Person	• Seismic Party Manager

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2.9 Rehabilitation Management

Seismic ROW's undergo progressive rehabilitation, so the land is not left in a disturbed state for a long period. The progressive rehabilitation is undertaken to stabilise the soil surface, prevent any erosion and/or sedimentation.

The seismic activity will cross a large number of watercourses. Section 8 covers the environmental management measures required to minimise risks associated with disturbance of sensitive water course areas. The rehabilitation section outlines the requirements to stabilise any soil disturbance aiming to

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minimise sediment and erosion in these sensitive environments. Any soil disturbance in watercourse embankments and beds will require a form of rehabilitation.

It is considered preferable from an environmental perspective to allow natural regeneration of vegetation. Seeding of native grasses or sterile crops may be carried out during initial reinstatement works to assist in stabilising the area and reducing the potential for weed outbreaks. Where the monitoring of vegetation regrowth indicates that the required rate is not being achieved, proactive measures will be initiated.

Revegetation on private land will be carried out in consultation with the landholder. On state-owned or controlled lands any revegetation will be conducted in consultation with the relevant government department or agency to ensure the measures proposed are acceptable and have a high likelihood of success.

Table 12 – Rehabilitation Management Plan

Rehabilitation Management Plan	
Relevant Document/s: QGC Procedure: Clean Up and Reinstatement Procedure (PRO-C-PCR-004)	
Aim	To restore land to a stable condition and restore land use to a condition that is (as far as practicable) compatible with the proposed land use after seismic operations are complete.
Performance Targets	• Minimal soil erosion. • Stable vegetation and habitat generation. • Minimal modification of drainage patterns. • No new weed species introduced. • Minimal adverse impacts on existing land uses. • Landholder relationships maintained • Effectiveness of permanent erosion and sediment control measures.
Management Strategy	• Flagging tape, rubbish and general waste will be removed as per waste management policy. • Any cleared vegetation will be mulched and respread across the seismic line in an even distribution, this is to be done in consultation with the landholder and their requirements. • The seismic line area will be re-profiled to original or stable contours, re-establishing surface drainage lines and other land features if soil structure is changed. • Erosion and sediment control measures will be installed or remain installed where necessary. Existing soil erosion control measures will be reinstated • Fences or other barriers shall be re-installed in consultation with the Land Access consultant and landholder requirements. • On steep slopes and banks adjacent to creek crossings, soil stabilisation involving

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	Re-profiling of the banks and over-seeding with sterile Japanese Millet (or oats and rye corn) will be required if water course embankments have been disturbed. This seed should be distributed heavily (as a guide, 50kg per hectare). • Where applied, seed will be evenly dispersed over the entire disturbed area and take place as soon as practicable during reinstatement. • Some watering will be required to increase seed germination, where natural rain events fail to occur.
Monitoring & Reporting	• Regular inspections will be undertaken during the seismic operation • Monitoring will also include an assessment of the effectiveness of weed control measures. • The process of monitoring and rehabilitation will only conclude when the site becomes stable.
Corrective Actions	• Investigate why rehabilitation failed and instigate corrective measures in consultation with the FEO • Ensure all sites are left free of rubbish. • Recommendations and actions arising from audits and reviews will be implemented.
Responsible Person	• Field Environment Officer (FEO) • Seismic Party Manager • Seismic HSSE Manager

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2.10 Fire Management

Fires are an ongoing threat in Queensland's regional areas. The Bowen Basin seismic program will traverse a range of different environments that will have differing amounts of fuel loads that will all have to be managed appropriately. For this project there is a strict no burning policy in place that must be adhered to at all times.

Appropriate measures should be taken where possible to mitigate the possibility that fires could occur and prevent the unnecessary increase in risk of fire occurring.

Table 13 – Fire Management

Fire Management	
Aim	To prevent the initiation of bushfires as a result of seismic activities. To protect Project personnel and equipment from bushfire impacts
Performance Targets	• No build-up of flammable material during access or near any hot work areas • No uncontrolled fires along the ROW.

	• Emergency Response Plan in place. • No unplanned and uncontrolled fires caused by Project Activities. • Consultation with all relevant fire management authorities.
Management Strategy	• Open fires are prohibited. • A **no burning** policy is in place for QGC activities • Unnecessary build-up of flammable material in working areas will be prevented. • Vehicle and machinery exhaust systems shall be inspected regularly for leaks and accumulated vegetation debris. Fuel systems shall also be inspected for leaks. • Water trucks (also used for dust suppression) available for use as fire trucks in the event of fire. • All vehicles will be equipped with portable fire extinguishers/fire blankets. • Emergency Response Plan shall include details on local contacts for fire fighting assistance. • Seismic Party Manager shall ensure all relevant bylaws with regard to Fire Management are adhered to. • A smoking policy is to be implemented to minimise fire risk. • Conduct periodic fire equipment audits. • Undertake fire safety awareness training as part of site inductions
Monitoring, Reporting and Corrective Actions	• Inspection of work areas for flammable material/ fuel build up. • Regular audits and reviews in accordance with this EMP will be undertaken, and recommendations and corrective actions shall be implemented.
Corrective actions	• Reinforce the importance of complying with this EMP • Remove built up fire fuel from working areas.
Responsible Person	• Seismic Party Manager

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2.11 Dangerous Goods and Hazardous Substances

Dangerous goods to be handled will predominately include hydrocarbon based goods. The safe and efficient handling of these products throughout the project from delivery to disposal must be monitored and controlled to ensure health and safety standards are maintained and environmental standards are upheld. The following management plan outlined in table 14 is designed to ensure that storage and handling of dangerous goods throughout the project is managed effectively.

Table 14 – Handling and Disposal of Dangerous Goods

Handling and Disposal of Dangerous Goods	
Aim	To protect Project personnel, the public and the environment from harm due to the transport, storage, use or disposal of dangerous goods or hazardous substances.

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Performance Targets	• Minimal potential for land contamination. • Dangerous goods don't cause harm to the environment or personnel. • No contamination of the environment due to dangerous goods. • All transport, storage and handling of dangerous goods or hazardous substances is performed in accordance with applicable legislation, guidelines and standards.
Management Strategy	• Emergency Response Procedure in place and employees inducted in its application. • Fuel, oil and chemicals will be stored, handled, separated and signed as required by the relevant legislation and AS1940. • No dangerous goods to be stored within 200 metres of a watercourse • Transportation of dangerous goods will be in accordance with the Regulations and with AS1678, AS2809 and AS2931. • Create and maintain a register of individual Material Safety Data Sheets (MSDS) for each chemical used on site. • Waste dangerous goods that cannot be recycled will be transported by licensed contractor to a designated disposal site as approved by the administering authority, all appropriate records must be kept. • Spills of dangerous goods will be rendered harmless and collected for treatment and disposal at a designated site, including cleaning materials, absorbents and, where small quantities only are concerned, contaminated soils. This must be reported to the Manager Environment Operations • All spills of dangerous good's must be reported to the Manager Environment Operations as soon as practical after the spill occurs. A remediation plan may be required to be developed and implemented. • Cut off flow path to drains/watercourses (e.g. sand bags, earthen bund) where required. • Absorbent and containment material (e.g. absorbent matting) will be available where hazardous materials used and stored and personnel trained in correct use. • Protective clothing, appropriate to the materials in use, will be provided. • If used, any spill kit material must be replaced as soon as practical. • Refuelling will only occur in designated areas away from drainage lines. • All dangerous goods to be stored in a bunded area, or have bunding incorporated into the design of the tank, built to the relevant Australian Standards. • Bunding is to have the capacity of 110% of the largest container stored in the bund or 25% of the total quantity of chemicals. • Ensure there are no ignition sources in the vicinity of the bunded area
Monitoring, Reporting and Corrective Actions	• Regular inspection to ensure that chemical storage facilities meet Australian Standards. • Audits shall include inspection of hazardous good storage sites and records for compliance with above. • Review of records of any spill with an FEO and ensure appropriate remedial action has been implemented. • Reporting of spills that occur to the Manager Environment Operations must occur

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	as soon as practical after a spill occurs
Corrective Action/s	• Review storage and handling procedures and correct as appropriate • Ensure Australian Standards are adhered to at all times
Responsible Person	• Seismic HSSE Supervisor • Seismic Party Manager

2.12 Machinery Hydrocarbon Spill and Leak Management

The movement, maintenance and storage of vehicles and machinery has the potential to cause contamination of land through spilled or dripping oil, grease and the waste material generated. The management plan to mitigate the environmental impacts of vehicles and machinery on site is detailed below.

