

Department of Environment and Resource Management (DERM) submission on the Gladstone LNG Project Environmental Impact Statement (EIS)

General Comments:

Issue: Western Basin Dredging

The dredging option proposed in the EIS is not consistent with the Port of Gladstone Western Basin Master Plan or the Port of Gladstone Western Basin Dredging Project.

While comments have been provided for the proposed dredging contained in the EIS, it is expected that the dredging will be in accordance with the outcomes of the Port of Gladstone Western Basin Master Plan and the Port of Gladstone Western Basin Dredging Project.

Issue: Front end engineering design (FEED)

Numerous sections of the EIS note that FEED is required to be undertaken before the final details of the proposal can be provided. In many cases the engineering design and associated mitigation measures is required for impact assessment. Examples include:

- material off load facility – the construction method and design of the structure. The construction method and design of the proposed dredge spoil rehandling ponds proposed to be located adjacent to the haul road;
- product off load construction details, particularly across mangroves;
- bridge construction details;
- LNG facility construction details including the design of the reverse osmosis water treatment plant and associated intake and outfall diffuser, the proposed treatment plant to treat sewage and dispose to land during construction and operation; and the waste management of contaminants removed from the CSG prior to liquefaction;
- the construction of the gas transmission across ranges, problem soil areas (43.2% of the route) and water courses which still require detailed geological and soil investigations with engineering design responses to determine if the construction is possible in these areas or how construction will take place; and
- upstream infrastructure design and construction methods such as well drilling, completion and rehabilitation.

Until information is provided on FEED there is insufficient information to adequately assess the EIS. Additionally, this information should provide certainty with respect to the constructability of the pipeline and other aspects requiring further detail.

Where sufficient information cannot be provided prior to the completion of the EIS process, it is unlikely that condition will be able to be developed or recommendations made for all approvals.

Recommendation

Provide sufficient information to assess all components of the project. Plans and maps should be provided showing waste streams and discharge points accompanied with detailed descriptions of the various components. Information should be presented describing the mitigations measures to be implemented during all stages of construction and operation of the project. The basis for these measures should also be included.

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Issue: Investigations still required

The EIS identifies many areas that require further or field investigations to be undertaken. For example, soil surveys of problem soils, geotechnical investigations of ranges, and flora fauna studies. This level of detail is required to adequately assess the EIS.

Recommendation

Provide the findings of the further studies, as noted in the EIS. The findings should include a detailed assessment of the mitigation measures provided to prevent and or minimise impacts to environmental values.

Issue: Santos EHS Management System (EHSMS)

In multiple sections the EIS refers to the EHSMS as providing mitigation measures. However, the EHSMS is not included in the EIS document. For those issues, the relevant components of the EIS can not be assessed. In addition, management systems usually operate to support management principles not necessarily set the principles.

Recommendation

Provide the Santos EHS Management System documentation.

Issue: Mitigation measures not identified nor discussed

In multiple sections of the EIS, mitigation measures refer to “*Environmental Authority requirements*” or “*in accordance with the Dredge Management Plan*” to be provided by contractors. This is inadequate. The Terms of Reference (TOR) requires the EIS to:

- Set out acceptable standards and levels of impacts (both beneficial and adverse) on environmental values.
- Demonstrate how environmental impacts can be managed through the protection and enhancement of the environmental values.

The EIS should address these matters in detail, not postpone the assessment to a later approval process.

Recommendation

The EIS should provide a detailed assessment of mitigation measures that will appropriately avoid and or minimise impacts to environmental values identified in the EIS. Such measures should provide for the minimum standard of environmental management to be used by contractors and encourage adoption by contractors of best practice environmental management.

Issue: Mitigation measures

There are inconsistencies with the location within the EIS of mitigation measures presented to prevent and or minimise the impacts on environmental values. Mitigation measures should be identified, discussed and assessed within the EIS document. These measures should then be duplicated, in detail, in the EM plans. Some measures are first identified in the EM plans – this is not appropriate. The mitigation measures need to be adequately discussed and assessed in sufficient detail within the EIS document before their adoption in the EM plans.

Recommendation

Provide a clear reasoned, evidence-based discussion and assessment of all mitigation measures to be adopted by the project. This assessment should take comments in this submission into consideration. As mentioned in other comments in this submission, the mitigation measures should be clear, measurable and auditable.

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Issue: Cumulative Impacts

The EIS only provides limited qualitative cumulative impact assessment. Details should be sought for each LNG project and other known proposals to facilitate a more detailed cumulative impact assessment. The Department of Infrastructure and Planning may be able to assist in this regard.

Recommendation

Provide a more detailed cumulative impact assessment addressing the proposed coal seam gas fields, pipeline alignments and the proposed LNG facilities. Such information should include assessments of flora, fauna, soils, air emissions, treated water discharges to ephemeral streams, groundwater impacts and water course crossing impacts of all LNG projects associated with the Surat and Bowen Basins, Curtis Island and Fishermans Landing.

Issue: Environmental offsets

Information is required to show that measures have been taken to avoid and minimise potential adverse impacts of the proposal. The EIS does not include information demonstrating why impacts are un-avoidable. For example, the location of the LNG facility would result in clearing all RE 12.2.2 (Microphyll/notophyll vine forest on beach ridges) located on the proposed LNG facility site. The EIS does not provide a detailed, evidence-based assessment addressing why this potential loss of critically endangered ecosystem cannot be avoided nor mitigated.

Environmental offsets should be proposed to counterbalance any remaining loss of environmental values, consistent with the principles and specific-issue offset policies under the framework of the Queensland Government Environmental Offset Policy 2008 (QGEOP).

Relevant specific-issue policies that should be addressed are:

- Queensland Government – *Policy for Biodiversity Offsets* – Consultation Draft;
- Vegetation management—*Policy for Vegetation Management Offsets*, September 2007, Department of Natural Resources and Water;
- Marine fish habitat—*Mitigation and Compensation for Works or Activities Causing Marine Fish Habitat Loss*, 2002, Department of Primary Industries and Fisheries; and
- Koala habitat—*Offsets for Net Benefit to Koalas and Koala Habitat*, 2006, Environmental Protection Agency.

Recommendation

Provide an offsets proposal covering the whole project in accordance with the QGEOP and specific issue policies.

Issue: Vegetation Management Act 1999

The EIS has identified the potential need to obtain approvals under the *Vegetation Management Act 1999* (VMA) and the possible requirement to provide offsets under the “*Policy for Vegetation Management Offsets*” (DNRW, 2007). While DERM encourages voluntary offsets, the EIS should clarify which offsets are a legislative requirement and which offsets are voluntary.

Recommendation

The project should determine which components of the project are petroleum activities as defined under the EP Act and therefore, exempt development under the *Integrated Planning Act 1997* (IPA). The EIS should clarify which offsets are a legislative requirement, specifying the legislation, and which offsets are voluntary.

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Issue: Financial Assurance

Financial assurance will be required prior to the issue of environmental authorities (petroleum activities) in accordance with section 312O of the EP Act. However, it is unclear how schedules of disturbance for financial assurance calculations will be determined without specific information regarding the scale of impacts.

Recommendation

The proponent should develop schedules of disturbance for all aspects of the project in accordance with the DERM guideline – Financial assurance for petroleum activities. Information demonstrating that the financial assurance estimates will be adequate for worst-case scenarios (including maximum possible areas of disturbance, maximum proportion of problem soil areas and maximum proportion of environmentally sensitive areas) should be provided.

Issue: Groundwater dependent ecosystems

The EIS does not adequately address groundwater dependent ecosystems (GDEs). These include:

- subterranean ecosystems;
- phreatophytic terrestrial and riparian vegetation;
- springs and other wetlands;
- stream communities dependent on baseflow; and
- estuarine and submarine systems dependent on groundwater discharge.

No information has been provided regarding the environmental values of GDEs or the proposed mitigation or monitoring of impacts on GDEs except for the statement that spring discharge will be monitored.

Recommendation

To ensure that environmental values of GDEs are recognised, potential impacts are fully assessed and appropriate mitigation measures are adopted, a comprehensive whole-of-project GDE assessment is required to include the identification of all types of GDEs, description of the values of identified GDEs, description of likely impacts, options to avoid or mitigate these impacts, and details of proposed monitoring for each identified GDE.

Issue: Information required for application for Environmental Authorities (Petroleum Activities)

The proponents propose to use the Phase One and Phase Two approach of the CSG fields component of the EIS to develop a system for issuing of environmental authorities subject to a management system and constraints mapping approach. The information from the Phase One studies is insufficient in some cases to finalise condition for any tenement. The protocols put forward under the Phase Two component are largely based on EHSMS and lack sufficient commitments and control mechanisms to provide surety that impacts on environmental values will be managed at an acceptable level. There is also insufficient information provided detailing what events will trigger further DERM approvals relating to the project and how the proposed system will facilitate the amendment of conditions in Environmental Authorities as best practice environmental management evolves in the future. DERM expects to be provided with more detailed information on each tenement prior to commencement of production activities – a mechanism needs to be recommended for discussion.

Recommendation

Detailed information on the following aspects will need to be provided prior to grant of environmental authorities:

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- Point source air emissions
- Air quality modelling
- Point source noise emissions
- Noise modelling to nearest sensitive receptors
- Water releases to the environment (location, quality, quantity, frequency)
- Effluent irrigation modelling
- Significant and high hazard dam designs and certifications
- Nature and description of activities to be undertaken in environmentally sensitive areas
- Offset proposals.

More detailed protocols under the Phase Two section of the EIS should be provided, detailing exactly what will be done to avoid, minimise and mitigate all impacts on all environmental values in all areas of the project. References to the EHSMS being the sole mitigation measure would not be considered acceptable in these circumstances.

The proponent should also detail what triggers will be included in this approvals process to amend environmental authority conditions as changes in potential environmental harm, the way in which operations are being carried out or changes to best practice environmental management occur.

Issue: Environmental Impacts (General)

The list of Environmentally Relevant Activities (ERAs) likely to be triggered by the project is incorrect and incomplete. More detail is required to allow development of appropriate conditions. Relevant ERAs may include (for the whole project):

- Chemical storage ERA 8
- Hydrocarbon gas refining ERA 9
- Electricity generation ERA 14
- Fuel burning ERA 15
- Motor vehicle workshop operation ERA 21
- Concrete batching ERA 43
- Bulk material handling ERA 50
- Water treatment ERA 64
- Bulk material handling ERA 50
- Regulated waste storage ERA 56
- Regulated waste transport ERA 57
- Waste disposal ERA 60
- Sewerage treatment ERA 63
- Water treatment ERA 64

Recommendation

The Supplementary EIS should identify those ERAs likely to be undertaken and provide sufficient information to adequately assess the proposed ERAs. Information on associated ERAs should include (reference can be):

- Site descriptions for each ERA
- The scale or intensity of each ERA, including clear details of yearly throughput.

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- Identify all environmental values and potential impacts from each ERA, at each location, including but not limited to:
 - potential water impacts;
 - potential noise impacts;
 - potential air impacts;
 - potential land impacts;
 - waste management practices.
- Best practice management for each ERA to demonstrate that the potential for harm to the receiving environment is prevented or minimised.
- Resilience of the receiving environment and established acceptable discharge limits that will minimise impacts on environmental values.
- Establish and detail ambient monitoring programs to monitor mitigation measures, compliance with conditions and for potential impacts identified in the EIS.
- Contingency plans and emergency procedures for non-routine or upset situations from each ERA at each location.
- Periodic review of environmental performance and continual improvement

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Specific EIS Comments:

Issue: Co-location opportunities

Table 1.7.1 in Section 1.7, Relationship to Other Projects, does not include all proposals to enable consideration of co-location opportunities.

Recommendation

The Surat to Gladstone Pipeline proposal by Surat Gladstone Pipeline Pty Ltd needs to be included when describing the relationship to other projects.

Issue: Federal and State regulatory approval process

Incorrect legislative reference in Figure 1.9.1 for environmental authorities (petroleum activities).

Recommendation

Environmental authorities are issued under the EP Act, not the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Issue: Key approvals required

All potential approvals required under the various acts have not been identified in Table 1.9.1.

Recommendations

1. Under the *Water Act 2000*, include details of potential approvals to take or trade associated water for uses not permitted under the *Petroleum and Gas (Production and Safety) Act 2004* (P&G Act).
2. Under the *Forestry Act 1959*, include details of potential approvals associated with including use of quarry materials and forest products and activities within State Forests and Timber Reserves.
3. Under the *Land Act 1994* and *Land Title Act 1994* an applicant must obtain appropriate tenure, or level of occupation, over all non-freehold land prior to any activity commencing on it. This should include roads or land administered under the *Nature Conservation Act 1992* and or the *Forestry Act 1959*.
4. Under the *Coastal Protection and Management Act 1995*, a development permit is required for works within a Coastal Management District removing or interfering with coastal dunes on land, other than State coastal land, that is in the erosion prone area and above high-water mark. Additionally, where quarry material (material below the high water mark) will be removed and an approved Dredge Management Plan is not in place, an application for an Allocation of Quarry Material would be required.

Issue: Regional planning frameworks

Section 1.9.3 does not address all planning frameworks.

Recommendation

Reference to and consideration of the draft Maranoa-Balonne Regional Plan should be included in the Supplementary EIS.

Issue: Local authority planning schemes

In section 1.9.6, some local government changes due to amalgamations have not been incorporated.

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Recommendation

The Roma Regional Council has been renamed "*The Maranoa Regional Council*"; and the Dalby Regional Council has been renamed as "*The Western Downs Regional Council*" and Planning Schemes for the former Taroom, Tara and Murilla Shires should be referenced.