Table 15 – Machinery Hydrocarbon Spill and Leak Management Plan

Machinery Hydrocarbon Spill and Leak Management Plan	
Aim	• To ensure that the use, storage and maintenance of machinery and vehicles does not cause contamination to the receiving environment.
Performance Targets	• No discharges to receiving environment in the form of leaking oils and/or fuels where machinery or vehicles are stored maintained or operated. • All necessary controls are in place, are built to specification and are in good repair.
Management Strategy	• Storage and signage of fuels, oils and lubricants used by machinery and vehicles to be in accordance with the relevant Australian standards; • Areas designated for maintenance and refuelling; • Refuelling of machinery and vehicles to be carried out in a manner which prevents spills; • Any maintenance or servicing of machinery and vehicles to be undertaken in accordance with best practice guidelines to minimise the potential for site contamination through oil or fuel leakage; • Waste oil to be collected in drums for recycling and kept in designated contractor lay down area prior to removal, with appropriate containment measures in place to capture any spills; • Used oil filters to be drained and dispatched to a licensed facility for disposal. All other oil contaminated items including rags, oily hoses etc. to also be disposed of at a licensed disposal facility; • Soil which becomes contaminated with any fuel or oil to be removed and remediated under supervision of FEO. • Vehicle operators to drive to the conditions to reduce dust generation. • No storage of fuel/oil within 200 metres of a watercourse. • Contractor is to advise QGC of chemicals and fuels that are stored on site and volumes. • All waste oils and chemicals are to be collected by licensed contractor for disposal;

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Machinery Hydrocarbon Spill and Leak Management Plan	
	records must be kept by the contractor and made available to QGC. • Spill kits must be kept at refuelling and waste oil storage locations. • Spill kits must be on hand and staff trained in correct use. • All machinery must be maintained as per manufacturers requirements • Vehicles accessing site are to be cleaned prior to entry to site and shall have a weed hygiene declaration. A FEO can advise the location of wash down facilities.
Monitoring and Reporting	• Routine inspection of fuel storage facilities, machinery and equipment for oil and fuel leaks; • Visual inspection will be carried out on all sites to ensure that all waste has been removed and all spilled material has either been removed or remediated; • Records and copies of all regulated waste transport certificates must be kept for all regulated waste removed from site. • Regular site inspections to ensure that the spill kits are available and appropriately maintained
Corrective Actions	• Inspection and repair of equipment and machinery. • Remediation of spills that occur • Ensure spill kits are available and maintained appropriately
Responsibility	Seismic Party Manager Seismic HSSE Supervisor

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3.0 SUP PORTING DOCUMENTATION

3.1 Staff Training

All personnel on site will be trained to the appropriate level of environmental awareness and competence to ensure continued environmental due diligence, implementation of appropriate mitigation measures and ongoing minimisation of environmental harm.

Environmental awareness training will cover:

- The importance of conformance with the Environmental Authority and components of the EMP;
- Awareness of the Environmental Authority and it's conditions.
- Significant aspects and impacts and the benefit of improving environmental performance;
- Roles and responsibilities for achieving environmental compliance and continual improvement;
- Consequences of failure to achieve environmental compliance; and
- Reporting environmental incidents to supervisors and participation in the investigation and corrective action required to reduce or remediate environmental harm or the reoccurrence of the incident.

QGC will make all contractors aware of their responsibility to comply with the EMP. As appropriate, contractual documents shall indicate that the Consultant/Contractor is responsible for ensuring EMP compliance.

3.2 Monitoring

Monitoring of the effective implementation of each of the identified control strategies will be ongoing during the Bowen Basin Seismic Project. This monitoring will detail how each control method has been achieved and include specific information relating to completion dates and delegation and overseeing responsibilities.

Various monitoring methods will be adopted depending upon the nature of the information required. These will generally be field logs; however will be reinforced by such methods as photographs, incident files, complaint registers, waste registers and Geographic Information Systems data. If monitoring identifies any non-conformances, a corrective action strategy is to be implemented according to the control strategies.

An inspection program will ensure continued adherence to QGC's environmental goals with appropriate staff assigned the role of monitoring. The designated FEO for the site will undertake regular monitoring to ensure compliance throughout construction. Any non-compliance if not rectified, will result in a non-conformance report being issued to the Contractor.

3.3 Reporting

The contractor is required to report all Incidents to the FEO as soon as they become aware of the incident. The FEO will organize completion of an incident report in consultation with the witness or person/s that discovered the incident. Once completed, the FEO will forward the incident report to the Environmental Manager, who will then ensure any relevant reporting to the DERM or other Statutory Authority takes place.

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Any environmental issues and community feedback associated with operational activities in accordance with the protocols of the EMP will be reported to the DERM and other Statutory Authorities as appropriate. The need to report an incident to the DERM will be identified by the Manager Environment Operations.

As soon as practicable, after becoming aware of any emergency or incident which results in the release of contaminants not in accordance, or reasonably expected to be not in accordance with the conditions of the Environmental Authority, the administering authority must be notified of the following details (if the Manager Environment Operations deems this as necessary under the EA conditions):

- the name (or identification) of the holder of the license;
- the location of the emergency or incident;
- the number of the license;
- the name and telephone number of the designated contact person;
- the time of the release;
- the time the license holder became aware of the release;
- the suspected cause of the release/incident;
- whether any environmental harm or environmental nuisance was caused, threatened or suspected to be caused by the release; and
- actions taken to prevent any further release and mitigate any environmental harm or environmental nuisance caused by the release.

Within 14 days of the initial notification written advice will be given including:

- proposed actions to prevent a recurrence of the emergency or incident;
- outcomes of actions taken at the time to prevent or minimise environmental harm or environmental nuisance; and
- the results of any environmental monitoring performed.

Reporting requirements regarding waste generation and disposal are outlined in Section 2.7

Reporting requirements regarding air emissions are outlined in Section 2.1

3.4 Conducting Environmental Reviews and Inspections

Any non-conformances identified shall be documented in a "Corrective Action Statement" and shall detail the nature of the non-conformance, including the appropriate corrective action(s) to be implemented. The results of the audit system and any information regarding corrective action will be forwarded to the General Manager. Employees shall be informed of the results at their regular team meetings.

The Site Manager will confirm that all incidents and corrective actions have been addressed and determine that the relevant records have been kept. Random auditing of sites will be conducted by the Environment Team on a regular basis. However, daily site inspections will be carried out by the site manager.

3.5 Documentation and Record Keeping

Any record or document required to be retained in compliance with any condition of the environmental licence, must be held at the licensed premises for a period of five years. These records or documents must remain available for examination by any authorised person. Daily and weekly records must be retained for a minimum period of three years. Subsequent to this period, these records are to be kept and maintained in the form of annual summaries.

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A copy of this EMP and the Environmental Authority licence must be kept in a location readily accessible to persons carrying out the relevant activities.

Any complaints that are received are to be documented in the "Complaints Register" and reported to the Social Performance Team in accordance with the 'Stakeholder Management Procedure' (need to check exact title). The following information is to be recorded where applicable;

- the location of issue leading to the complaint;
- the name and telephone number of the person making the complaint;
- the name and telephone number of the designated QGC employee;
- the time of incident;
- the suspected cause;
- the environmental harm and/or environmental nuisance caused, threatened or suspected to be caused; and
- action taken to prevent any further complaints about this issue.

Depending on the nature and extent of the incident or complaint, the relevant government body is to be notified.

The following list of procedures is to be put in place prior to construction.

Procedures:

- Daily site inspection procedure
- Pre-construction sediment control
- During construction sediment control
- Post construction sediment control
- Post rainfall event sediment control
- Cultural heritage removal and storage

4.0 EMERGENCY CONTACTS

Emergency Contacts			
Seismic HSSE Advisor	•	s.73 irrelevant information	
Seismic Operations Manager	•		
Seismic Field Environment Officers	•		
	•		
Manager Environment Operations	•		
Windibri Environment Team Phone (24hr)	•		
Duty officer – Gasfield	•		

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APPENDIX A – ENVIRONMENTAL AUTHORITY

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RP 33722045

EMD2007/2914

Queensland Government
Environmental Protection Agency

Environmental Protection Agency
Central Region
PO Box 906
Emerald QLD 4720
Ph: 07 4982 4555
Fax: 07 4982 2568

ENVIRONMENTAL PROTECTION ACT 1994

Environmental Authority (Approval) No. PEN200013707

Sections 124 *Environmental Protection Act 1994*

This environmental authority is granted under the Environmental Protection Act 1994 *and includes conditions to minimise environmental harm caused, or likely to be caused, by the authorised petroleum activities. An environmental authority (petroleum activities) may be for petroleum activities authorised (under the Petroleum and Gas (Production and Safety) Act 2004, Petroleum Act 1923 or Petroleum (Submerged Lands) Act 1982) to occur under any of the following petroleum authorities: authority to prospect; petroleum lease, data acquisition authority, water monitoring authority, petroleum facility licence, survey licence or pipeline licence. In general, a petroleum activity means an activity that, under the relevant petroleum legislation, is an authorised activity, rehabilitation, remediation, and includes facilitation and supporting activities and any action taken to prevent environmental harm.*

Under the provisions of the *Environmental Protection Act 1994*, this environmental authority (approval) is issued to:

OME Resources Australia Pty Ltd
C/- Pure Energy Resources Limited
7/66 Mill Point Road
SOUTH PERTH, WA 6951

in respect of carrying out the following level 2 environmentally relevant activity (ERA) of Schedule 1 of the *Environmental Protection Regulation 1998*:

ERA	Description
21E	A petroleum activity not otherwise prescribed under this schedule as a level 1 environmentally relevant activity.

on the relevant authorities to prospect identified below:

Type of Petroleum Authority	Authorised Petroleum Authority	Project / Location description
Authority to Prospect	ATP806	Emerald District

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This environmental authority (approval) is subject to the condition that the holder carry out the above environmentally relevant activities in accordance with the conditions listed in the attached Schedule.

This environmental authority takes effect from the grant date and remains in force until the environmental authority is transferred, surrendered, cancelled or suspended.

sch4p4(6) Personal information

Signed

5/10/07
Date

Michael Rodgerson
District Manager
Delegate of Administering Authority
Environmental Protection Act 1994

Note: This environmental authority document is not proof of the current status of the environmental authority. The current status of the environmental authority may be ascertained by contacting the Administering Authority

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Schedule of conditions

Condition 1 – Significant Disturbance

The holder of the environmental authority must ensure that petroleum activities do not cause more than 4 ha of any land to be significantly disturbed at a petroleum works site at any one time.

Condition 2 – Work Program, Development Plan

The applicant for or holder of the environmental authority must submit to the administering authority a copy of the original or any amended work program or development plan for the relevant application for or granted petroleum authority.

Condition 3 – Financial Assurance

The holder of the environmental authority must:
(a) calculate a financial assurance in accordance with the Schedule of Rehabilitation Costs and Schedule of Disturbance in Appendix C of this Authority;
(b) attach the Schedule of Disturbance to the original or any amended Work Program or Development Plan;
(c) provide to the administering authority the financial assurance in the amount and form required by the administering authority at the time of submission of the original or any amended Work Program or development plan; and
(d) maintain the financial assurance until the administrating authority is satisfied that no claim is likely to be made on the assurance.

Condition 5 – Land Management

The holder of the environmental authority must:
(a) take all reasonable and practicable measures to minimise disturbance to land in order to prevent land degradation; and
(b) ensure that for land that is to be significantly disturbed by petroleum activities, the top layer of the soil profile is removed and
    i. stockpiled in a manner that will preserve its biological and chemical properties; and
    ii. used for rehabilitation purposes (refer condition 14).

Condition 6 – Vegetation

The holder of the environmental authority must:
(a) take all reasonable and practicable measures to prevent or minimise disturbance to vegetation by petroleum activities; and
(b) manage the effects of clearing to prevent the loss of biodiversity, reduction of ecological processes and land degradation.

Condition 7 – Protection of Riverine Areas

The holder of the environmental authority must:
(a) ensure that there is no significant disturbance in riverine areas containing permanent water, except for the necessary construction and/or maintenance of roads, tracks and pipelines; and
(b) minimise disturbance of all other riverine areas.

Condition 8 – Erosion and Sedimentation Control

The holder of the environmental authority must take all reasonable and practicable measures to prevent or minimise:
(a) erosion of areas disturbed by petroleum activities; and
(b) sedimentation of any waters as a result of petroleum activities.

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sch4p4(6) Personal information

Condition 9 – Dust Management

The holder of the environmental authority (petroleum activities) must ensure that:
(a) dust or particulate matter or both resulting from a petroleum activity must not cause an environmental nuisance at any sensitive place or commercial place; and
(b) when requested by the administering authority, dust and particulate monitoring must be undertaken within a reasonable and practicable timeframe nominated by the administering authority to investigate any complaint (which is neither frivolous nor vexatious nor based on mistaken belief in the opinion of the authorised officer) of environmental nuisance at any sensitive place or commercial place, and the results must be notified within **14 days** to the administering authority following completion of monitoring, analysis and interpretation of results.

Condition 10 - Noise Management

(a) Noise emitted from the temporary petroleum activities must not exceed the noise acoustic quality objective of 55 dB(A)at any sensitive or commercial place.
(b) Noise emitted from the permanent petroleum activities must not exceed the noise levels, specified in the table below, at any sensitive place or commercial place.

Time period	Noise level at a sensitive place measured as the Adjusted Maximum Sound Pressure Level $L_{A, max, adj,T}$
7am– 6 pm	Background noise level plus 5 dB(A)
6pm–10pm	Background noise level plus 5 dB(A)
10pm–7am	Background noise level plus 3 dB(A)
Time period	Noise level at a commercial place measured as the Adjusted Maximum Sound Pressure Level $L_{A, max, adj,T}$
7am –6 pm	Background noise level plus 10 dB(A)
6pm–10pm	Background noise level plus 10 dB(A)
10pm–7am	Background noise level plus 8 dB(A)

General note: In no case is the background noise level, $L_{A90, 15\ mins}$ to be less than 25 dB(A). In the event that measured background noise level is less than 25 dB(A), then 25 dB(A) is to be used.

(c) When requested by the administering authority, noise monitoring must be undertaken within a reasonable and practicable timeframe nominated by the administering authority to investigate any complaint (which is neither frivolous nor vexatious nor based on mistaken belief in the opinion of the authorised officer) of environmental nuisance at any sensitive place or commercial place, and the results must be notified within **14 days** to the administering authority following completion of monitoring, analysis and interpretation of results.
(d) The method of measurement and reporting of noise levels must be in accordance with most recent edition of the EPA's Noise Measurement Manual.

Condition 11 – Waste Management

The holder of the environmental authority must:
(a) ensure that petroleum activities do not result in the release or likely release of a contaminants to land or waters that results in unlawful environmental harm; and
(b) as soon as practicable, remove and dispose of all regulated waste to a licensed waste disposal facility or recycling facility.

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Condition 12 - Sewage Management and Disposal

The holder of this environmental authority must ensure that:
(a) plant and equipment used in the carrying out of the activity is installed, maintained and operated in a proper and efficient manner;
(b) sewage effluent is not released to waters (including groundwater);
(c) the disposal of sewage effluent does not cause the contamination of any water used for drinking or domestic purposes or manufacturing purposes or for consumption by animals;
(d) any area(s) used for the disposal of sewage wastes (liquids or solids) is securely fenced to prevent animals entering such area(s);
(e) where sewage sludge is buried on land the sludge is covered with at least **250mm** of top soil and where practicable located above known flood levels;
(f) where sewage effluent is irrigated on land it is carried out in accordance with the *National Water Quality Guidelines for Sewage Systems – Use of Reclaimed Water*;
(g) there is no surface pond of effluent on land disposal area(s);
(h) any noxious offence odours or any other noxious or offensive contaminant resulting from the activity do not cause a nuisance at any odour sensitive place; and
(i) public access to any sewage effluent land disposal area must be denied during the release of contaminants to the land and until the irrigation/disposal area has dried.