Issue: Sewerage

Section 3.6.6.5 states that further discussion on sewage treatment is presented in section 6.5. This information could not be located.

Recommendation

The proponent should provide detailed information regarding sewage treatment infrastructure, processes, irrigation methods and expected water quality parameters.

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Coal Seam Gas (CSG) Fields:

Issue: CSG Field Development Alternatives

Section 2.1.3 discusses the storage of produced CSG but does not identify how the CSG will be transported to the storage sites. The likelihood of additional impacts on environmental values needs to be identified if gas storage results in additional pipelines and other infrastructure.

Recommendation

Clarify whether additional pipelines will be required to transmit gas to the Santos Underground Gas Storage at Ballera and or Moomba, or other depleted fields, as noted in the EIS.

Issue: Nature of Field Development

Section 3.6.2.1 of the EIS mentions that one method of facilitating the ramp-up of gas required to commence liquefaction is the underground storage of gas. Insufficient data has been provided regarding how releases of gas to the environment will be prevented.

Recommendation

The proponent should provide detailed preliminary testing, control measures and monitoring that will be adopted to ensure gas containment will be effective and groundwater aquifers are not impacted by the gas. Contingency measures should be developed to ensure gas is not released to atmosphere should unforeseen circumstances arise.

Issue: Borrow pits and Storage Areas

There is no mention of *Forestry Act 1959* approvals for borrow pits nor storage areas.

Recommendation

Include reference to approvals that may also be required under the *Forestry Act 1959* for borrow pits and any quarrying activity located on State Land.

Issue: Stock routes

Table 4.14.2 does not address impacts on stock routes.

Recommendation

Include an assessment of the potential impact on stock routes. Mitigation measures should also be described to prevent and or minimise the potential impacts.

Issue: Groundwater protection

Section 5.4.7, Groundwater Protection, should address the storage of reverse osmosis concentrate as a waste material that has a potential to impact on groundwater values.

Recommendation

Include information regarding the storage of reverse osmosis concentrate in ponds and its potential to adversely impact on groundwater if not properly constructed and maintained. Also detail mitigation measures to be undertaken to ensure groundwater will not be contaminated by leakage of reverse osmosis concentrate from storage ponds. Reference should be made to engineering standards to be adopted and to monitoring and reporting regimes.

Issue: Land mitigation methods and native plants

Sections 6.3, 7.3 and 8.3, Land – Topography and Geomorphology Potential Impacts and Mitigation Methods, of the EIS provided insufficient information on the use of native plant

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species in revegetation and landscaping. The use of native vegetation should be considered for use before other options.

Recommendation

The extent of appropriate native plant species during any landscaping and re-vegetation should be described in more detail.

Issue: Acid sulfate management plan

The TOR requires a site-specific Acid Sulfate Management Plan.

Recommendation

Provide the site-specific Acid Sulfate Management Plan as requested by the TOR.

Issue: Land contamination

Sections 3.2, 7.3.2 and 8.3.2, Land Contamination, provide insufficient information to adequately assess contaminated sites.

Recommendation

The proponent should provide detailed information on the expected nature and extent of contamination at each site and a remediation plan and validation sampling for any contaminated site.

The proponent should note that in the event that unexpected contamination is identified, action must be taken to immediately abate the potential harm, and a remediation action plan is developed. If this information is detailed in Management Procedure EHS08, a copy of this document should be provided.

Issue: Land management manuals

Use should be made of Land Management Manuals because appropriate land management guidelines relevant to specific soil types are included in these reference manuals.

Recommendation

Use the following Land Management Manuals to assist in determining agricultural suitability of soils:

- Land Management Field Manual — Roma District;
- Land Management Field Manual — Wandoan District;
- Land Management Field Manual — Dawson–Callide District.

Revise the potential impacts and proposed mitigation measures in accordance with these manuals.

Issue: Agricultural Land Classes, CSG Fields (Southern Section)

Departmental mapping of Good Quality Agricultural Land has not been considered in identifying the agricultural land classes.

Recommendation

Revise the proposed environmental values and mitigation measures after considering the following:

- For Series 34 – CSIRO (1974) mapping, Map code 31 should be included as Agricultural Land Class A while Map code 30 should be included as Class B land.

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- Identify the source of the mapping for the area south of Miles. Departmental mapping based on the Murilla, Tara and Chinchilla Shires Land Management Manual indicates there are significant areas of Class A and Class B Agricultural land.

Issue: Soil Erosion – General Erosion Control Measures

Section 6.3.1.5 of the EIS has provided desktop assessments of soils in the CSG fields. Detailed soil surveys should be conducted to identify and avoid problem soils. Where avoidance is not possible specific mitigation measures should be developed to prevent and or minimise the impacts from erosion.

Recommendation

Provide detailed soil survey information including soil types and characteristics mapped to facilitate appropriate location of works and development of effective mitigation measures. The Supplementary EIS should detail how facilities, access tracks and pipelines avoid problem soils. Where such soils cannot be avoided, specific measures should be detailed in the Supplementary EIS to prevent and or minimise impacts to environmental values.

Issue: Over land flow

The Water Resource Plans for the Fitzroy (1999), Moonie (2003) and the Condamine–Balonne (2004) Catchments include provisions adopting the Overland Flows Codes that limit the take of water, and these must be complied with.

Recommendation

Provide detailed information describing how the project is consistent with the Water Resource Plans. Information should include the identification of the potential constraint to 'taking' water in a sediment basin under the provisions of Overland Flow Codes relevant to an approved Water Resource Plan.

Issue: Vegetation clearing

The *Forestry Act 1959* contains requirements regarding millable timber on State lands.

Recommendation

Provide survey information detailing the millable timber to be cleared as a result of the project.

Issue: Sodic and/or dispersive soils

Spoil management should be further addressed because inappropriate disposal of spoil from drilling can result in difficulties in establishing surface cover, resulting in increased erosion risks that has not been identified in Section 6.3.1.5.

Recommendation

Spoil resulting from drilling operations should not be disposed of by spreading over the surface, especially if the soils are sodic. Appropriate mitigation measures should be described to prevent and or minimise impacts to environmental values.

Issue: Agricultural Land Capability

Impacts on Good Quality Agricultural Land (especially Class A and B) should be avoided in accordance with State Planning Policy 1/92.

Recommendation

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The proposed methods to avoid GQAL should be discussed and included in the Supplementary EIS. Where there is no alternative to locating wells, pipelines and tracks within cultivation areas, they should be located on the edge of the cultivation area.

Issue: Identification, Monitoring and Management

Surface and groundwater reports can assist in on-going water quality assessments carried out by the Department regionally.

Recommendation

Monitoring reports should be made available to the DERM upon their completion.

Issue: Structures on flood plains

Table 6.3.21 identify structures on floodplains have the potential to divert and/or concentrate flood flows, resulting in increased erosion risks.

Recommendation

Include the following mitigation measures:

- Roads or other structures on floodplains should be orientated and constructed so as not to divert or concentrate flood flows;
- Road heights on floodplains should not exceed 20cm above Natural Ground Level (NGL); and invert levels should not be greater than 10 cm above NGL.

Issue: Problem Soil Areas

Table 6.3.21 identifies that detailed soil surveys should be conducted prior to any construction activities to allow for works to be located in areas that will not require intensive mitigation measures to prevent erosion. Exposing sodic subsoils may lead to severe gully erosion.

Recommendation

Provide detailed soil survey information in the Supplementary EIS detailing the occurrence of problem soils. Specific mitigation measures should be developed depending on the soil characteristics. Also, include the following mitigation measures:

- Pre-construction soil surveys should identify problem soil areas that, where practical, should be avoided for locating facilities, access tracks and pipelines;
- Appropriate construction methods of banks should be used to control runoff in sodic soil areas; and
- Alternative construction methods may be required to avoid exposing the sodic subsoil.

Issue: Water management ponds and reverse osmosis concentrate ponds

The decommissioning and rehabilitation of water management ponds and reverse osmosis concentrate ponds is unclear in Table 6.3.22 of the EIS and in Appendix Q. The EIS should provide a detailed, evidence-based assessment of the appropriate options for decommissioning and rehabilitation.

Recommendation

Provide a detailed, evidenced based assessment for the decommissioning and rehabilitation of ponds.

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Issue: Further flora and fauna study commitments

In attempting to protect significant vegetation, habitat and fauna during establishment of gas wells a number of commitments such as identification and marking of trees and remnant habitat are made in section 6.4 (page 6.4.34) and section 11 (page 11.12 and 11.14). Environmental Management Plans (sections 11, 12 and 13) contain related commitments for flora and fauna management. These activities will require expert knowledge in identification.

The commitments are supported. However, the EIS does not make clear who will carry out the necessary identifications, other than a general statement on responsibilities of Santos staff and construction contractors.

Recommendation

The proponent should provide specific information on responsibilities for identification of significant vegetation and habitats.

Issue: Groundwater dependant ecosystems

Sections 6.4.2.1 and 6.4.5.4 of the EIS has provided insufficient information on the environmental values of groundwater dependant ecosystems and where the EIS proposes further investigation on specific matters, the investigation of groundwater dependant ecosystems is not included. Additionally, there are numerous species that are not strictly aquatic species, yet are dependant on their association with shallow groundwater associated with wetlands and waterways (for example River Red Gum, *Eucalyptus camaldulensis*).

Recommendation

To ensure potential impacts are fully assessed and appropriate mitigation measures are adopted, surveys should be expanded to target groundwater dependant ecosystems and terrestrial species that are ecologically dependant on aquifers, wetlands and waterways and therefore likely to be affected by the project. Specific mitigation measures should be assessed, detailed and provided.

Issue: Regulatory framework

Section 6.4.3 of the EIS does not identify areas of endangered regrowth vegetation that are protected under the *Vegetation Management (Regrowth Clearing Moratorium) Act 2009*. However, they are only required to be considered on freehold and leasehold land (agriculture and grazing) and where triggered under the IPA.

The mapped areas are indicative and can be amended should the on-ground vegetation type, extent and functionality of the ecosystem not be an endangered ecosystem. The moratorium mapping can be obtained in digital format from the DERM.

Recommendation

Mapping demonstrating restrictions under the *Vegetation Management (Regrowth Clearing Moratorium) Act 2009* should be obtained. The requirements and constraints with respect to the project should be discussed.

Issue: Flora and fauna management

Sections 6.4.3.1 and 7.4.3 of the EIS do not provide for the requirement for effective fauna and flora management in areas impacted by development of the CSG fields, and construction and operations of the Pipeline has not been adequately discussed in the EIS.

Recommendation

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In relation to the development of the CSG fields, and construction and operations of the pipeline, provide more detail on the management of flora and fauna. The following management plans should be developed specifically address this issue:

- Flora and Fauna Management Plans.
- Biodiversity Management Plans

[Note: These plans should be incorporated in the Environmental Management Plan covering the whole project.]

Issue: Weeds and pests

The principles for weeds and pest in the *Land Protection Act 2002* have not been incorporated into the EIS. The *Land Protection Act 2002* also provides for provisions to approve weed and pest management plans.

Recommendation

The principles relating to weeds and pests specified in the *Land Protection Act 2002* should be incorporated into to mitigation measures and included in the Supplementary EIS. Weed and pest management plans should be considered.

Issue: Section 6.4.4.2, Terrestrial Flora

Section 6.4.4.2 of the EIS has recognised the highly fragmented nature of the remnant regional ecosystems of the southern CSG fields and the remaining remnant vegetation is tenuously connected through roadside corridors. Consequently, it is important that clearing remnant vegetation on roads for infrastructure purposes is avoided.

Recommendation

Infrastructure should be located outside road corridors if clearing will reduce the width of vegetation on the corridor to less than 50 metres.

Issue: Water Quality

In section 6.4.4.4 of the EIS the proposed protocols for collecting and interpreting the water quality data do not take account of footnotes attached to the regional guideline values specified in the ANZECC 2000 guidelines pertaining to the following:

- Dissolved oxygen (DO) guidelines for freshwater should only be applied to flowing water, including those with significant subsurface flows. Stagnant pools in intermittent streams naturally experience values of DO below 50% saturation.
- Flow conditions are a critical consideration in application of these guideline values and highly relevant to considering any potential pulse inputs of pollutants.
- The guidelines adopted for freshwaters are for the most part the default ANZECC 2000 guidelines. The Queensland Water Quality Guidelines 2006 (QWQG) recommends that local water quality guideline values be developed from local data.
- Temperature varies daily and seasonally, it is depth dependent and is also highly site specific. It is not possible to provide simple generic water quality guidelines for this indicator.
- Turbidity is likely to be influenced by proximity to obstructions including culverts and road crossings and hence some bias may have been introduced in sampling these locations. Monitoring locations should be revised to avoid potential biased results.

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Recommendation

Recommendations for the collection and interpretation of water quality data associated with development of both the gas fields and the pipeline route need to be restated in a manner that is consistent with the QWQG and ANZECC 2000 guidelines.

Issue: Terrestrial flora – Fragmentation of communities

Section 6.5.4.2 of the EIS identifies that remnant vegetation, in some instances, is limited to that within a road reserve. The loss of this vegetation is significant as it may form the last remaining habitat for many species. Road corridors can serve to connect isolated remnant fragments in heavily cleared catchments. The explanation in the EIS that the remaining remnant vegetation is highly fragmented, which appears to be justification for removal of these roadside areas, does not adequately consider the values of such areas in many circumstances.

Recommendation

Areas of remnant and mature regrowth vegetation on roads should be avoided.

Issue: Terrestrial Flora – Vegetation Clearing

The EIS requires more detail on the impacts and mitigation measures related to protection of terrestrial flora.