Condition 13 – Storage of Hazardous Substances, Fuel and Oil

The holder of the environmental authority must ensure that the storage of all flammable and combustible liquids are:
(a) contained within an on-site containment system;
(b) controlled in a manner that prevents environmental harm; and
(c) maintained in accordance with Section 2.3 for minor storages and Section 5.8 for storages above 10,000 L of *AS 1940 –2004 Storage and Handling of Flammable and Combustible Liquids.*

Condition 14 – Spills and clean up action

Notwithstanding the other conditions of this Authority, if a hazardous contaminant is released to waters or land, the holder of the environmental authority must:
(a) take immediate action to stop any further release;
(b) take immediate action to contain the hazardous contaminant to the affected area, taking particular care to protect environmentally sensitive areas;
(c) restore or rehabilitate the environment to its condition before the release occurred; and
(d) take necessary action to prevent a recurrence of the release.

Condition 15 – Associated Water

(a) The holder of the environmental authority must ensure that associated water is not released to land or waters, other than to an appropriate containment facility except as provided for:
    (i) under section 186 of the *Petroleum and Gas (Production and Safety) Act 2004*; and
    (ii) Condition 15 (c).

(b) Despite 15 (a) (i), the holder of the environmental authority must ensure that associated water to be used for domestic or stock purposes meets the accepted *ANZECC 2000 Water Quality Guidelines for Stock and Domestic Purposes.*
(c) Despite 15 (a), the holder of the environmental authority may apply to the administrative authority to allow associated water that meets a nominated set of water quality standards to:
    (i) be released to land or waters; or
    (ii) be used for a specific purpose, provided the potential user has given written advice about the proposed use and environmental safeguards that will be implemented to prevent material or serious environmental harm.

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Condition 16 – Containment Facilities

(a) The holder of the environmental authority must ensure all environmentally relevant containment facilities are:
    (i) designed, constructed, operated, maintained and decommissioned in accordance with the criteria outlined in Appendix B; and
    (ii) not located within 100 m of any natural drainage feature (i.e. watercourses, waterway, wetland or lank).
(b) The holder of the environmental authority must ensure all drill sumps are installed and maintained to prevent any discharge through the bed or banks of the sumps from causing environmental harm or environmental nuisance in-any waters.

Condition 17 – Containment Facilities and Other Excavations

For all environmentally relevant activities and other excavations which are constructed as part of the petroleum activities, the holder of the environmental authority must where relevant either:
(a) provide safe access for livestock where contained water quality is adequate for live stock; or
(b) construct and maintain bunds and/or fences sufficient to exclude livestock.

Condition 18 – Rehabilitation

As soon as practicable and within 6 months (or longer period agreed in writing with the administering authority) of the completion of petroleum activities causing significant disturbance to land, the holder of the environmental authority must:
(a) remediate contaminated land (e.g. evaporation ponds containing hazardous waste) in accordance with EP Act requirements;
(b) reshape all significantly disturbed land to a stable landform similar to that of surrounding undisturbed areas; and
(c) on all significantly disturbed land, take all reasonable and practicable measures to:
    i. re-establish surface drainage lines;
    ii. reinstate the top layer of the soil profile; and
    iii. promote establishment of vegetation of the same species and density of cover to that of the surrounding undisturbed areas.

Condition 19 – Infrastructure

All Infrastructure, constructed by or for the holder of the environmental authority, including water storage structures, must be removed by the holder from the site and the sites rehabilitated according to condition 18, prior to surrender of the petroleum authority, except where it is to remain with the written agreement of the administering authority and post petroleum authority landowner / holder.

Condition 20 – Environmentally Sensitive Areas

The holder of the environmental authority must ensure that petroleum activities:
(a) are not conducted within a category A or B environmentally sensitive area;
(b) do not cause a significant disturbance within **1km** of a category A environmentally sensitive area or within **500m** of a category B environmentally sensitive area unless authorised under this environmental authority; and
(c) are not conducted in a category C environmentally sensitive area unless there is a written agreement to enter the area for those activities from the relevant administering authority.

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Condition 21- Exploration within Buffer of ERE

For exploration activities the environmental authority holder must comply with each of the standard environmental conditions contained in the *Code of Environmental Compliance for Exploration and Mineral Development Projects*, except Condition 13, which is replaced by 21 (a) to 21 (n) conditions.

(a) The environmental authority holder is authorised to construct 1 borehole on ATP806 within the ERE buffer. The subsequent conditions, B2-1 to B4-2, authorises the environmental disturbance related to this borehole;
(b) The operational area of the drill site within the 500m buffer must not exceed $1000m^2$;
(c) The drill hole within the buffer of the ERE is limited to less than 200mm in diameter;
(d) The construction of sumps within the ERE buffer must not exceed $10m^2$;
(e) Topsoil stripping within the ERE buffer is limited to an area no greater than 25m x 25m;

(f) The environmental holder must minimise disturbance within the ERE buffer and avoid clearing of trees;
(g) Existing access and fence line tracks must be used wherever possible. Any new tracks are to be constructed by linking natural cleared or disturbed areas;
(h) Track construction must avoid clearing of trees;
(i) Where new tracks are required they will not be constructed greater than 5m in width;
(j) Track construction involving blade clearing of established ground cover vegetation and/or clearing of mature trees is to be minimised;
(k) No clearing or disturbance for access to borehole will take place within the ERE;
(l) Exploration within the ERE buffer must not involve costeaning or bulk sampling activities;
(m) Exploration camps must not be established within the ERE or ERE buffer; and
(n) Rehabilitation of drill sites and sumps will be in accordance with the Code of Environmental Compliance for Exploration and Mineral Development Projects.

Condition 22- Seismic Activity within ERE Buffer
The holder of the environmental authority is authorized to undertake seismic acquisition within the 500 metre buffer of the Endangered Regional Ecosystem (ERE). The seismic activity is restricted to cleared areas and is not authorised to enter the dominant ERE.

Condition 23 – Monitoring and Complaints

The holder of the environmental authority must:
(a) develop and implement a monitoring program that will demonstrate compliance with this Authority;
(b) document the monitoring and inspections carried out under the program and any actions taken;
(c) maintain a record of complaints and incidents causing environmental harm, and actions taken in response to the complaint or incident; and
(d) retain the record of complaints required by this condition for **5 years**.

Condition 24 – Notification

The holder of the environmental authority must:
(a) record and initially notify the administering authority as soon as practicable, but within **24 hours**, of any emergency or incident that demonstrates non-compliance to the standard environmental conditions, and
(b) notify the administering authority in writing within **14 days** of the initial notification.

End of Conditions

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Definitions

APPEA Code means the current APPEA, Code of Environmental Practice.

AS 2885 Australian Standard Pipelines – Gas and Liquid Petroleum

Associated water is underground water taken from or interfered with from a petroleum well during the course of or resulting from carrying out petroleum activities. Associated water may be potable or suitable for stock purposes, or saline, high in fluoride, contain hydrocarbons, and/or is otherwise contaminated by a hazardous contaminant and become a **hazardous waste.**

Commercial place means a place used as an office or for business or commercial purposes.

End means the stopping of the particular activity that has caused a significant disturbance in a particular area. It refers to, among other things, the end of a seismic survey or the end of a drilling operation. It does not refer to the end of all related *activities such as rehabilitation.* In other words, it does not refer to: the "completion" of the particular activity, the time at which the petroleum authority ends or the time that the land in question ceases to be part of an authority. Under the *APPEA Code* "completion" refers to the point at which the particular survey, program or operation has been rehabilitated and abandoned.

Environmental nuisance is unreasonable interference or likely interference with an environmental value caused by:
(a) noise, dust, odour, light; or
(b) an unhealthy, offensive or unsightly condition because of contamination; or
(c) another way prescribed by regulation.

Evaporation pond means a dam or interceptor pond constructed outside a watercourse, wetland or waterway by excavating a pit and constructing a wall around the pit with the excavated material. Natural surface flow is excluded from the pond.

Environmentally sensitive area (as determined from the EPA GIS data base) means a location, however large or small, that has environmental values that contribute to maintaining biological diversity and integrity, have intrinsic or attributed scientific, historical or cultural heritage value, or are important in providing amenity, harmony or sense of community.

"ERE" means Endangered Regional Ecosystem.

Financial assurance means a security deposit, either cash or a bank guarantee, held by the administering authority to cover the potential costs of rehabilitating areas significantly disturbed by the petroleum activities.

Hazardous contaminant means a contaminant that, if improperly treated, stored, disposed of or otherwise managed, is likely to cause serious or material environmental harm because of—
(a) its quantity, concentration, acute or chronic toxic effects, carcinogencity, teratogenicity, mutagenicity, corrosiveness, explosiveness, radioactivity or flammability; or
(b) its physical, chemical or infectious characteristics.

Land in the "land schedule" of this document means land excluding waters and the atmosphere.

Land degradation includes the following:
(a) soil erosion;
(b) rising water tables;
(c) the expression of salinity;
(d) mass movement by gravity of soil or rock;
(e) stream bank instability; and
(f) a process that results in declining water quality.

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Licensed waste disposal facility is a facility approved under a development approval and operated by a holder of a registration certificate for environmentally relevant activity item number 75 under Schedule 1 of the *Environmental Protection Regulation 1998*.

Permanent infrastructure includes any infrastructure (roads, tracks, bridges, culverts, dams, bores, buildings, fixed machinery, hardstand areas, airstrips, helipads, pipelines etc), which is to be left by *agreement* with the landowner.

Petroleum activity is defined in the *EP Act* as an activity:

a) authorised on a petroleum tenure granted under the *Petroleum Act 1923*; or
b) authorised on a petroleum authority granted under the *P&G Act*; or
c) exploring for or mining minerals under a licence, permit, pipeline licence, primary licence, secondary licence or special prospecting authority granted under the *Petroleum (Submerged Lands) Act 1982*; or
d) rehabilitating or remediating environmental harm because of an activity mentioned in paragraphs (a) to (c); or
e) action taken to prevent environmental harm because of an activity mentioned in paragraphs (a) to (d); or
f) required under a condition of an environmental authority (petroleum activities); or
g) required under a condition of an environmental authority (petroleum activities) that has ended or ceased to have effect, if the condition:
    i. continues to apply after the authority has ended or ceased to have effect; and
    ii. has not been complied with.

Petroleum Authority includes Authority to Prospect, Petroleum Lease, Data Acquisition Authority Water Monitoring Authority, Petroleum Facility Licence, Survey Licence and Pipeline Licence issued or granted under the *Petroleum Act 1923* or *Petroleum and Gas (Production and Safety) Act 2004*.

Petroleum works site is a separate location on the area subject to a petroleum authority where certain petroleum activities are undertaken; including a well site, production facilities, evaporation pond, compressor site and campsite. The following petroleum activities are excluded from the definition of *petroleum works site*: roads and tracks, seismic survey lines, and non-licensed gathering systems.

Release of a contaminant into the environment, includes –
(a) to deposit, discharge, emit or disturb the contaminant; and
(b) to cause or allow the contaminant to be deposited, discharged, emitted or disturbed; and
(c) to fail to prevent the contaminant from being deposited, discharged, emitted or disturbed; and
(d) to allow the contaminant to escape; and
(e) to fail to prevent the contaminant from escaping.

Riverine area refers to the land confined to the flood flow channel of a watercourse.

Sediment pond means a bunded or excavated structure used to contain and settle waterborne sediment running off significantly disturbed areas.

Sediment trap means a device used to filter waterborne sediment running off significantly disturbed areas. This may include silt fences, hay bales or grassed strips.

Sensitive place means
(a) a dwelling, mobile home or caravan park, residential marina or other residential place;
(b) a motel, hotel or hostel; .
(c) a kindergarten, school, university or other educational institution;
(d) a medical centre or hospital;
(e) a protected area;
(f) a park or garden that is open to the public (whether or not on payment of money) for use other than for sport or organized entertainment.

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Significantly disturbed land and **significant disturbance** means land if:

(a) it is contaminated land; or
(b) it has been disturbed and human intervention is needed to rehabilitate it:
  i. to a state required under the relevant environmental authority; or
  ii. if the environmental authority does not require the land to be rehabilitated to a particular state – to its state immediately before the disturbance

Examples of a disturbance to land:

(a) areas where soil has been compacted, removed, covered, exposed or stockpiled;
(b) areas where vegetation has been removed or destroyed to an extent where the land has been made susceptible to erosion;
(c) areas where land use suitability or capability has been diminished;
(d) areas within a watercourse, waterway, wetland or lake where petroleum activities occur and human intervention is necessary to restore or stabilise the disturbed area;
(e) areas submerged by hazardous waste storage and dam walls in all cases;
(f) areas under temporary infrastructure. Temporary infrastructure includes any infrastructure (roads, tracks, bridges, culverts, dams, bores, buildings, fixed machinery, hardstand areas, airstrips, helipads etc) which is to be removed after petroleum activities have ceased; or
(g) areas where land has become contaminated land and a suitability statement has not been issued.

However, for the purpose of this Authority the following areas **are not** significantly disturbed:
(a) areas off the petroleum authority (e.g. roads or tracks which provide access to the petroleum authority).
(b) areas previously significantly disturbed which have been rehabilitated to the administering authority's satisfaction.
(c) areas under permanent infrastructure.
(d) areas that were significantly disturbed prior to the grant of the environmental authority, unless those areas are re-disturbed by the holder of the environmental authority during the term of the authority.
(e) minor disturbances such as drill sumps and minor respreading of soil on GPS located seismic lines.

Stable means geo-technical stability of the rehabilitated landform i.e. settlement and subsidence caused by consolidation / settlement of the wastes deposited, and sliding / slumping are unlikely to cause instability.

Temporary petroleum activities means drilling

Permanent petroleum activities means compressors, wells

Top layer of soil means soil, alluvium, weathered rock or other suitable plant growth medium. Top layer material should be non-crusting and low in salinity.

Turkey's nest dam - A dam constructed outside a watercourse, wetland or waterway by excavating a pit and constructing a wall around the pit with the excavated material. Natural surface flow is excluded from the dam.

Waters includes river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined natural or artificial watercourse, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, roadside gutter, stormwater run-off, and groundwater and any part-thereof.

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APPENDIX A Environmentally Sensitive Areas

Category A - Environmentally Sensitive Areas		
LAND AREA CLASSIFICATION	**ADMINISTERING LEGISLATION**	**AMINISTERING AUTHORITY**
• National Parks (Scientific) • National Parks • National Parks (Aboriginal Land) • National Parks (Torres Strait Islander Land) • National Parks (Recovery) • Conservation Parks • Forest Reserves	*Nature Conservation Act 1992*	EPA
• Restricted Areas that include Constructed Water Reservoirs	*Mineral Resources Act 1989*	NR&M
• Marine Parks (other than general use zones)	*Marine Parks Act 1982*	EPA
• Wet Tropics Area	*Wet Tropics World Heritage Protection and Management Act 1993*	WTMA
• Great Barrier Reef Marine Park Region	*Great Barrier Reef Marine Park Act 1975 (Cth)*	GBRMPA

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Category B – Environmentally Sensitive Areas		
LAND AREA CLASSIFICATION	**ADMINISTERING LEGISLATION**	**ADMINISTERING AUTHORITY**
• Coordinated Conservation Areas; • Wilderness Areas; • World Heritage Management Areas; • International Agreement Areas; • An area of Critical Habitat or Major Interest identified under a Conservation Plan; • Areas subject to an Interim Conservation Order;	*Nature Conservation Act 1992*	EPA
An area subject to following conventions: • Convention on the Conservation of Migratory Species of Wild Animals (Bonn, 23 June 1979); • Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar, 2 February 1971); • Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris, 16 November 1972).	*International Conventions*	EPA
• General Use Zones of a Marine Park	*Marine Parks Act 1982*	EPA
• An Area to the Seaward Side of the Highest Astronomical Tide	Nil	EPA
• Registered Places; • Area of Cultural Heritage Significance; • Protected Area;	*Queensland Heritage Act 1992* *Aboriginal Cultural Heritage Act 2003* *Torres Strait Islander Cultural Heritage Act 2003*	EPA NR&M NR&M
• Designated Landscape Area (other than the area known as the 'Stanbroke Pastoral Holding')	*Aboriginal Cultural Heritage Act 2003* *Torres Strait Islander Cultural Heritage Act 2003*	EPA
• Feature Protection Area; • State Forest Park; • Scientific Area	*Forestry Act 1959*	EPA
• Fish Habitat Area; • A place in which a Marine Plant is situated	*Fisheries Act 1994*	DPI
• Endangered Regional Ecosystems (ERE); • An area of High Nature Conservation Value	Nil	EPA
• Essential habitat of Endangered, Vulnerable and Rare Species for the purposes of a Regional Vegetation Management Code	*Vegetation Management Act 1999*	EPA

Important Note: Regional ecosystem classification is determined according to the Queensland Herbarium **Biodiversity Status** Classification. Information on ERE's is maintained by the EPA on the Regional Ecosystem Description Database.