Recommendation

Include more detail on potential impacts and mitigation measures required with consideration of the following:

- The actual extent and significance of vegetation removal should be discussed in more detail. Include impacts of all development infrastructure (access, pipelines) in addition to that of the well sites.
- Removal of any 'Endangered' or 'Of Concern' vegetation may trigger the necessity to acquire an environmental offset. The issue of 'Environmental Offsets' is mentioned but should be examined in more detail. An offsets package should be provided for assessment in accordance with the QGEOP and specific issue policies.
- There may be a need to obtain a Clearing Permit under the *Nature Conservation Act 1992* to remove and/or translocate plants.

Issue: Terrestrial Flora – Vegetation Clearing

The EIS requires more detail on the impacts and mitigation measures related to protection of terrestrial flora.

No reference has been made to establishing reference sites for monitoring rehabilitation.

Recommendation

At least two reference sites should be selected as benchmark monitoring sites, to provide on-going reference for environmental management and rehabilitation activities. The sites should be selected to represent the major natural ecosystems being significantly impacted by the project, and should be sufficiently removed from the project to be unaffected by the project's activities. The sites should be monitored at the same intervals and with the same methodology as that used for on-site monitoring.

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Issue: Terrestrial Flora – Loss of Topsoil

Section 6.4.5.2 is inadequate and requires more information required to ensure topsoil stored for revegetation is suitably managed.

Recommendation

Provide more detail on the removal and stockpiling of topsoil for future use in revegetation work. Storage of topsoil should be minimised. This is important in maintaining fertility, as well as in maintaining the viability of the seed bank. The description of topsoil management should consider transport, storage and replacement of topsoil on disturbed areas.

Issue: Terrestrial Fauna – Loss of Habitat

Section 6.4.5.3 of the EIS does not ensure appropriate revegetation measures are adopted to minimise impacts of CSG field developments on terrestrial fauna.

Recommendation

Include more detail on revegetation methods and procedures with consideration of the following:

- Revegetation should use locally indigenous species, sourced from a local seed bank where possible.
- Revegetation of exposed soils should be carried out as soon as practical after works have been completed.
- Where plantings and screening or landscaping are proposed, details should be provided of the species that will be used, and their provenance. Use of non-native and non-local species should be avoided.

Issue: Terrestrial Ecology Impacts and Mitigation Measures

Table 6.4.6 needs to be a concise compilation of impacts, mitigation measures and objectives.

Recommendation

Provide a more comprehensive assessment of impacts on terrestrial ecology and required mitigation measures. Table 6.4.6 should be expanded to incorporate all recommendations.

Issue: Aquatic Ecology Impacts and Mitigation Measures

The EIS (Table 6.4.7) does not adequately document the aquatic values associated with watercourses and wetland areas on either the gas fields, or along the pipeline route. Information is provided in relation to general values identified from State of the Rivers assessments within the catchment but no specific detail is provided for areas to be directly impacted by the project. Mitigation measures are too generic and not scaled in accordance with any specific identified values.

Recommendation

1. Undertake a detailed assessment of the aquatic values associated with watercourses and wetland areas on the CSG field site and along the pipeline route. The assessment should identify specific values that would be potentially impacted by the project.
2. Develop specific mitigation measures in relation to these potential impacts.

Issue: Aquatic Ecology Impacts and Mitigation Measures – Watercourses

Table 6.4.7 provides proposals for mitigation measures associated with the construction and rehabilitation of permanent creek crossings for pipeline construction make no reference to either AS2885 or the *Australian Pipeline Industry Association Code of Environmental Practice*.

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Recommendation

Provide detailed information describing the mitigation measures for permanent creek crossings and other aspects of pipeline construction that are consistent with AS2885 and the *Australian Pipeline Industry Association Code of Environmental Practice*, which documents the approach to be taken when determining the optimal route selection as well as engineering standards that must be applied to the construction.

Issue: Watercourses – Removal of riparian vegetation and soils

Where essential works are to be located adjacent to watercourses, bulldozing can result in erosion and loss of micro-habitats.

Recommendation

Alternative clearing methods such as lopping and hand clearing should be adopted adjacent to watercourses to minimise the disturbance to the riparian soils.

Issue: Section 6.5.3, Regulatory Framework

The Roma CSG Fields are located within Water Resource Plans which have not been referenced.

Recommendation

The following items should be considered as 'key legislation':

- Water Resource (Condamine and Balonne) Plan 2004.
- Water Resource (Moonie River) Plan 2003.

Relevant details of the above plans should be provided, including, respectively:

- Condamine and Balonne Resource Operations Plan, finalised in December 2008, for the upper and middle parts of the Plan, including the Roma Gasfields.
- Moonie Resource Operations Plan finalised in January 2006, including the Eastern Surat Gasfields.

Provide information detailing how the project is consistent with the legislation listed above.

Issue: Section 6.5.3, Regulatory Framework

Gas fields within the Roma and Fairview areas are located in the Great Artesian Basin. Appendix P2 highlights that there will be inter-aquifer transfer and drawdown of other aquifers such as the Precipice Sandstone and Hutton Sandstone formations. It is unclear how these impacts will fit within the scope of the Water Resource (Great Artesian Basin) Plan (2006).

Recommendation

Detailed information should be provided illustrating how the proponent will ensure the outcomes outlined in Section 8 of the Water Resource (Great Artesian Basin) Plan (2006) will be met.

Issue: Section 6.5.3, Regulatory Framework

The pipeline and LNG plant are located in the Calliope Basin and the appropriate Water Resource Plan has not been addressed.

Recommendation

Include reference to the Water Resource Calliope River Basin Plan 2006 and detailed information should be provided showing how the project is consistent with the plan.

Release

Issue: Section 6.5.4.1, Study Area

Incorrect catchment references.

Recommendation

Catchment references should be the Upper Dawson catchment, the Comet catchment, the Moonie Catchment, and the Condamine-Balonne-Culgoa catchment in Queensland.

Issue: Catchment Overview

Section 6.5.4.2 contains conflicting statements that may influence the level of monitoring required.

Recommendation

Clarify the statement in paragraph 2: "...it is expected that the same environmental values will apply to all streams in the catchment". This is also reflected in Table 6.5.1, but conflicts with the statement in Sect. 6.5.6 Summary of Findings (p6.5.21): "... baseline assessment has indicated that the existing water quality of surface waters ... is variable..."

Issue: Catchment Environmental Values

Table 6.5.1 contains incorrect reference to aquatic ecosystem protection.

Recommendation

The categories in Table 6.5.1 should be called Protection of ... disturbed aquatic ecosystems (not habitat).

Issue: Potential Surface Water Impacts and Mitigation Measures

Upstream and or downstream gauging is essential for an effective monitoring program. DERM officers can provide advice on suitable locations, and construction methods for gauging stations. These should be sited so as to minimise impacts on flows.

Recommendation

The proponent should install strategically located gauging stations upstream and or downstream of discharge points.

Issue: Surface Water Impacts and Mitigation Measures

With respect to Table 6.5.5, further details should be provided to define "background" quality, set appropriate water quality discharge limits and decide what monitoring should be undertaken. Similarly, information on discharge volumes and relationships with stream flows will be needed to derive monitoring approaches/limits for regulating discharge flows. In general it is preferred that the background water quality is defined based on historical data (and relevant 20th, 50th or 80th percentiles). This can be used as the basis for setting specific end-of-pipe limits in an approval, rather than a statement relating to measured background water quality at the time of discharge.

Recommendation

Provide further information on how "background" levels will be determined for discharge to Bungil Creek (or other creeks) and appropriate discharge limits (or approaches if this is to be determined at a future date) that should be adopted for both water quality concentrations and discharge rates.

Release

Issue: Surface Water Impacts and Mitigation Measures

Associated water has the potential to cause environmental harm to groundwater, surface water and adjacent lands if leakage occurs from the containment structure. Sufficient information has not been provided detailing the measures to prevent leakage.

Recommendation

Include details on the engineering and design standards to be applied to containment structures and for the decommissioning treatment of the reverse osmosis concentrate ponds.

Issue: Surface Water Impacts and Mitigation Measures

There are some potential impacts on streams from the discharge of hydrostatic testing as indicated in Table 6.5.5 and section 7.5. These are most likely due to chlorine, other contaminants or flow effects. The background water quality, hydrotest water characteristics, the proposed water quality indicators, limits and proposed monitoring (or methods for determining these) are required.

Recommendation

The background water quality, hydrotest water characteristics, water quality indicators, limits and proposed monitoring should be discussed and defined.

Issue: Water quality and river health monitoring program

In terms of monitoring the effects of the discharge, the commitment in Table 6.5.5 is that water quality sampling will be undertaken up to 2km downstream of the discharge. However, depending on the nature and size of the discharge, monitoring may be required for a greater distance than 2km downstream.

Recommendation

Provide evidenced based reasoning for the siting of the water quality monitoring station downstream of the discharge.

Issue: Ephemeral stream water quality

Conclusions about the water quality of ephemeral streams, contained in section 6.5.6, are not based on appropriate reference data. The guidelines being used for the comparison are reference-based guidelines from the ANZECC 2000 or the QWQG that have been derived from permanent flowing streams. Most of the streams in the study area are ephemeral and comparison to such guidelines is not really appropriate. Proper assessment would require suitable local reference data (as per the QWQG) to account for local conditions.

Recommendation:

The conclusions and findings of the report about water quality condition in ephemeral streams in the study area should be based on suitable reference data. Any limitations in available reference data should be acknowledged. The collection of relevant reference data should be considered for locations where there is a potential risk from the activity on surrounding environmental water quality.

Issue: Groundwater management

The EIS does not address the Central Highlands Aquifers – Interim Management Policy.

Recommendation:

Release

The proponent needs to recognise that DERM currently has an allocation policy for groundwater in the Central Highlands declared area. The policy uses a volume per hectare calculation to determine entitlement and protect existing users. The policy does allow for larger allocations where the proponent is prepared to complete a hydrogeological report and construct a monitoring network. Impacts on existing users and DERM policy in relation to the Interim Management Policy should be considered by the proponent.

Issue: Section 6.6.1.3, Regulatory Framework

The Roma CSG Fields are located within a number of Water Resource Plans that should be considered in the EIS.

Recommendation:

The following items should be considered as 'key legislation':

- Water Resource (Condamine and Balonne) Plan 2004.
- Water Resource (Moonie River) Plan 2003.

Relevant details of the above plans should be provided, including, respectively:

- Condamine and Balonne Resource Operations Plan, finalised in December 2008, for the upper and middle parts of the Plan, including the Roma Gasfields.
- Moonie Resource Operations Plan finalised in January 2006, including the Eastern Surat Gasfields.

Issue: Section 6.6.1.3, Regulatory Framework

The EIS should recognise the provisions of the P&G Act concerning groundwater monitoring.

Recommendation:

Provisions of the P&G Act require the holder of petroleum tenure to lodge regular monitoring reports, and review reports, on groundwater conditions of the tenure. Details of monitoring to be undertaken to fulfil these requirements should be provided.

Issue: Groundwater

The Gubberamunda Sandstone aquifers are important groundwater resources in the Roma gasfields area that have not been considered in the EIS.

Recommendation:

Provide detailed information and an assessment of the environmental values, potential impact and appropriate mitigation measures to prevent and or minimise impacts on the environmental values identified.

Issue: Section 6.6.1.5, Potential Impacts and Mitigation Measures – Mitigation Measures

To avoid sourcing additional replacement water from limited regional water supplies, attempts should be made to isolate wells that may cause drawdown of production aquifers.

Recommendation:

A triggered dewatering result will require shutting down of any wells that have lead to impacts on groundwater aquifers, and should form part of the water replacement plan.

Release

Issue: Groundwater

The EIS should clarify the measures to mitigate potential impacts on the several groundwater aquifers that occur in the CSG fields.

Recommendation:

Clarify this section in view of the following comments:

- It is not clear whether the trigger levels identified are in the context of the requirement under the P&G Act.
- The mitigation measures section should be separated in the context of the shallow groundwater and the deep groundwater. This section is difficult to understand. The report needs to identify that the shallow and deep aquifers may be connected.
- The references to monitoring are not clear and consistent between the text in this section, table 6.6.1 and 6.6.2 and the reports provided in Appendix P.
- There seems to be no discussion on monitoring of the Gubberamunda Sandstone. The report in Appendix P2 indicates that the Gubberamunda Sandstone should be monitored.

Issue: Groundwater – Cumulative Impacts

Clarification is required regarding the understanding of cumulative impacts on groundwater aquifers impacted by the gasfields.

Recommendation:

Clarify comments in this section related to deep groundwater considering that Section 6.6.1 is to address shallow groundwater issues, whereas deep groundwater is discussed in Section 6.6.2

Issue: Groundwater – mitigation measures

It is noted that the EIS is based on desktop assessment – Tables 6.6.1 and 6.6.2. However, monitoring and reviewing of the Hydrogeological Assessment is required to more clearly identify potential impacts.

Recommendation:

A detailed assessment of the potential impacts to groundwater resources should be provided. The proposed mitigation measures, to prevent and or minimise the impacts, should include the following:

- A monitoring program for identified aquifer systems to be approved by DERM; and
- A review of the existing groundwater model using the monitoring data to verify impact predictions should be completed and provided in the Supplementary EIS.

Issue: GAB dependent springs and base flow watercourses dependent on groundwater

While GAB dependent springs on the CSG field areas has been identified in the EIS, those GAB dependent springs and baseflow watercourses off the CSG field that could be affected by changes in groundwater due to the petroleum activity, have not be identified.

Also, the environmental values of the GAB dependent springs and base flow watercourses dependent on the GAB have not be identified.

Further, the EIS acknowledges that the project may impact on the GAB and that these effects maybe long lasting (up to 100years), yet no appropriate means for avoiding or mitigating these impacts are provided.