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Category C – Environmentally Sensitive Areas		
LAND AREA CLASSIFICATION	**ADMINISTERING LEGISLATION**	**ADMINISTERING AUTHORITY**
• Nature Refuges and Resource Reserves	*Nature Conservation Act 1992*	EPA
• Declared Catchment Areas; • Declared Irrigation and Irrigation Undertaking Areas; • Water Reservoirs and Drainage Areas.	*Water Act 2000 and various Water Board Acts*	NR&M and/ or Relevant Storage Operator or Board
• River Improvement Areas	*River Improvement Trust Act 1940*	NR&M and the Relevant River Trust
• The Designated Landscape Area - Stanbroke Pastoral Holding	*Aboriginal Cultural Heritage Act 2003* *Torres Strait Islander Cultural Heritage Act 2003*	EPA
Areas under Part 5 Division 2 of the Aboriginal Cultural Heritage Act 2003 and Torres Strait Islander Cultural Heritage Act 2003	*Aboriginal Cultural Heritage Act 2003* *Torres Strait Islander Cultural Heritage Act 2003*	NR&M
• State Forest or Timber Reserves	*Forestry Act 1959*	EPA
• DPI Research Sites	*Nil*	DPI
• Areas of land occupied by the Bureau of Sugar Experiment Stations.	*Sugar Industry Act 1999*	DPI
• Critical Areas and Public Purpose Reserves	*Land Act 1994*	NR&M
• An area subject to a State Planning Policy that the policy declares is in need of environmental protection.	*Integrated Planning Act 1997*	EPA
• Erosion Prone Areas under Coastal Management Plans and Coastal Management Control Districts	*Coastal Protection and Management Act 1995*	EPA

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APPENDIX B Criteria for environmentally relevant containment facilities

The holder of the environmental authority (petroleum activities) may require environmentally relevant containment facilities to be constructed within the petroleum authority for raw water storage, storage and evaporation of **associated water** or for the containment of contaminated solids formed from such waters. Environmentally relevant containment facilities are defined as "structures that may or could contain flowable substances that, in the event of collapse of the structure, failure to contain or discharge of either liquor, solids or gas, could or would adversely impact on the environment."

Associated water may be saline, contain hydrocarbons or other substances at certain concentrations that when released to land or waters may cause material or serious environmental harm. This does not prevent or limit the holder of the environmental authority from treating the associated water to a specified standard for subsequent discharge to land or waters, or on-supplied to a third party for beneficial reuse, providing it is authorised by the relevant environmental authority.

Appendix B provides for the environmental regulation of such containment facilities. The regulation of such facilities is based on both a hazard and risk assessment, which includes an assessment of the contents of the containment facility.

The assessment criteria presented in Tables 1 and 2 allow these structures to be classified as:

- High hazard containment facility;
- Medium hazard containment facility; or
- Low hazard containment facility.

High hazard containment facilities that could impact on life or property on collapse or failure are not permitted under this environmental authority and will require either site-specific conditions or will be conditioned under a level 1 environmental authority.

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Step 1 - Assessing the contents of the relevant containment facility

The first step in the assessment process is to determine whether the facility contains substances that may be classed as hazardous if released to the environment. If the contents of the relevant containment facility, including either liquor and/or total solids, exceed the limits in Table 1, then the containment facility contains hazardous substances.

Table 1 – Criteria for determining the contents of the containment facility

Contaminant [1]	Liquor [2]	Total solids [3,4]
Arsenic	0.5 mg/l	250 mg/kg
Boron	5.0 mg/l	15,000 mg/kg
Cadmium	10 µg /	100 mg/kg
Cobalt	1.0 mg/l	500 mg/kg
Copper	1.0 mg/l	5,000 mg/kg
Lead	0.1 mg/l	300 mg/kg
Mercury	2µg/l	75 mg/kg
Nickel	1.0 mg/l	3,000 mg/kg
Zinc	20 mg/l	35,000 mg/kg
Chloride	2,500 mg/l	-
Fluoride	2.0 mg/l	-
Selenium	0.02 mg/l	
Sulphate	1,000 mg/l	-
Cyanide	10 mg/l	2,500 mg/kg
pH	Between 5.5 and 9.0	Net acid generation of pH ≤4
Nitrite	30 mg/l	-
Nitrate	400 mg/l	-
Total Dissolved Solids	4000 mg/l	
Aromatic Hydrocarbons	600 µg/l	-

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Polycyclic Aromatic Hydrocarbons Naphthalene Benzo (a) pyrene	 16µg/l 0.2 C	-
Phenol	320 µg/l	-
Polychlorinated Biphenyls Aroclor 1242 Aro 1254	 0.3 µg /l 0.1 µg /l	-
Total Petroleum Hydrocarbons	10 mg/l (or no visible film)	
Blue green Algae (Microcystis)	11,000 cells/ml	-

1. Metals should be analysed in accordance with recognised test methods by a NATA certified laboratory.
2. Applies to the liquid contents in the containment facility readily available to the environment (e.g. water available to birds and animals).
3. Total solids include suspended and colloidal solids.
4. Applies to the solids in the containment facility.

Step 2 - Determining other risk factors

The second step in the assessment process is to consider other factors that may increase the hazard category of the containment facility including its size, location and environmental setting. If a proposed containment facility exceeds any of the size and location criteria listed in Table 2, then the structure will be a high hazard containment facility.

Table 2 – Determination of other risk factors

	Threshold criteria for a high hazard containment facilities
Criterion 1 Location with respect to habitation or water infrastructure	In the event of collapse, failure or overflow from the containment facility, would result in one or more of the following actions, it would or could: • impact on occupied premises to a depth of more than 300 mm; or • flow to a sensitive or commercial place; or • flow to a riverine area containing permanent water; or • contaminate a water supply for human consumption; or • contaminate a water supply used for livestock.
Criterion 2 Location in catchments	The containment facility is located within a: • declared catchment or sub-artesian area; or • watercourse and the containment facilities surface area of water exceeds 1ha.
Criterion 3 Size	The containment facility has a surface area of water greater than 4 ha; or the containment facility has a volume of water greater than 20 mega litres.

Step 3 - Determining the hazard category

Table 3 summarises the process for determining the hazard category of containment facilities on a petroleum authority.

If any proposed containment facility cannot comply with the acceptance criteria listed in Table 1 but can comply with the size and location criteria listed in Table 2, then the structure will be a medium hazard

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containment facility. Similarly if the structure contains substances that may be hazardous and exceeds the criteria in Table 2 then the structure will be a high hazard containment facility.

Table 3 – Determination of hazard category

Concentration of liquor and total solids	Location and size	Hazard Category
Contents of the containment facility do not exceed limits in Table 1	Containment facility location and size do not trigger criterion 1 listed in table 2	The structure is a low hazard containment facility
Contents of the containment facility exceed limits in Table 1	Containment facility location and size are below the criteria listed in table 2	The structure is a medium hazard containment facility.
Contents of the containment facility exceed limits in Table 1	Containment facility location and size are above the criteria listed in table 2	The structure is a high hazard containment facility.

Design, construction, operation, maintenance and decommissioning criteria

Containment facilities are engineering structures and must be designed by professional engineer(s) who would normally apply the criteria defined below. A professional engineer should also be consulted in the development of the decommissioning plan.

Criteria for Low Hazard Containment Facilities

Low hazard containment facilities should be designed, constructed, operated and decommissioned in accordance with the "Queensland Small Embankment Dam Guideline".

Criteria for Medium Hazard Containment Facilities

In order to comply with the conditions of this environmental authority, design, construction, operation, maintenance and decommissioning of medium hazard containment facilities, must be in accordance with the following.

Design:

(a) Containment facilities with a capacity up to 3 mega litres are best constructed as ***Turkey's Nest*** structures;

(b) Containment facilities should be located to have the smallest practical catchment area;

(c) Containment facilities must have a spillway capable of passing a design flood, defined as the peak discharge from a critical duration storm with an annual exceedence probability of 1% (i.e. 1 in 100 yr event) or lower;

(d) The spillway should be located where practicable in the abutment of the containment facility or in the minimum height section of the containment facility;

(e) Any spillway discharge should be contained within stable defined channels until it enters any natural watercourse or waterway;

(f) For embankments built on stable foundations, not subject to draw down and out of uniform soil material, the batters shall be no steeper than those shown in the table below, unless otherwise shown to be stable:

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Embankment Soil Classification (Universal soil classification)	Upstream Batter	Downstream Batter
GC, SC	2.5:1	2.0:1
CL, ML	3.5:1	2.5:1
CH, MH	3.5:1	2.5:1
GW, GP, GM, SW, SP, SM	Not suitable	Not suitable

Note: The codes for the Universal Soil Classification (e.g. GC) are detailed in the Australian Standard AS 1726 1993 Geotechnical Site Investigation, Appendix A.

(g) Where foundation material differs from the embankment fill material, the batters shall be chosen conservatively to be consistent with the weaker material classification.

Construction:

(a) Embankments must be constructed in accordance with an engineering design and specification, which has considered the internal seepage pressures, flow velocities, material strength, stability and durability.

(b) Fine grained soils used in embankment construction should be mechanically compacted when they are near or at the optimum moisture content (i.e. slightly plastic) to improve soil strength, minimise seepage and reduce the risk of piping failure

(c) Where geo-membranes are used, ensure that they are placed, anchored and joined in accordance with the manufacturer's specification.

(d) Where geo-membranes are used ensure that they are suitable to prevent leakage of the hazardous contaminants, which are contained within the containment facility.

(e) Where geo-membranes are used for liners, filters or drains, ensure that the geo-membrane is in contact only with fine-grained soils to prevent punching or tearing of the membrane.

(f) Embankments built out of pervious material must be constructed in accordance with an engineering design and specification, which has considered the internal seepage pressures and flow velocities.

(g) Where foundation material differs from embankment fill material, the embankment should be constructed out of the material, which gives the flatter batter.

(h) Prior to construction of an embankment, the foundation should be cleared of all:

- vegetation (grass, shrubs and trees);
- soils containing organic matter (roots);
- cracked soils (stiff plastic soils);
- pervious soils (sand, gravel)
- pervious material in rock faults, joints or the rock foundation itself.

(i) Prior to construction of an embankment, all transverse trenches, holes and other irregularities should be plugged or backfilled to create a generally undulating foundation for placement of the embankment.

(j) Fine-grained soils used in embankment construction should have a consistent texture and be free from foreign matter such as branches, logs, gravels or boulders etc.

(k) Fine-grained soils including dispersible soils should be placed in the centre of or towards the upstream faces of embankment containment facilities.

(l) Coarser grained soils and rock materials are to be placed towards and on the outer faces of embankment containment facility to minimise erosion and breaching potential.

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(m) Dispersible and easily erodible soils should not be used on the outer faces of embankment containment facility.

(n) Provide adequate measures to control seepage through the containment facility wall and the transmission of contaminants through underlying soil layers or rock stratum.

(o) Embankment containment facility should be constructed with stable earth materials that will not decay or generate leachate or hazardous contaminants.

Operation:

(a) The containment facility should be operated to maintain a minimum freeboard of 0.5m below the spillway level.

(b) To ensure that there is no leakage of hazardous wastes from any containment facility associated with the petroleum activity a field based groundwater monitoring program must be established to ensure there is no contamination of any unsaturated perched systems or existing groundwater aquifers in the vicinity of the works. Three or more monitoring bores specifically designed for this purpose should be located in a cluster between the contaminant source and any environmentally sensitive place. The monitoring program should regularly record:

i. water levels;
ii. water quality;
iii. flow rates; and
iv. direction of flow.

(c) As far as practicable minimise seepage and return any contaminated seepage to the containment facility.

Maintenance:

(a) Maintain the erosion resistance of the downstream face of the containment facility to avoid surface scour, which may lead to failure of the wall;

(b) Maintain the erosion resistance of the spillway to avoid scouring during the design flood;

(c) Prevent the establishment of trees or shrubs on water containing embankments (roots initiate seepage paths);

(d) Control of burrowing insects and animals (initiation of piping paths);

(e) Repair active erosion and piping processes; and

(f) During initial filling or commissioning, the containment facility should be monitored for leaks, seepages, embankment deformation or other signs of embankment distress.

Decommissioning:

(a) Removing (where possible) all remaining liquids in the containment facilitiy (e.g. it is generally acceptable to evaporate the liquid if the containment facility is not to be left to the land owner / holder).

(b) Remove (where possible) all contaminated solids from the containment facility and encapsulate in a purpose built storage facility, or encapsulate any residual contaminated solids in situ by capping with an appropriate capillary break and with one metre of clay or similar impermeable material;

(c) Design, install and maintain adequate diversion drains or similar structures to protect or minimise the erosion of any exposed surfaces by stormwater runoff;

(d) Design, install and maintain adequate surface drainage to prevent water ponding and infiltration into any contaminated materials;

(e) Address contaminated site issues by referring to Notes 11.2 and 11.3 of this environmental authority;

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(f) Establish a monitoring program to determine the success of the decommissioning plan;

(g) If required, remove the wall of the containment facility; and

(h) Rehabilitate the disturbed areas in accordance with the rehabilitation conditions of this environmental authority.

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APPENDIX C Schedule of Rehabilitation Costs

OIL ACTIVITIES	
Activity Type	***Unit Cost***
First well	$10,000
Subsequent wells	$10,000
Activity in environmentally sensitive area *	Site specific estimation
Roads	$400 per km
Buried flow line construction	$20,000 per gathering system project
Buried flow line in operation	$500 per line
Flow lines – surface	$500 per line, plus $200 per km
Borrow pit	$1,000 each
Evaporation pond	Site-specific estimation
Storage tank	$5,000 per tank
Contaminated land survey	$20,000 per facility
Sampling	$5,000 per facility
Bioremediation land farm	$5,000 per facility
Infrastructure	Site specific estimation
Seismic lines	$5,000 per seismic line survey
Management fee	20% (maximum $20,000)
* Including but not limited to exploration, appraisal, development activities and infrastructure developments	

GAS ACTIVITIES (Including Coal Seam Gas wells >350m)	
Activity Type	***Unit Cost***
First well	$10,000
Subsequent wells	$5,000
Activity in environmentally sensitive area *	Site specific estimation
Roads	$400 per km
Buried flow line construction	$20,000 per gathering system project
Buried flow line in operation	$500 per line
Flow lines – surface	$200 per km
Borrow pit	$1,000 each
Containment pond (water)	Site specific estimation

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GAS ACTIVITIES (Including Coal Seam Gas wells >350m)	
Activity Type	***Unit Cost***
Contaminated land survey	$20,000 per facility
Processing facility (small)	$10,000 each
Processing facility (large)	Site specific estimation
Compressor only	$5,000 each
Seismic lines	$5,000 per seismic line survey
Management fee	20% (maximum $20,000)
* Including but not limited to exploration, appraisal, development activities and infrastructure developments	

GAS ACTIVITIES (Coal Seam Gas wells <350m)	
Activity Type	***Unit Cost***
First well	$10,000
Subsequent wells	$1,000
Activity in environmentally sensitive area *	Site specific estimation
Roads	$400 per km
Flow lines - buried	$500 per line
Flow lines - surface	$200 per line
Borrow pit	$1,000 each
Containment pond (water)	Site specific estimation
Contaminated land survey	$20,000 per facility
Processing facility (small)	$10,000 each
Processing facility (large)	Site specific estimation
Compressor only	$5,000 each
Seismic lines	$5,000 per seismic line survey
Management fee	20% (maximum $20,000)
* Including but not limited to exploration, appraisal, development activities and infrastructure developments	

Note: Rehabilitation cost estimates must be based on third party costs for rehabilitation of land that has been "*significantly disturbed*" and may be reviewed annually by the administering authority.

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APPENDIX B – WASTE RECORDS

Waste classifications
Wastes is categorised as Hazardous, General, Metal or Cuttings .

Waste categories	Description
Hazardous	Hazardous waste does **not** include waste treated on site and rendered non-hazardous. As a minimum these shall include those wastes listed by the Basel Convention. In addition to these wastes any others defined as Hazardous within the local country legislation shall be included. Information on the Basel Convention definitions can be found at www.basel.int/text/con-e.htm
General	General waste
Metal Metal	Waste

The tiered approach
The nature of waste from different facilities is variable, making comparison difficult. In addition to defining tiers reflecting accuracy of measurement, a waste categorisation system is provided.