Release

Recommendation

The EIS should identify and describe GAB dependent springs and baseflow watercourses dependent on the GAB that maybe affected by the project, both on and off the CSG field tenure areas. The environmental values of these springs and watercourses should be fully described. Potential impacts should be identified (preferably using the study described in Section 6.4 and using the models in Appendix P2) and appropriate mitigation measures described.

Issue: GAB spring mitigation measures

Proposed methods for detecting impacts on springs are inadequate. By the time spring flows change, mitigation measures are unlikely to be effective. Also monitoring spring flows accurately is very difficult if not impractical. Other methods of detecting impacts should be proposed.

Recommendations:

Monitoring methods, capable of detecting or predicting changes in spring flows should be more fully described. This could include using an adaptive management framework containing groundwater pressure monitoring, modelling and frequent review. Mitigation measures, for example the reinjection of treated water into affected aquifers before there is any detectable change in spring flow, should be proposed that are consistent with this adaptive management approach.

Issue: Groundwater

An anomaly exists in dot point 7 of section 6.6.2.5.

Recommendation:

Provide an assessment of the potential impacts on the Mooga and Gubberamunda sandstone aquifers as shown in Appendix P2 (refer Case 1, Case 2). Mitigation measures should be provided avoid and or minimise potential impacts on the identified environmental values.

Issue: Section 6.6.2.6, Summary of Findings

Regular reporting will assist in gauging impacts on licensed stakeholders and assist in meeting the EIS objectives related to groundwater impacts.

Recommendation:

Regular reporting of monitoring results should be provided to DERM.

Issue: Associated Water Management

The associated water strategies presented, in section 6.7 and Appendix Q, do not provide enough detail to be certain that the proposed methods will be adequate to deal with the forecast maximum of 386GL (a forecast that has been previously revised considerably) of associated water production. Assuming a worst case that all the water is treated by reverse osmosis (RO), and the treatment is 80% efficient, this could potentially lead to approximately 80GL of reverse osmosis concentrate to be disposed of over the life of the RFD area. The proposed methods do not provide adequate confidence that the salt will not be deposited in the ground on site. No standards have been provided for storage structures for reverse osmosis concentrate and encapsulation methods for salt and other contaminants.

Recommendation:

The proponent must provide more detailed information on the feasibility of the proposed associated water management options to deal with the entire volume of associated water to be

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produced in the RFD. Standards and risk minimisation measures relating to reverse osmosis concentrate storage structures and encapsulation methods must be provided. The proponent should fully assess the disposal of salt and other contaminants.

Issue: Associated Water Management

Section 6.7 and Appendix Q outlines the possibility of discharging treated associated water into the Dawson River for users downstream. The Department has a policy "Watercourses as Conduits Interim Policy" WAM/2006/2402 in relation to using watercourses as conduits which does not allow the use of a watercourse to deliver effluent, wastewater or tailwater for the purposes of supply to any person or for gaining credit for volumes returned to a watercourse. Any water put into a watercourse is therefore vested in the State, regardless of any intent that the water be re-taken at a separate location. However it does not limit the capacity of water users to deliver effluent, wastewater or tailwater to an end user by some means other than via a watercourse, for example through a pipeline.

Recommendation:

The EIS should address the "Watercourses as Conduits Interim Policy".

Issue: Associated Water Management

Section 6.7 and Appendix Q of the EIS indicates that one option for associated water is storage in dams. The Water Resource Fitzroy Basin Plan regulates overland flow. Any dams must be constructed in accordance with the provisions of the Water Resource (Fitzroy Basin) Plan 1999.

Recommendation:

The proponent should be aware that any overland flow dams constructed within the Fitzroy catchment need to be constructed in accordance with the Water Resource (Fitzroy Basin) Plan 1999. The plan does allow for the construction of works that are for stock and domestic, of a capacity no greater than 5ML or to meet the requirements of an Environmental Authority.

There is a current exemption for the take of overland flow for activities authorised under the *Petroleum Act 1923* or the P&G Act. However, the Water Resource (Fitzroy Basin) Plan 1999 is currently under review. This review may result in possible amendments to the overland flow provisions during the life of the project development.

Issue: Water Management Options Constraints Summary

Treated discharge to surface water should not be accepted as a preferred option for ephemeral streams unless there has been substantial evidence demonstrating there are no adverse impacts on aquatic ecosystems.

Recommendation:

The proponent should place a high constraint for treated discharge to surface water, related to anticipated high volumes being discharged to ephemeral streams, particularly for the Roma Gasfields.

Issue: Section 6.7.3, Regulatory Framework

The Roma CSG Fields are located within a number of Water Resource Plans and therefore should be referenced. Any storages constructed to service the proposal to supplement town water and industrial uses with associated water, must be designed to comply with the Water Resource Plans and not take overland flows.

Recommendation:

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The following items should be considered as 'key legislation':

- Water Resource (Condamine and Balonne) Plan 2004.
- Water Resource (Moonie River) Plan 2003.

Relevant details of the above plans should be provided, including, respectively:

- Water Resource (Condamine and Balonne) Plan 2004, finalised in December 2008, for the upper and middle parts of the Plan, including the Roma Gasfields.
- Water Resource (Moonie River) Plan 2003, finalised in January 2006, including the Eastern Surat Gasfields.

Issue: Section 6.7.4.5, Fairview Irrigation Scheme

During the recent water quality monitoring within the Nogoa, Mackenzie and Fitzroy River systems Selenium was identified.

Recommendation:

Include Selenium as a potential contaminant in water quality investigations conducted for the project.

Issue: Section 6.7.4.5, Fairview Irrigation Scheme

The success of this scheme presumes that salts left behind in soils around tree crops will remain in-situ indefinitely and that there will be no deep drainage or lateral movement of salt. There are many examples in the State of salts exiting the soil profile around the toe slopes of drainage systems due to percolation after heavy rains, including the Fitzroy. Large amounts of salts will be introduced to the surface of soils if this scheme is implemented. Based on the figures in the EIS of 2g/L TDS and 4 ML/day of irrigated effluent at peak production this equates to 16,000 tonnes of salts per year.

It would be expected that some of this salt will be mobilised to the stream network, even if it takes many years.

Recommendation:

Further investigation is required into the risks associated with salt movement from the irrigated areas to surface drainage and water courses. A suitable model should be used to assess the potential movement. The EIS should describe the model type, parameters used and outputs from the model. The proponent should also include details of any similar existing schemes and monitoring results of salt loads in soils. The mitigation measure should be revised following the detailed investigation.

Issue: Section 6.7.5.1, Cumulative Impacts

It is noted in paragraph 5, APPEA is to "... undertake a technical and feasibility study for the aggregation of associated water from CSG members from across the region." Further, that "... the outcomes from the study is to be available by May 2009..."

A more comprehensive assessment of cumulative impacts and the potential benefit of an industry wide aggregation strategy is required. The EIS should address the commitments to be made by the proponent.

Recommendation:

The cumulative impacts of associated water production should be further detailed incorporating the findings of the APPEA study. The viability of industry wide aggregation systems should be discussed.

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Issue: Roma Field Associated Water Strategy, Storage of reverse osmosis concentrate in containment dams

Management of salts and other contaminants from reverse osmosis concentrate dams must not become the responsibility of individual landholders.

Recommendation

Mitigation measures should be developed that clarify responsibility for the safe removal of salts and other contaminants prior to transfer of reverse osmosis concentrate containment storages to landholders.

Issue: Discharge to Bungil Creek via Campbell Lake or discharge line

Gauging stations need to be strategically located to avoid backwater impacts on adjacent streams and lands.

Changes to the Lake Campbell structure should comply with overland flow conditions of the WRP.

Recommendation

Adopt the following Mitigation Measures:

- A gauging station upstream from Surat must be located so as to not cause backwater effects at the junction of Bungil Creek and the Balonne River;
- Any alterations to the Lake Campbell embankment and spillway must comply with the provisions of the Water Resource (Condamine and Balonne) Plan 2004.

Issue: Emission Rates during normal operation

Up to twelve field compressor stations with an average of eight compressor engines each and generators will be installed along the CSG fields, as identified in section 6.8.5.2. The locations of these units are not given in the EIS. A screening level impact assessment is conducted using the Ausplume model. The compressor's NO_x emissions of 166 mg/m³ or 0.461 g/s per unit are proposed. For the best practice, this concentration value is compared against the *NSW POEP Regulations 2005* standards of 450 mg(N)/m³ (dry) at 3% O₂. It is stated in Section 6.8.5.2 of the EIS and Appendix S that no correction is applied to the NO_x concentration value of 166 mg/m³ towards the reference conditions (which is based on moisture and O₂ contents). No data was available at the time when this EIS was prepared (i.e. March 2009). The generators stack specifications and fuel type are also not provided. This information is important for the licence conditions.

Recommendations:

The following information related to the CSG field developments should be provided:

- Predicted locations of the compressor engines and generators;
- NO_x concentration in term of mg(N)/m³ (dry) at 3% O₂; and
- The generators stack specifications and fuel type.

Issue: Noise and Vibration

Sections 6.10.3.1, 7.10.3.1 and 8.10.1.3 provide the assessment of noise and vibration and while there is no construction noise limits specified in the Environmental Protection Policy (Noise) 2008 (EPP (Noise)), DERM would expect the proponent to comply with the noise limits that would be applied to similar proposed developments. Based on the low background noise levels

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provided in the EIS, the limits proposed in Tables 6.10.1, 7.10.1 and 8.10.1 would not adequately mitigate the noise impacts from construction and operation.

Recommendation

The proponent should base noise planning criteria (for both construction and operation phases of the project) on the limits specified in the table below:

Sensitive place						
Noise level dB(A) measured as:	Monday to Saturday			Sundays and public holidays		
	7am to 6pm	6pm to 10pm	10pm to 7am	9am to 6pm	6pm to 10pm	10pm to 9am
L _{A90} , adj, 15 mins	lesser of bg+3 or 48	lesser of bg+0 or 40	lesser of bg+0 or 40	lesser of bg+0 or 40	lesser of bg+0 or 40	lesser of bg+0 or 40
L _{A10} , adj, 15 mins	lesser of bg+5 or 50	lesser of bg+5 or 45	lesser of bg+0 or 40	lesser of bg+5 or 45	lesser of bg+5 or 40	lesser of bg+0 or 35
L _{A1} , adj, 15 mins	lesser of bg+10 or 55	lesser of bg+10 or 50	lesser of bg+5 or 45	lesser of bg+10 or 50	lesser of bg+10 or 45	lesser of bg+5 or 40
Commercial place						
Noise level dB(A) measured as:	Monday to Saturday			Sundays and public holidays		
	7am to 6pm	6pm to 10pm	10pm to 7am	9am to 6pm	6pm to 10pm	10pm to 9am
L _{A90} , adj, 15 mins	lesser of bg+5 or 50	lesser of bg+0 or 45	lesser of bg+0 or 40	lesser of bg+3 or 43	lesser of bg+0 or 40	lesser of bg+0 or 40
L _{A10} , adj, 15 mins	lesser of bg+10 or 55	lesser of bg+10 or 50	lesser of bg+5 or 45	lesser of bg+10 or 50	lesser of bg+10 or 45	lesser of bg+5 or 40
L _{A1} , adj, 15 mins	lesser of bg+15 or 60	lesser of bg+15 or 55	lesser of bg+10 or 50	lesser of bg+15 or 55	lesser of bg+15 or 50	lesser of bg+10 or 45

o bg = background noise level

o In the event that measured background is less than 25 dB(A), then 25 dB(A) can be substituted for the measured level

If these limits cannot be met, alternative arrangements may be agreed to between the proponent and affected landholders during the construction phase of the project.

Issue: Ambient Noise Monitoring Locations

In Tables 6.10.7 and 7.10.3 it is stated that monitoring sites (Gas & Pipeline) 5, 6 and 9 had to be located up to 300m from the houses due to machinery noise. It is unclear what the source of this machinery noise was and what impact having the monitoring station this distance from the receptor will have on identifying the actual noise levels inside the residence.

Recommendation

The proponent should provide detailed information regarding the source and impacts of the machinery noise on values provided. If the machinery noise is of a temporary nature, information on the predicted noise levels inside the residence without this machinery noise should be provided.

Issue: Draft Maranoa and Districts Regional Plan

Following the amalgamation of several of the former component Shires, the areas of Murilla and Tara Shires have been removed from this Regional Plan.

Miles is in the former Murilla Shire.

Recommendations:

The proponent should note that the Regional Plan has been renamed as the "Draft Maranoa-Balonne Regional Plan" and that Miles Town is no longer included in this plan.

Release

Issue: Table 6.11.1, GQAL within the Coal Seam Fields

Overlay Map 1 of the Tara Planning Scheme, (adopted 14 Dec 2005), shows Good Quality Agricultural Land (GQAL) mapping for the former Tara Shire.

Recommendation:

Include GQAL data from the former Tara Shire Planning Scheme.

Issue: Regional Council names

Table 6.11.2 reflects old Regional Council names.

Recommendation:

Note that:

"Roma Regional Council" is now "Maranoa Regional Council"

"Dalby Regional Council" is now "Western Downs Regional Council"

Issue: Stock route network

These sections 6.11.3, 6.11.4.3, 6.11.5.3, and Table 6.11.8 do not address compliance with the *Land Protection (Pest and Stock Route Management) Act 2002*. Location of pipelines and access roads within the CSG field developments may impact on the Stock Route Network.

Further consideration is required to ensure the Stock Route Network is not compromised by activities related to the development of the CSG fields.

Recommendation

Include relevant details of the Stock Route Network as illustrated in Figs 6.11.9a and 6.11.9b. Appropriate mitigation measures should be provided to prevent and or minimise the potential impacts on environmental values. Include information on how the project satisfies the requirements of the *Land Protection (Pest Management and Stock Route Management) Act 2002*. Consider the impacts of activities of CSG field developments on management and operation of the Stock Route Network, in view of the following comments:

- The stock route network comprises declared stock routes, reserves for travelling stock and other relevant land. The main use is for travelling stock while the network has multiple uses.
- The relevant DERM Senior Lands Officer (Stock Routes) and Local Government stock route officer must be consulted from the early planning stage of activities that may impact on the Stock Route network.
- Associated infrastructure, (fences, watering facilities, access) must be maintained and managed in good condition, and be available for public use.
- Options for temporary diverting stock that may be considered unsafe to travelling stock and drovers (as well as the travelling public) will not be supported.
- Affected parts of the Stock Route network are to be reinstated upon completion of the activities that may interfere with any part of the network.

Issue: Forestry and Millable timbers

Section 6.11.5.1 of the EIS does not address compliance with the *Forestry Act 1959* and identifies an incorrect administering authority for this act.

Recommendations:

1. Note that the Forest Products Section of DERM is the administering authority, not Queensland Primary Industries and Fisheries.

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2. The proponent should note that if insufficient notification is provided to DERM to survey and remove millable timber prior to clearing, then compensation for destroyed timber may be required.

Issue: Regional Planning Framework – Draft Maranoa and Districts Regional Plan

Following the amalgamation of several of the former component Shires, the areas of Murilla and Tara Shires have been removed from this Regional Plan.

Recommendations:

The proponent should note that this Plan has been renamed as the “*Draft Maranoa-Balonne Regional Plan*”

Issue: Local Government Planning Schemes

Further information is required to clarify approvals triggered under the IPA. Section 6.11 of the EIS mentions that “*certain types of development applications may not need to repeated*” and is unclear.

Recommendations:

The proponent should identify the applications that will be assessed under the IPA.

Issue: Non-indigenous Cultural Heritage

It is accepted that field surveys were conducted on a targeted basis only across what is a very large project area. However identified potential sites, in sections 6.13.2; 7.13.2 and 8.13.2, that have not been investigated, of non-indigenous cultural heritage interest, should still be considered in the planning phase of the project.

Recommendations:

The proponent should provide a clear process by which identified potential sites which were not located, recorded and assessed in field surveys can be assessed and can be considered in the planning phase of the project, with particular reference to the gas pipeline corridor.

Issue: Water Management Ponds

Section 6.16.4.3 implies that to facilitate surrender of an environmental authority (EA), water management ponds may be used by the landholder upon decommission of the project. However, water management ponds are designed to avoid taking of overland water flow, and would therefore be of limited use to the landholder. If these dams are to be modified to take overland water flow at the completion of the project to enable transfer of the pond to the landholder, it would need to meet other requirements as provided for in the Fitzroy WRP. Written agreement would be required from the landholder and the administering authority of the EA for this process to be accepted as a means of surrender of the EA.

Recommendation

Any dams that are constructed for petroleum activities under an environmental authority should be removed post project unless written agreement is provided from the landholder and the administering authority; and the dam meets the requirements provided for in the Fitzroy WRP in relation to overland flow.

Release

Issue: Appendix K – Section 4.2, Waste Generation

More information is required to assess impacts of all wastes/contaminants proposed to be discharged from site to waters including their chemical composition/contents and volumes. This information is required to develop appropriate discharge conditions.

Recommendation:

Provide details of expected contaminants (e.g. chemical composition, particulates, metals, effluent temperature and pH) in controlled discharges of proposed wastewater and stormwater management systems.

Issue: Appendix L1, CSG Field Terrain Soils and Land Capability – Section 2.5, Land Suitability for the Location of Water Storage Facilities

Placing containment structures on alluvia increases the risk of potential failures.

Recommendation:

The location of storage dams will require careful consideration. Ponds should not be located on alluvia or perched on a toe slope above alluvia where there would be an increased risk of leaking.

Issue: Appendix N4, Section 3.10

Section 3.10 notes that a key limitation of the study was the field data (for example, macroinvertebrates) which was limited to a single, dry-season survey. Given the ephemeral nature of much of the study area, conclusions as to the health of the system based on this data are unreliable.

Recommendations:

As suggested in Section 3.10 of Appendix N4, further surveys are required to adequately assess and describe aquatic communities of the study area (particularly for non-dry periods after rainfall). Until this time, any conclusions made in the EIS based on this data will be speculative and should be appropriately qualified.

Issue: Appendix N4, Section 3.7.1, Aquatic Ecology Impact Assessment – Turtle Communities

The impact assessment states that “purpose built cathedral traps” were used for surveying freshwater turtles. DERM has previously published in a report (EPA 2007c) that the consultants have quoted in their report that the two turtle species of conservation concern in the Fitzroy Catchment (*R. leukpos* and *E. albagula*) cannot be adequately sampled by this method trapping. The authors also acknowledge this on p129-130 of Aquatic Ecology Impact Assessment report, but did not identify and undertake appropriate alternative sampling techniques for these turtles of conservation interest. *E. albagula* is not difficult to sample using seine netting. Both species can be observed and captured using dip-netting from dinghies or canoes at night around logs and in the shallows.

The generalised descriptions of turtle distribution and habitat use are inadequate and in some places inaccurate.

This impact assessment has not identified any occurrence of nesting banks at any of the stream crossings that they will be impacting.

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This impact assessment has failed to adequately identify the occurrence of both *R. leukops* and *E. albagula* turtles and their nesting areas used by the species in the areas that would be impacted in the construction and operational phases.

Recommendations:

Further surveys using appropriate techniques should be carried out to accurately quantify presence and abundance of *R. leukops* and *E. albagula* turtles and subsequently develop appropriate avoidance and mitigation measures to reduce impacts on these species.

Issue: Appendix P2 Groundwater (Deep Aquifer Modelling)

The report states that the modelling incorporated Santos' RFD area as well as the Spring Gully CSG fields operated by Origin Energy. No information is provided on what future development scenario for the Spring Gully Field was used in the modelling.

Recommendation

The proponent should provide information on the future development scenario (including number of wells and associated water quantity assumptions) that was used in the modelling for the Spring Gully fields.

Issue: Appendix P2 Groundwater (Deep Aquifer Modelling)

The report has not provided evidence that other proximally located LNG associated CSG field developments, such as the Australian Pacific LNG project, will not have an impact on deep groundwater aquifers.

Recommendation

The proponent should provide a detailed assessment on the interaction of deep aquifers between this project and other proposed LNG projects.

Issue: Appendix P2 Groundwater (Deep Aquifer Modelling)

The report identifies that CSG extraction has occurred in the Comet Ridge area since the mid 1990s. This would indicate that the present monitoring may not be an appropriate baseline for quantifying impacts on environmental values.

Recommendation

The proponent should obtain groundwater data pre-dating CSG extraction for the area to form a baseline for impact assessment.

Issue: Appendix P2 Groundwater (Deep Aquifer Modelling)

The report states that monitoring of the radial extent and magnitude of drawdown will provide "early warning" of variation of the groundwater system. The potential time lag between aquifer drawdown in the coal seams and the resource aquifers is unclear.

Recommendation

The proponent should provide information detailing the estimated time that would elapse between drawdown of coal seam aquifers and resource aquifers. In consequence, the estimated time between cessation of water extraction from the coal seams and cessation of drawdown in the resource aquifers should also be provide. As a result, the proponent should provide detailed mitigation measures demonstrating an ability to "make good" based on this information.

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Issue: Appendix Q, Section 3.4.2

Table 3-2 states that the average sodium value for Fairview is 98. However, the text below the table states that the average SAR value for Fairview is 149.

Recommendation

The proponent should confirm the correct SAR values (minimum, maximum and average) for the Fairview area.

Issue: Appendix Q, Table 3-2 (and elsewhere in EM plans and EIS)

The current EIS reports contaminant levels in effluent in terms of Total Dissolved Solids (TDS). However, electrical conductivity (EC) is a more appropriate parameter that can be readily measured and audited.

Recommendation:

The water quality data should refer to Electrical Conductivity (EC) rather than TDS for inclusion in the mitigation measures, EM plan and approval conditions.

Issue: Appendix Q Table 3-2 (and elsewhere in EM plan and EIS)

The current EM plan (which Santos suggests is the working model at present) gives 90th percentile figures for EC. A maximum EC level should be included. If 340 $\mu\text{S}/\text{cm}$ is used as the background natural value, then this should be made clear.

The maximum proposed EC level for any water discharged to streams for the project should be clearly identified as this is not yet evident. The lack of clarity is also increased by the change to using TDS as the main value for releases in the EIS.

Recommendation:

The EIS describe finalised maximum EC levels proposed for release of CSG effluents to river systems.

Release

CSG Transmission Pipeline:

Issue: Gas Transmission Pipeline

Section 7 of the EIS indicates that the proposed pipeline corridor crosses RA18 Proposed Castlehope Dam Site. While the *Central Queensland Regional Water Supply Strategy*, December 2006 (CQRWSS) does not include Castlehope Dam as a preferred option to meet the short term needs (10 to 15 years) identified in the Strategy, this would not preclude it from being developed some time in the future as future reviews of the CQRWSS may include Castlehope Dam. The *Queensland Water Plan 2005-2010* identifies that Queensland has relatively few future storage sites with development potential and those sites should be protected to ensure their availability. Consequently, the pipeline route should avoid the Castlehope Dam Site.

Recommendation

The corridor crosses the restricted area of the Castlehope Dam site, and the pipeline route should be changed to avoid this area.

Issue: Overall Assessment Methodology

The topography, geology and soils investigation, in section 7.1, for most of the pipeline was confined to "a drive-through reconnaissance survey of parts of the western and southern sections" as outlined in section 7.3.2.1 Methodology. Problem soil areas with moderate-high and high rating due to sodic and/or dispersive conditions, salinity and reactive clays are assessed to occur over 43% of the pipeline route from desktop studies, without field assessment. Detailed field investigations are required to characterise the problem soil areas to enable the route selection process to avoid areas where construction may not be possible or impacts are unacceptable. Alternatively, the investigations should allow for the assessment and development of specific and detailed mitigation measures.

Recommendation

Provide information detailing how the pipeline will be constructed in the problem soil areas and areas of difficult topography. The information should include appropriate field studies of sensitive soils and landform along the pipeline corridor identified in the EIS.

Issue: Assessment Methodology (pipeline route selection)

Further information is required to ensure the process of selecting the preferred alignment for the pipeline route has been effective in avoiding, or minimising impacts on the environment, including remnant vegetation, habitat for native fauna, and watercourses.

Recommendation

Include a detailed account of the process used to derive the preferred alignment for the gas pipeline. Specific details of measures and decisions taken to avoid and minimise impacts on the natural environment should be provided. Particular attention should be made to remnant vegetation, wildlife habitat and watercourses and wetlands.

Issue: Section 7.3, Agricultural Land

The assessment of Agricultural Land Classes (ALC) and Good Quality Agricultural Land (GQAL) has been undertaken by DERM on the basis of land system mapping. In addition, DERM is required to administer the provisions of SPP 1/92, *Development and Conservation of Agricultural Land*, using these GQAL datasets.

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The role of DERM in determining ALC and GQAL is acknowledged in the EIS. It is further stated that *"the mapping has been modified in parts by the more detailed terrain unit mapping undertaken for the gas pipeline corridor assessment"*. However, the details of where this occurs are not provided nor is there any explanation or justification for the change.

Recommendation

An assessment is required to support the difference of Agricultural Land Classes and Good Quality Agricultural Land datasets and the findings of the EIS.

Issue: Section 7.3.1.4, Existing Environmental Values (Terrain Units and Figures 7.3.6-26 and Figure 7.3.31)

The land system studies of the Isaac-Comet, Dawson-Fitzroy, Balonne-Maranoa and Capricornia Coastal Lands contain a principal source of data used by the Department to make decisions regarding land management, planning and assessment of impacts from development proposals. In section 1.1.2 of Appendix L2, Land – Gas Transmission Pipeline, it is stated that the datasets from these land system studies *"were reviewed and /or used"*. However, there is no cross referencing between terrain units and land systems and the component land units and soils.

Recommendation

The soils in the terrain units described in Fig 7.3.1, of the EIS, should be cross referenced to the land units and land systems in the various land system studies previously undertaken across the area. The proponent should provide a GIS shape file of the pipeline corridor to allow DERM to review the results of the desktop study against existing datasets.

Issue: Pipe bedding & excess material

Section 7, Land, identifies that material may be imported for the pipeline trench and conversely, material, such as rock, may be in excess.

Recommendation:

Provide a detailed description, characterisation, location and method for the import of suitable material and the disposal of excess rock and other waste material. The potential impacts and suitable mitigation measures should also be discussed.

Issues: Section 7.4.4.1, Regional Context - Environmentally Sensitive Areas – Mainland and Curtis Island (World Heritage Areas)

The Great Barrier Reef World Heritage Area is not mentioned in the EIS. The EIS only discusses the Great Barrier Reef Marine Park and incorrectly states that the Commonwealth marine park extends down the western side of Curtis Island whereas it is the World Heritage area that extends across the Port of Gladstone and The Narrows and includes the whole of Curtis Island.

Recommendation

Amend the World Heritage Areas section to refer to the Great Barrier Reef World Heritage Area, and correctly identify the boundary of the world heritage area. Any potential impacts and mitigation measures specific to these areas should be detailed.

Issue: Mitigation measures for *Cycas megacarpa*

In section 7, Nature conservation, *Cycas megacarpa* is identified as a significant species that occurs along the pipeline route. It is noted that further detailed studies are proposed to obtain accurate information on this species. Additionally, there are no specific mitigation measures

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developed for this species. However, it is identified that there will be permits required under the *Nature Conservation Act 1992* and EPBC Act where listed plants are cleared.