- Tier 1 is for facilities to which typical quantities of waste from similar plants are
- applie d;
- Tier 2 includes waste estimates in the absence of a measurement or reporting
- system and limited categorisation;
- Tier 3 involves routine reporting of a unit measure such as skips or drums disposed
- of and categorisation;
- Tier 4 requires recording of wastes by weight and volume and categorisation;
- Tier 5 requires recording of wastes or volume composition analysis.

Disposal route
The disposal route should be specified using the following classifications:

Waste classification	Description
In-situ disposal	Disposal by the company. This includes reinjection, on-site landfill, on-site incineration of **solid** waste
Total storage	Total inventory of waste stored on site or at a company-held storage facility (at the end of the reporting year)
Reporting year storage	Total waste generated **during the reporting year** and stored on site or at a company-held storage facility (at the end of the reporting year)
Incineration with energy recovery	Off-site incineration with energy recovery
Incineration without energy	Off-site incineration without energy recovery

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recovery	
Authorised landfill	Waste passed to a responsible third party for disposal at an authorised landfill site
Reuse	Waste that is reused in its original form
Recycling	Waste that is reprocessed into usable materials

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Year	
Project	
Asset	
Contact for Project	

'One Time' waste (eg Large one-time projects)								
CATERGORY	IN-SITU DISPOSAL	TOTAL STORAGE	REPORTING YEAR STORAGE	INCINERATION WITHOUT	INCINERATION WITH	AUTHORISED LANDFILL	RECYCLING/ REUSE	SUM
Hazardous (tonnes)								
General (tonnes)								
Metals (tonnes)								
Total (tonnes)								

Please forward complete form to QGCEnvironment@bg-group.com at the completion of the project.

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APPENDIX C – Emissions Reporting Form

BG Group Emissions Reporting

YEAR	
ASSET	
COUNTRY	
Survey Name	
Seismic Contractor	
Seismic Vessel	

INPUTS

ASSUMPTIONS

Engines	QUANTITY	UNIT	Emissions Factors t/t CO	Emissions Factors t/t NOx	Sulphur in fuel (mass%)
Gas		scm			
Diesel		m3			
Oil - HFO		m3			
Oil - LFO		m3			

Support Transport	QUANTITY	UNIT	Sulphur in fuel (mass%)
Kerosene		m3	
Diesel (vehicles)		m3	
Diesel (vessels)		m3	
Heavy Fuel Oil		m3	
Gasoline		m3	
Natural Gas Vehicles		m3	

Fuel Gas Composition (mole %)

%Nitrogen	%CO2	%H2S	%CH4	%Ethane	%Propane	%Butanes	%Pentanes	%Hexanes	%Benzene	%Heptanes	%Toluene	% C8 +

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at the FCSs, which will be high enough to safely disperse unburnt gases, and to ensure safe radiation intensities in the immediate vicinity, in the event of unplanned ignition (eg by lightning). Separate vents will be provided to safely handle the gas during upset conditions from each compressor set, as well as from sources at the plant inlet manifold. These vents are expected to be approximately 25 metres in height.

Greenhouse gas emissions from the FCS venting system are comparable to a constantly lit flare. QGC has estimated that venting at FCSs will result in 78 tCO_2e- (tonnes CO_2 equivalent) per annum per FCS being released and that flaring at an FCS with a constantly lit pilot (fuelled by CSG) would result in 72 tCO_2e- per annum per FCS being relased. Venting is considered to be a more reliable solution than flaring and is QGC's preferred method of relief at the FCSs. The net difference in emissions between venting and flaring (with a constantly lit pilot) at an FCS is insignificant in the context of total QCLNG project emissions (approximately 5 million tonnes per annum). However QGC may revert to flaring at FCSs should regulations prescribe flaring.

During a downstream process upset (maintenance/emergency), gas produced from 'sensitive' well-sites will be vented at the inlet to the respective FCS. A sensitive well is defined as a well that, following a period of shut-in, will require some form of well intervention or stimulation to start-up the well and resume well production at the rates observed before the shut-in.

On wells classified as 'sensitive' wells, the flow control valve (FCV) on the gas outlet at the wellhead shall close to a minimum open position to greatly restrict the flow of gas produced from the well. Additionally, the pump speed will be slowed to operate at reduced rates to avoid 'bogging' the pump and any settling of solids in the production tubing. Wells classified as 'non-sensitive' will be shut-in via stoppage of the down-hole pump and closure of the flow control valve (FCV) at the wellhead.

It is estimated that each sensitive well will flare 1 MMscf (28,300 m3) per annum. There are a range of potential flaring scenarios occurring between once every four years and twice per year. Flaring events range between five minutes and six hours except for flaring during pilot well testing and workover rig activities.

For gas produced during workover rig activities and at pilot well testing, a temporary flare will be installed.Flaring during workover rig activities occurs once every two years for a duration of approximately three days. Each workover flaring event will flare approximately 0.5 MMscf (14,150 m^3) per day.

Pilot well testing will occur as part of the exploration and appraisal program for the QCLNG Project and these wells (approximately 5 % or 300 wells) will typically flare for six months. Pilot wells are expected to flare approximately 95 MMscf (2.7 million m^3) per event.

The stack for temporary well site flares will be between 2 and 6 m high and between 80 and 250 mm diameter and designed to comply with all relevant standards. The flares will be elevated and will have a sterile radius which will be validated through radiation modelling (with a nominal radius of 20 m). This sterile radius will be cleared of all vegetation so there are no ignition sources in a flaring event.

3.5.3 Well Instrumentation

Wells are equipped with instrumentation and telemetry that will transmit information including production and gas flow data to a central control room. The control room's primary function is to manage and balance production against demand for CSG, as well as provide a central point for managing and responding to field-based emergencies. All wells will be capable of being remotely shutdown or opened from the control room. Triggers for a shutdown can include potential well leaks and production constraints.

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3.5.4 Well Spacing

At a conceptual level QGC plans to locate wells approximately 750 m apart to optimise production. Actual well locations are refined on the basis of environmental, social and land access constraints (refer *Section 11.0*).

In accordance with existing land access procedures, QGC negotiates with landholders prior to the development of each well, construction of gathering systems and access tracks, and the installation of well site equipment. In these discussions and during the QGC planning process, account is taken of environmentally or culturally sensitive locations, landholder requirements and safety requirements. QGC also secures land access agreements where required.

3.5.5 Progressive Rehabilitation

Once wellhead infrastructure is established, the pad is progressively rehabilitated and eventually occupies an area of approximately 5,000 m^2. The surface equipment is fenced to exclude stock access.

3.5.6 Monitoring and Maintenance

Ongoing and active management of the wells is required and is particularly focused on monitoring/maintenance and workover management. A workover rig may be utilised to maintain a well, optimise production and ensure asset integrity once every two years and take approximately three days per well.

Wells are monitored continuously and maintained on a regular basis. Gas and water levels and pressures of the wells are recorded as are the gas and water volumes produced from the well bore. Gas engines, gas-gathering lines, flares, separators and pump drive units in the field are regularly inspected and maintained.

A telemetry system provides real-time monitoring of performance to allow trending for maintenance planning. QGC maintains surplus equipment and materials for the maintenance and repair of equipment at warehouse facilities.

Maintenance of the separator and the associated equipment between the wellhead and gathering system includes:

- flushing the separator to clean out the silt and coal fines
- cleaning coal fines and silt from the strainer
- valve replacement for faulty or worn valves
- meter maintenance
- cleaning of gas/water vents and replacement of worn o-ring seals in these vents
- replacement of faulty or worn separator gauges
- replacement of o-ring fittings
- maintenance or repair of safety valves
- maintenance of hammer union fittings
- changing of orifice plates.

The wellhead and separator skid design and control system configuration incorporate a number of protection layers to prevent uncontrolled gas releases. The well pad and surrounding area will be cleared of vegetation so that a bush fire will not reach the equipment. Upon high pressure at the well site, due to a downstream LNG or compressor upset flow, the well can be shut-in. Some areas of the coal seam are sensitive to well closure and in these instances (approximately 10 % of total wells) the well will vent CSG

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