Recommendation

Provide a detailed investigation and identification of the plants to be cleared for the construction of the gas transmission pipeline. Mitigation measures should also be identified.

Please note that other LNG projects are proposing to propagate multiple *Cycas megacarpa* for each *Cycas megacarpa* cleared. This proposal should be considered in developing mitigation measures.

Issue: Right of Way (ROW) width in sensitive areas

Section 7, Nature conservation, identifies that the ROW width can be reduced for sensitive areas.

Recommendation

Provide the locations of all sensitive areas that are proposed to use a reduced ROW width. Where additional clearing is required, for access tracks etc. around sensitive areas to support the reduced width, identify the location and vegetation to be cleared.

Issue: Clearing vegetation outside of ROW

In section 7, Land, clearing outside of the ROW during construction is identified. However, there is no detail on the scale or location.

Recommendation:

Provide an evidence-based assessment, considering alternatives, of the proposal to clear vegetation outside of the ROW. A detailed description of the vegetation should be included.

Issues: Terrestrial Flora (Vegetation Disturbance)

In section 7.4.5.1 the EIS incorrectly states that remnant regional ecosystems (REs) 12.11.6, 11.10.1, 11.11.15 and 12.11.7 have no current conservation significance under Commonwealth or State legislation. However, all remnant vegetation has protection under the VMA. This includes vegetation mapped as remnant 'Not of Concern'. Unless the clearing activity proposed is currently exempt under a licence, lease or authority, all vegetation must be considered when the clearing of vegetation is proposed, including vegetation identified as 'Not of Concern', 'Of Concern' and 'Endangered'.

Recommendation

Provide information detailing the location and extent of native vegetation proposed to be cleared. This should include all vegetation on state land (road reserves), whether mapped as remnant or not. This should include mature regrowth vegetation.

Issues: Terrestrial Flora

The EIS and section 7.4.5.1 provides insufficient information to assess vegetation clearing. A detailed description of all types of native vegetation is required to for assessment under the EP Act and or VMA.

Recommendation

Provide information detailing the all native vegetation proposed to be cleared. A determination of whether it would be assessable under the VMA should be included.

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Issues: Koala habitat

Section 7.4.5.1 identifies that the pipeline route traverses areas identified as Koala Habitat under the *Nature Conservation (Koala) Conservation Plan 2006*. Specific mitigation measures appropriated to Koala Habitat are to be prescribed in relation to any direct or indirect potential impacts.

Recommendation

Provide detail in relation to potential disturbances of Koala Habitat Areas associated with the pipeline ROW and associated infrastructure (i.e. access tracks). Include relevant specific mitigation measures and consideration of habitat offsets that may be required where impacts cannot be avoided.

Issues: Section 7.4.5.1, Rehabilitation of Disturbed Areas (also Section 7.16.3.3)

The EIS has provided insufficient information to ensure the effectiveness of rehabilitation. Reference sites and measurable rehabilitation criteria should provide the basis for rehabilitation of the ROW.

Recommendation

Reference sites should be developed from which to develop benchmarks, and to provide on-going reference for environmental management and rehabilitation activities. The sites should be selected to represent the ecosystem types impacted by the project, and should be sufficiently removed from the project to ensure they are unaffected by the ROW and associated activities. The sites should be monitored at the same intervals and with the same methodology as that used for on-site monitoring of rehabilitated areas.

Issue: Terrestrial Flora (Weeds)

Limited information has been provided on the monitoring of weeds during the construction, operation and decommissioning of the pipeline.

Recommendation

Provide further information on the mitigation of weeds, particularly monitoring and mitigation measures used during the operation of the pipeline.

Issue: Weed mitigation measures

Section 7, Nature conservation, identifies the use of Santos Standards, regional management practice or "DNR&W" (now DERM) pest control sheets. These do not appear to be mitigation measures. Additionally, reference is made to the Santos Parthenium Weed Management Plan (URS, 2008) which is not included in the EIS.

Recommendation

Provide the actual mitigation measures to be implemented that will protect environmental values from weed impacts.

Issue: Fire risk

Cleared and stockpiled vegetation may be a fire hazard and may harbour pest species.

Recommendation

Provide a discussion of the potential fire and pest risk from stock piled vegetation. Suitable mitigation measures should be provided to prevent and or minimise the potential impact to environmental values.

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Issue: Freshwater turtle communities

The EIS has failed to provide any details of the occurrence of both freshwater turtles in their area of construction and operations. The deficiencies include:

- Lack of information on *R. leukops* and *E. albagula* distribution at each stream crossing site proposed for the pipeline.
- Lack of information on the presence of turtle nesting at each of the stream crossing sites for the pipeline. Given that both *R. leukops* and *E. albagula* aggregate their nesting at traditional nesting sites, small localised areas of nesting can be significant for a larger area of stream. Nesting surveys need to be conducted at nesting time for each species. If aggregated nesting is found to occur then actions will need to be planned for local deviation of the pipeline crossing on those streams or alternate mitigation procedures will need to be developed to safeguard the nesting.

Recommendation

Suitably qualified persons should conduct appropriate nesting surveys at nesting times for each species. This information should be provided with appropriate mitigation measures to prevent and or minimise environmental harm to those values identified.

Issue: Water course crossings

Section 7, Surface water, identifies "...pipelines or other buried services are required to cross water courses...". It is unclear if this infrastructure, that hasn't been identified, requires separate water course crossings.

Recommendation

Provide a detailed description and assessment potential impacts for water course crossings required for "other buried services" if applicable.

Issue: Potential impacts on water quality from works near drainage lines and watercourses

Sediment mobilisation has been identified as a potential impact in Table 7.5.2 from earth moving and stock piling, but significant potential impacts will also exist for works near drainage lines and water courses where streams are flowing. These potential impacts will be related to water quality in addition to flow. In such cases, appropriate mitigation measures and monitoring should be undertaken to help reduce such risks. As for the points listed for earth moving/stock piling, monitoring in the planning phase will be required to collected background water quality data to refine mitigation measures and assess impact.

Recommendation

Clearly identify any potential impacts on water quality from works near drainage lines or watercourses and any mitigation measures that will be undertaken to reduce the potential impacts.

Issue: State Planning Provisions

As a statutory instrument, and with the effect of a State Planning Policy, the State Coastal Management Plan is relevant for consideration of development within the coastal zone. The EIS cites the Curtis Coast Regional Coastal Management Plan, which is to be read in conjunction with the State Coastal Management Plan but fails to reference the State Coastal Management Plan itself.

Recommendation

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Include the State Coastal Management Plan – Queensland's Coastal Policy 2001 as a relevant State Planning Provision for consideration. Further, the relevant regional policies as identified in Table 7.11.13 should be addressed. Information should be provided to demonstrate how the project is consistent with those and other relevant State and Regional policies.

Issue: Stock route network

The location of pipelines and access roads for the construction of the pipeline may impact on the Stock Route Network. Therefore, additional information is required to meet the *Land Protection (Pest and Stock Route Management) Act 2002*.

Recommendation

Include relevant details of the Stock Route Network similar to those illustrated in Figs 6.11.9a and 6.11.9b for the ROW. An assessment of the potential impacts and mitigation measures is required.

Issue: Millable Timber

The Forest Products Section of the DERM administers the *Forestry Act 1959*. Millable timber survey information is required to define the location and extent of the resource. Where this is not provided prior to clearing, compensation for the destroyed timber may be required. In addition, millable timber occurs on State owned land that includes State Forests and Crown Leasehold land.

Recommendation

Provide information detailing the millable timber to be cleared for the construction of the pipeline.

Issue: Impacts on Cultural Heritage and Native Title

Section 7.11.5.4 of the EIS provides the requirements of Cultural Heritage and Native Title. However, this section fails to recognise the need to gain relevant permissions under the *Queensland Heritage Act 1992*.

Recommendation

Identify the necessary permissions under the *Queensland Heritage Act 1992* for the Santos GLNG Project.

Issue: Non-indigenous cultural heritage sites

The EIS contains no clear commitment to the assessment and mitigation measures identified for the 41 places of potential non-indigenous cultural heritage significance within the planning stage and prior to construction, particularly with respect to the gas pipeline corridor.

Appendix X, Non-Indigenous Cultural Heritage, notes 41 places of potential non-Indigenous cultural heritage significance within the project area and recommends that these places be surveyed, assessed and managed if development is planned in these areas. A number of these potential places occur within the pipeline corridor. Others occur within the gas fields.

However, there is no clear commitment in the EIS to conduct the assessment and mitigation of impacts – e.g. Section 7.13.2.5, (page 7.13.17) in relation to mitigation measures for “Potential Sites” makes general statements only about how significance (most notably Indigenous significance) is assessed.

It is not clear in the main body of the EIS if, and when, these places will be assessed. Assessment of these places should occur within the planning process and prior to construction phase. Whilst

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it is noted that those places in the gas fields may only require investigation when the gas fields are developed, those places within the pipeline corridor need to be investigated within the context of the planning phase.

Recommendation

The EIS should clearly identify whether the potential sites are to be the subject of a cultural heritage assessment during the planning stage and prior to construction. DERM would prefer that these studies be included in the Supplementary EIS. The timing of these assessments and the mechanism for reporting these places to DERM in accordance with the requirements of section 89 the *Queensland Heritage Act 1992* should also be identified.

Issue: Coastal Environments

Information should be provided to demonstrate the need for the potential bridge and pipeline crossing to be constructed in the Habitat Protection Zone of the Great Barrier Reef Coast Marine Park (State Marine Park). This is a statutory requirement of the *Marine Parks Act 2004*.

Recommendation:

Sufficient information should be provided to demonstrate the alignment of the pipeline and bridge cannot be located outside of the Marine Park.

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Liquid Natural Gas Facility

Issue: Construction description

The construction description is inadequate, possibly due to lack of FEED. The stages of construction and the associated mitigation measures should be provided for the LNG Facility. For example, stormwater controls would be implemented initially and will change depending on the stage of construction.

Recommendation

Provide an illustrated description of the staging of construction and the proposed mitigation measures including monitoring. An example would be the staged construction of the material offloading facility (MOF), including the construction of the dredge spoil rehandling facility (proposed to be located adjacent to the haul road) and associated discharge.

Issue: LNG process description

The operational description of the LNG Facility is inadequate. The EIS is unclear with respect to inputs and outputs of the facility. Section 3.8.3.8 and Table 3.8.6 specify chemicals to be consumed by the plant. However, the fate of these chemicals is not described in this section (3.8.3.8, LNG Facility Inputs and Outputs) or section 5, Waste.

Recommendation

Provide a detailed illustrated description of the LNG process. The description should include all inputs and outputs (as well as fugitive emissions). Where output wastes are to be disposed, their characterisation, the location and the method of disposal should be assessed and described.

Issue: Waste disposal

The EIS is unclear as to the makeup of waste volumes and the disposal options. Disposal options include the utilisation of a Gladstone Regional Council facility. If the Gladstone Regional Council Curtis Island landfill were to be used, a Material Change of Use development application would likely be required to operate at these proposed levels.

Recommendation

Provide details on the disposal method for waste from the LNG Facility in general (including the water treatment plant) and opportunities for waste avoidance and reuse.

Provide information on whether the Gladstone Regional Council Curtis Island landfill is proposed to be used as part of the waste management system.

Issue: Cumulative Impacts

While the EIS states that proposed and associated industry will be located in the area, there is no information on potential cumulative impacts and cooperative management mechanisms which will be put in place.

Recommendation

Report on potential cumulative impacts on water, noise, air, land and waste management from associated industry and proposed industry in the area. The report should include how these impacts will be minimised and managed through an integrated management plan.

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Issue: Soil Investigation Results

It is possible that a significant component of the arsenic in groundwater is leaching from the dip site identified in Table 8.3.10. This may then necessitate some level of remediation, unless demonstrated otherwise by further investigation.

Recommendation

Further investigation of the cattle dip area is required, given the high levels of arsenic found in this area as well as in the groundwater.

Issue: Soil mitigation measures

Section 8.3.1.5, Potential impacts and mitigation measures (Site Investigation Conditions), identifies the use of extracted rock as rip rap or rock armouring for soil erosion mitigation measures. However, the soil erosion mitigation measures section does not mention this.

Recommendation

Provide the mitigation measures proposed to mitigate soil erosion at all stages of construction and during operation of the facility.

Issue: Acid Sulfate Soils (ASS) & Potential Acid Sulfate Soils (PASS)

Section 8.3.1.5, Potential impacts and mitigation measures, discusses the occurrence of ASS and PASS. However, no mitigation measures are proposed.

Recommendation

Provide the mitigation measures to prevent and or minimise environmental harm from ASS and PASS. The basis for the proposed mitigation measures should be discussed.

Issue: Identification, monitoring and management

Section 8.3.1.5, Potential impacts and mitigation measures, states that "...targets to achieve acceptable level for land rehabilitation..." and "...monitoring of the success of the impact management strategies and the progress of land rehabilitation..." However, neither targets nor acceptable levels for land rehabilitation have been identified. Additionally, there is no monitoring of impact management strategies provided in the EIS.

Recommendation

Provide the targets, acceptable levels of land rehabilitation and monitoring requirements as referred to.

Issue: Light emissions

Section 8, Nature conservation, dismisses the impact of altered light horizons on marine turtle nesting and states "... that there is no direct line of sight from the LNG facility site to these beaches. Hence no light effects from the project on turtle nesting are expected." The proponents have inadequately assessed the impact of lighting on marine turtle nesting. The turtles do not need to be able to have direct line of sight of the lights. The altered reflected illumination of the night sky above the LNG facilities has the potential to negatively impact on the continued nesting of flatback turtles on Sound End Curtis Island beaches. Depending on the brightness of the skyline inland of the nesting beach even the turtles that choose to nest there may be disoriented and even hatchlings may be disoriented. Flatback turtle disorientation on a nesting beach has been recorded up to 18km away from a brightly illuminated industrial site. There is the potential for light from the LNG plant, including the two flare sites, to significantly alter the light horizons behind the Curtis Island flatback nesting area.

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Recommendation

The changes in light horizons should be investigated and defined to determine the potential impacts to the Flatback turtle nesting area. The mitigation measures to prevent and or minimise the impacts should also be defined.

Issue: Migratory fauna and threatened megafauna

In Appendix R1, the Final Report GLNG Marine Ecology Technical Report, Sections 2 and 3 have not used appropriate methods for assessing populations of migratory species and threatened species that inhabit the inter-tidal and sub-tidal waters of Port Curtis in the area that they investigated. In addition, the report has failed to identify the populations of marine turtles, dolphins and dugong that will move in and out with the tides as they forage over the inter-tidal flats. The report has not addressed the common practice of green turtles aggregating to feed among inter-tidal mangroves and remaining there as “basking” turtles at low tide.

There is no evidence of an attempt to survey the distribution and abundance of the migratory fauna and threatened megafauna that occurred within their study area. The report focussed on the benthic community rather than the values that may be impacted upon. There is also no evidence of a detailed literature search of the occurrence of nesting and foraging turtles for the Port Curtis area.

Recommendation

Conduct an investigation assessing populations of migratory species and threatened species that inhabit the inter-tidal and sub-tidal waters of Port Curtis. Such investigations should be conducted by suitably qualified persons. Appropriate mitigation measures should be proposed to prevent and or minimise the impacts to environmental values identified.

Issue: LNG Facility clearing requirements

Section 8.4, Nature conservation, identifies clearing required for the LNG Facility. However, the clearing requirements are not adequately discussed. The clearing results in the removal of “of concern” and “endangered” regional ecosystems including: 12.2.2; 12.3.3; and 12.11.14.

Recommendation

Provide a discussion and assessment of the location of the LNG Facility (within the site) detailing the chosen location. Specific information detailing why impacts on environmental values cannot be avoided should be included

Issue: Water Mouse

Section 8.4, Nature conservation, identifies the potential habitat of the Water Mouse and states that the survey was inconclusive.

Recommendation

Conduct an appropriate and detailed survey to definitively determine the presence of the Water Mouse. An assessment of the proposed mitigation measures should be included where the presence of the Water Mouse is detected.

Issue: Environmental offsets

Section 8.4, Nature conservation, identifies a number of impacts related to dredging and other aspects of the project on the marine environment. There seems to be no proposal to mitigate the loss of seagrass, mangrove and salt flat communities. The project area is part of the Port Curtis Directory of Important Wetlands listing and intersects The Narrows Directory of Important

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Wetlands listing. As such, the area should be considered a High Conservation Value Wetland. The draft Queensland Government Policy for Biodiversity Offsets (QGPBO) lists requirements for offsets related to High Conservation Wetlands.

It is noted that the discussion on development of a biodiversity offset strategy and management plan does not include any reference to marine or wetland values.

Recommendation

The EIS should examine opportunities for using offsets for any unavoidable impacts on the marine environment and wetlands.

Issue: Section 8.4.3, Regulatory Framework

The State Coastal Management Plan and the Curtis Coast Regional Coastal Management Plan are statutory instruments that have the effect of State Planning Policies and are relevant to development in the coastal zone.

Recommendation

Include the State Coastal Management Plan – Queensland's Coastal Policy and the Curtis Coast Regional Coastal Management Plan as relevant key planning policies. The relevant State and Regional policies should be addressed. Information should be provided to demonstrate how the project is consistent with the relevant State and Regional policies.

Issue: Section 8.4.3.4, Marine Parks Act 2004

The following text from the EIS is incorrect:

"...The MPGBRC Zoning Plan regulates the area from the low water mark of the Great Barrier Reef Marine Park to either the high water mark or the seaward edge of significant mangrove forests."

It should state the GBRCMP Zoning Plan regulates the GBRCMP which commences from either HAT or high water and extends to the extent of Queensland Waters.

Issue: Section 8.4.4.2, Environmentally Sensitive Areas

The Curtis Coast Regional Coastal Management Plan identifies significant coastal wetlands and endangered regional ecosystems within the proposed development area as 'areas of state significance (natural resources)' for the purposes of policy 2.8.1 of the State and Curtis Coast Plans. The Curtis Coast Plan also identifies regionally important coastal habitat for the purposes of Policy 2.8.3, Biodiversity, of the State and Curtis Coast Plans.

Recommendation

The EIS should recognise the significant coastal wetlands and endangered regional ecosystems (areas of state significance (natural resources) as significant vegetation communities and recognise mapped regionally important coastal habitats.

Sufficient information should be provided to demonstrate that the project is consistent with the State and Regional policies.

Issue: Fish habitat area

In consideration of impacts on Queensland Fish Habitat areas (section 8.4) the Fitzroy Fish Habitat Area (north of project) is not discussed in section 8, only the Colosseum FHA is considered. Fitzroy FHA is directly connected to the Harbour through the Narrows.

Recommendation

The EIS should consider the impacts of the project on the Fitzroy Fish Habitat Area.

Issue: Marine Ecology

Section 8.4.5.3 of the EIS has acknowledged these seagrasses in Port Curtis are of regional significance (Page 8.4.26). However, insufficient information has been provided to support statements such as “no significant impacts are expected” (page 8.4.52). The report states that seagrasses may be impacted by dredging and the impacts are expected to be minor and limited in extent. Information is required to support this statement. Furthermore, the long-term and potentially irreversible impacts to the marine ecosystem due to the removal of salt pan, saltmarsh, mangrove and intertidal areas have not been addressed.

Recommendation

Provide a detailed assessment to support the statement that “no significant impacts are expected” from clearing saltmarsh or mangrove communities. Information should include the potential impact expected resulting from the increases that TSS will have on the surrounding seagrass meadows.

Issue: Dredging Impacts

Section 8.7.4.1 of the EIS states that dugongs and turtles “may be impacted” due to their reliance on seagrasses in the area.

Recommendation

Provide more definitive information on what types of impacts are expected on dugongs and turtles. Such information (and the modelling) should show the seagrass meadows that are to be impacted by the dredge plume, the duration of the impact and the potential behavioural change of the fauna (e.g. avoidance of the area, and changes in breeding patterns).

Issue: Existing Water Quality

Section 8.5.4.6 states that there is no recognised watercourse on Curtis Island. However, only a qualified officer of DERM can identify a watercourse for the purposes of the *Water Act 2000* and the watercourse surveys have not yet been done.

Recommendation

The proponent should refer the determination of watercourses to DERM for the purposes of the *Water Act 2000*.

Issue: Stormwater management during construction

Section 8.5.5.1 discusses stormwater management; however, it is not adequately addressed in the EIS. Stormwater management plans must be developed prior to any disturbances and stormwater controls are to be in place prior to any subsequent disturbance.

Recommendation

A stormwater management plan is required to be in place prior to construction. The plan should be consistent with the detailed construction information that has been requested.

Issue: Construction Phase - erosion and sediment controls

Section 8.5.5.1 of the EIS states that erosion and sediment controls will be used as mitigation measures. However, it does not state what type of controls will be used, how or when they will be implemented. See earlier comments on Stormwater Management Plan (section 8.5.5.1).

Recommendation

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The Supplementary EIS should detail the erosion and sediment control techniques that will be used to minimise sediment movement and potential erosion from construction of the LNG facility.

Issue: Sewage Treatment

Section 8.5.5.2 of the EIS states that plant effluent will be routed to an irrigation system for disposal. However, it does not state the disposal rate or other critical aspects (e.g. chemical composition, disposal area, soil characteristics, flora to be irrigated, long-term acceptance rate for soil to accept effluent etc.). There is currently insufficient information to assess or provide conditions for the proposed treatment and disposal of effluent.

Recommendation

The Supplementary EIS should provide much more detail on the irrigation system for disposal of plant effluent and the associated environmental impacts and mitigation of these impacts.

Issue: Stormwater management during operation

Section 8.5.5.2 of the EIS has not detailed what parameters will be tested and what quality stormwater will be acceptable for release. Unless all contaminants are listed, DERM cannot develop appropriate discharge conditions.

Recommendation

Provide an assessment of the proposed stormwater quantity and quality, which will protect and enhance the environmental values, to be discharged.

Issue: Old versions of GAMS, Calpuff and TAPM used in air impact assessment

It is stated in Section 8.8.4 of the EIS and Appendix S that the air impact assessment was conducted by using the Gladstone Airshed Modelling System (GAMS). It is not clear why old versions of GAMS, Calpuff and TAPM were used in the assessment. It is also not clear why the future known industries proposed for the region are not included in the EIS (for example, information on the Rio Tinto Aluminium Refinery Stage 2 is now available).

Recommendation:

Reassess the potential impacts using the current versions of the Gladstone Airshed Modelling System, Calpuff and TAPM and include all future known industries proposed for the region.

Issue: Formaldehyde and benzene emissions

Volatile organic compounds such as formaldehyde and benzene may be released from the gas turbines and flare at the proposed LNG facility. These emissions can be calculated using gas turbine specification and US EPA AP42 emissions factors or based on a similar facilities operating elsewhere. The formaldehyde and benzene emissions are not provided in the EIS. It is stated in Section 3 of the URS report, Appendix S (page 50) that VOCs such as formaldehyde, benzene, toluene and xylene are very low and have not been modelled. It is not clear what sort of concentration is considered as "a low concentration".

Recommendation:

Specify formaldehyde, benzene, toluene and xylene concentrations and mass emission rates from the release points (stacks and flare) and also mentioned the methodology on how these values are estimated.

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Issue: Incorrect listing of Environmental Protection Policy (Air) 2008 (EPP Air) Air Quality Objectives

Queensland Air Quality Objectives have been revised in EPP Air. The EIS considered old EPP Air standards (see Table 3-3 of URS report, Appendix S). The EIS needs to be revised to reflect the new EPP Air. For example, the conclusions in section 3.2.5 of Appendix S should be revised after considering the new standards.

Recommendation:

Use the latest Air Quality Objectives as specified in EPP Air and compare the modelled results against these objectives.

Issue: Wrong interpretation of Protection of the Environment Operations (Clean Air) Amendment (Industrial and Commercial Activities and Plant) Regulation 2005 (POEO Regulation 2005) for NO_x emission standards

The EP Act requires setting stack emission limits based on the best practice emission standards. NSW POEO Regulation 2005 is used in Queensland as the source of the best practice emission standards. The NO_x general standards for gas turbines with a capacity of less than 10 MW is 70 mg(N)/m³ (dry) at 15% O₂. This is incorrectly quoted in the EIS, as 350 mg(N)/m³ (dry) at 15% O₂ (see Table 8.8.7 of Section 8 and Tables Table 3-4, 3-9 and 3-10 of URS report, Appendix S). The standard of 350 mg(N)/m³ (dry) at 3% O₂ is for general activity or plant.

Recommendation:

Please specify the correct NO_x emission standards of individual units proposed for the project.

Issue: Facility design

Section 3.2 of the URS Report (Appendix S, page 44) mentioned that the emission estimates are provided for the two OCP and C3MR design options (see Tables 3-7 and 3-8). The main EIS report in Section 8 (page 8.8.10) provides emission data that may represent OCP process only. It is not clear which process is selected for the final design and what is the final stack emission data. This information is important for the licence conditions.

Recommendation:

Clarify which process (OCP and C3MR) was selected for the LNG facility and the final expected emissions at the site.

Issue: Concentration values are not referenced to the standards levels.

For some sources, air emissions are provided in terms of mass emissions only and their concentration values are not provided in the EIS. For example one of the major NO_x emission sources for the OCP design is "hot oil heater". The NO_x emissions of hot oil heater are expected to be 1.18 g/s per unit (see Table 8.8.6 of Section 8 and Table 3-8 of Appendix S). The NO_x concentration of this source is not provided in terms of mg(N)/m³ (dry) at O₂ reference level. This information is important for the licence conditions.

Recommendation:

Specify concentration values of all major emission sources in terms of mg(N)/m³ (dry) at the O₂ reference level.

Issue: The control technology review process is not finalised

One of the major sources of methane emissions at the facility is nitrogen vent (see Table 3-8 of the URS Report, Appendix S). It is mentioned in the URS Report (page 48) that further

refinement of the facility is currently underway as part of the FEED process with consideration being given to the use of a thermal oxidiser for the nitrogen removal unit to combust methane gases and the incorporation of waste heat recovery units on gas turbines. This report was prepared in February 2009. The EIS should discuss whether any progress has been made in the finalisations of the emission control technologies and the heat recovery units.

Recommendation:

Clarify the status of the proposed methane emission control technologies and the heat recovery units of the gas turbines.

Issue: LNG Facility Discharge Impacts

Section 8.7.4.6 of the EIS provides that the water supply for the LNG facility will be *"provided by the desalination of seawater from Port Curtis"*. Further information on the proposed desalination plant and the mechanisms for approval is required.

Recommendation

Provide the design details of the desalination plant, intake and discharge structures. The approach to the design should be described to show how potential impacts including those due to reverse osmosis concentrate discharge are to be avoided or minimised. Storage and handling of chemical should be addressed. Where impacts are identified, the EIS should detail the proposed mitigation measures to manage those impacts. Clarification should also be made to the approvals required for the plant and associated infrastructure.

Issue: Ability of Cormix to assess near-field mixing of saline discharge and potential stratification

In Section 8.7.4.6 LNG Facility Discharge Impacts, the near-field assessment of the reverse osmosis plant discharge was done using CORMIX. It is stated that CORMIX is an acceptable industry standard model for such applications. However, no information is provided to substantiate this claim or to explain how reliable CORMIX can predict the mixing of the more dense discharge water with the receiving bay water.

Recommendation

Provide information to demonstrate appropriateness of the CORMIX program to model the near-field mixing of the dense reverse osmosis concentrate with bay water. This could include examples of where the model has been successfully used for other similar applications and statements about the reliability of the model in this application.

Issue: Limited information on diffuser design for reverse osmosis concentrate discharge

There is a need for more detail about the reverse osmosis concentrate discharge diffuser design. The diffuser should be designed to promote mixing in the water column of the dense saline plume and avoid the potential for a denser saline layer to form over benthic communities. This would typically require jets to project upwards from the bottom. The discussion talks about time for the plume to fall to the bottom. However, the design of the diffuser is not provided (for example, the location of the diffuser including the number of jets and their projection angle). A diagram is needed to explain the design and the near field mixing.

Recommendation

Provide further information on the diffuser design including its proposed depth and jet/port angles and an assessment of the suitability of the design.

Release

Issue: More detail on the fate of the reverse osmosis waste stream

The EIS states that the reverse osmosis waste stream from backwash will not be discharged but will be treated and taken offsite. Although this is a preferred option to discharge, the type of treatment and likely fate of the waste stream should be discussed in more detail.

Recommendation

Provide details on the type of treatment and disposal method for the RO waste stream from backwashing.

Issue: No information on chemical use for desalination

The chemicals, such as antiscalents, that will be added to the desalination water should be identified and characterised. The likely impacts on receiving waters from the chemical should be detailed and assessed. Some antiscalents have phosphates or ferric constituents that are potential nutrients in marine waters and could lead to adverse impacts. The mitigation measures for the potential impacts should also be identified.

Recommendation

Provide information on the characteristics and quantities of any chemicals that will be added to the desalination treatment and may be discharge in the reverse osmosis concentrate. The potential impacts on receiving waters should be identified along with the proposed mitigation measures.

Issue: No information on the desalination plant water intake line

The desalination plant in-take line has the potential to cause entrainment or entrapment of aquatic organisms. No information is provided on the location or type of intake method and the measures that will be adopted to minimise entrainment or entrapment of marine organisms.

Recommendation

Provide a detailed description and location of the intake line. Describe the potential for entrainment or entrapment of marine organisms. The proposed mitigation measures to minimise these impacts should be described.

Issue: Section 8.17, Marine Dredging and Marine Placement Facility

It is understood that a Curtis Island LNG facility, associated with another proponent, may be constructed at Laird Point where the proposed Gladstone LNG Project dredge spoil disposal facility is proposed.

Recommendation

Discuss and assess whether the proposed disposal of dredge spoil at Laird Point would impact on future use of the area by other LNG projects.

Issue: Sediment modelling assumptions

The modelling assumptions used in the modelling do not appear to be fully justified. The assumption of 1.5 kg/sec sediment loading into the water (section 8.7.4.1) for cutter suction dredging should be qualified in terms of the rate of dredging, sediment characteristics, and whether dredging involves overflow. It appears that an 'average' sediment type and non-overflow dredging has been assumed. The rate of dredging is unknown at this stage (Appendix R2, 6.4.1). Assumptions about resuspension of sediment over the 14 month dredging program (at least up to an equilibrium point) may be significant and again may be very important for overlapping projects. The settling rate for sediments is assumed to be 1 m/day based on what was

Release

adopted for the WICT modelling. In the absence of any actual supporting data on settling rate, this assumption should be justified. A range of dredging scenarios and weather conditions would be a better approach with a clear statement of all assumptions.

Recommendation

Provide a detailed discussion describing the adoption of assumptions for the dredge plume modelling. A range of scenarios should be used to assess the potential impacts.

Issue: Equilibrium of suspended sediment

The turbidity modelling used a 2 day run up and 2 day operation and presumably is displayed as turbidity increase at the end of this period. No indication is given as to whether this represents an equilibrium state or whether the turbidity will continue to increase as dredging continues. It takes a substantial period of time for the water within Port Curtis to be 'flushed' with full turnover possibly taking a couple of weeks. The dredge plume created by dredging at Hay Point took weeks to build to an equilibrium state. This project may be carried out over 14 months. The equilibrium state and the interaction with multiple dredging operations in the port will provide key information in determining conditions, and identifying potential cumulative impacts from dredging.

Recommendation

Provide further information on the equilibrium state of the dredge plume. This information should be supported by the identification of likely time of other dredging projects for Port Curtis.

Issue: Dredge plume modelling

The dredge plume modelling does not appear to provide any input into mitigation measures to prevent and or minimise impacts on the marine environmental values identified in the EIS.

Recommendation

Provide a detailed discussion on how the modelling results will be used to develop measures to prevent and or minimise the impacts on environmental values.

Issue: Dredge spoil rehandling design

The EIS does not detail the discharge objectives for the Laird Point dredge spoil rehandling facility.

Recommendation

Provide the details of the proposed discharge, including: the characterisation of the discharge; the background water quality; and the proposed mitigations measures to avoid and or minimise impact to environmental values.

Issue: Dredge spoil rehandling

The project description proposes a 120ha spoil storage area with 13.2 million cubic metre capacity to hold 10.7 million cubic metres of spoil. The details of dredging rate and settling capacity at the end of the dredging project are unknown.

Recommendation

Although it is likely that the area can provide adequate settling capacity through the entire project, the EIS should provide objective information in this regard and detail contingency measures if additional storage is needed.

Release

Issue: Dredge spoil for MOF

Table 5.3.1 and Table 5.3.7 only refer to dredge material waste associated with the proposed capital dredging for the channel and swing basin and do not include the dredging for the materials offloading facility.

Recommendation

Discuss the 100,000m³ of 'waste' material associated with the dredging for the MOF.

Issue: LNG Facility Environmental Values and Management of Impacts

It is unclear whether impacts associated with the dredging for the MOF, and potential beneficial reuse of the dredged material, have been covered in Section 8 of the EIS.

For example, Section 3.10.1.2 refers to an "onshore reception lagoon and settlement pond" potentially located adjacent to the MOF haul road. The lagoon and pond is to contain the 100,000m³ of material dredged for the MOF. It is unclear whether the vegetation disturbance discussed in Section 8.4.5.1 includes any clearing associated with the dredge spoil facility.

Recommendation

Potential impacts and mitigation measures associated with the dredging for the MOF, and subsequent land-based use of the dredged material, should be discussed.

Issue: Appendix G - Table 2-1

There is no information provided as to the efficacy of proposed mitigation measures.

Recommendation:

Provide information on the effectiveness of proposed mitigation measures to minimise impacts on marine mammals from increased shipping movement from other cases.

Issue: Appendix L4 – Appendix A: Stratigraphic Logs with Acid Sulfate Chemistry, Section A.1 Logs of onshore cores #1 to #54

The borehole logs of onshore cores #41 to #54 are missing. These logs are required to assess the sediment characteristics at these locations for suitability for fill placement and likely acid sulfate soil disturbance.

Recommendation:

Provide missing borehole logs of onshore cores # 41 to # 54.

Release

Environmental Management Plans (EM plan)

Issue: Environmental Management Plan requirements – CSG, pipeline and LNG facility

Section 310D of the EP Act sets out the requirements for an EM plan to help the administering authority decide the conditions of the environmental authority. The EM plans provided in the EIS do not contain all requirements of section 310D.

Recommendation

Amend the EM plans to include sufficient information to meet section 310D of the EP Act.

Issue: Santos Environment Health and Safety Management System

The EM plans for the various components of the project often refer back to Santos' Environment Health and Safety Management System (EHSMS).

Recommendation:

Environmental management commitments and processes should be taken from the EHSMS and incorporated into the Supplementary EIS and EM plans.

Issue: Environmental commitments

The proposed EM plans provide a basis for interpreting the commitments set out in the EIS. However, there are some proposed performance criteria and actions that contain qualifiers such as "wherever possible" and "where practical". It is DERM's experience that interpretation (by construction supervisors and contractors for example) of qualified commitments often leads to them being ignored. The EM plan should state circumstances where the commitments apply.

The EM plan performance standards must be clear, unambiguous and auditable. Qualifying terms such as "where possible" or "where practical" and "minimise" should not be used within EM plans.

Recommendation

The EM plans should be reviewed to ensure that all performance criteria and actions that contain qualifiers are re-written to clarify the performance standards expected of contractors and others given the responsibility to implement the plan.

Issue: Environmental Management Plans

The EM plans advise: "It is envisaged that the final EM plan for each component of the project will provide additional, more detailed guidance for construction and operational personnel, regulators and stakeholders prior to the application for the relevant environmental authorities". As described in the EIS (Appendix C) the project will require various approvals including those under the P&G Act, EP Act and the IPA. The content of the relevant EM plan assists in formulating conditions which will apply to the approvals and which are required for inclusion in the EIS Coordinator-General's Report.

The EM plans contain insufficient detail to ensure provision of appropriate approval conditions. The EM plans should be refined to provide the planned additions to better facilitate preparation of approval conditions. For an environmental authority for chapter 5A activities, EM plan requirements are defined in s310D of the EP Act.

Recommendation

Release

The EM plans should be amended to provide the planned additional detail to allow preparation of appropriate approval conditions.

Issue: Environmental Management Plans – regulatory environment

The EM plans for the relevant components are not clear in the description of which approvals each plan will apply to. Each EM plan refers to environmental authorities although does not cover the approvals under other legislation. For example, the IPA. These statements do not clearly define the approvals sought for the proposal.

Recommendation:

The EM plans should be revised to provide a clear distinction between various legislative requirements and approvals sought, including those relating to the IPA, P&G Act, EP Act and the *Dangerous Goods Safety Management Act 2001*.

Issue: Environmental offsets

The large and complex nature of the three related project components means that the nature conservation issues involved are equally varied and complex. While the EIS and EM plans for the three related projects make commitments to develop Biodiversity Offset Strategy and Management Plans for each of the aspects of the project, the effectiveness of these plans will depend on the criteria used in establishing the offsets. It is not clear whether the CSG Fields and LNG facility will base their Biodiversity Offset Management Plans on the consultation draft of the Queensland Government Policy for Biodiversity Offsets. This document should be particularly useful since its Appendix 2 addresses a number of issues applicable to the overall project including issues related to terrestrial, marine and freshwater habitats. It is strongly recommended that the guiding policies, principles and requirements of this policy should be applied in designing the Biodiversity Offset Strategy and Management Plans.

The Gas Transmission Pipeline EIS section 7.4 page 7.4.24 states: “A biodiversity offset strategy and management plan will be developed in line with guidelines of the QLD Government Biodiversity Offset Policy”.

This is strongly supported and it is recommended that a similar commitment should apply in the other aspects of the overall project.

Recommendation:

The project EM plans should commit to establishing Biodiversity Offset Strategy and Management Plans based on the policy, principles and requirements of the draft Queensland Government Policy for Biodiversity Offsets.

Issue: Corehole and Exploration Drilling

Drilling waste material may restrict rehabilitation of the CSG fields.

Recommendation:

Waste from the drilling operation should not be spread over the soil surface.

Issue: Gas and Watering Gathering System

The EIS needs to demonstrate how the proponent will prevent and or minimise erosion on disturbed areas.

Recommendation:

Release

Erosion control measures such as 'whoa boys' (also known as check, cross or roll-over banks) should be implemented to reduce concentration of water flow along the pipeline and access tracks.

Issue: Clearing and Grading

The EIS needs to further define measures to minimise the risk of erosion during clearing and grading.

Recommendation:

The proponent should adopt the following mitigation measures:

- Clearing should be by hand, or lopped, to protect the bank of the watercourse.
- Retaining the root mass is especially important for sodic soils, to minimise the risk of tunnel erosion.
- Where cleared vegetation is stockpiled, measures should be taken to avoid concentration of overland flows.

Issue: Trenching and rehabilitation

Sodic material can inhibit rehabilitation and increase the risk of erosion.

Recommendation:

The proponent should ensure trench spoil that contains sodic material will not be spread on the land surface.

Issue: Associated Water Management

The associated water management plan required under the Queensland Government's CSG Water Management Strategy is to be incorporated into the EM plan for a Level 1 Environmental Authority (Petroleum Activities).

Recommendation:

An associated water management plan should be included in the Supplementary EIS and CSG EM plan.

Issue: Associated Water Management

The CSG EM plan provides inadequate detail on the operation and effectiveness of proposed associated water management mechanisms in dealing with forecast water qualities and quantities. The feasibility of the listed options does not provide adequate commitments.

Recommendation:

That the proponent should provide additional information detailing exactly how potential water management options will manage the forecast quantities and qualities of associated water (acknowledging that these estimates may vary).

Issue: Containment Ponds

The CSG EM plan should to put in place methods that ensure the management of salts and other contaminants from reverse osmosis concentrate dams does not become the responsibility of individual landholders.

Recommendation:

Release

The transfer of reverse osmosis concentrate containment ponds to landholders should only take place following safe removal of reverse osmosis concentrate and other contaminants from the ponds.

Issue: Access

The access methods should prevent and or minimise risks of erosion.

Recommendation:

The EM plan should detail how erosion control measures will be implemented and how on-farm runoff control works re-instated.

Issue: Fauna management

Marine flora and fauna is not covered in the implementation strategy for the Gas Transmission Pipeline EM plan nor the LNG Facility EM plan

Recommendation:

Include sections in the EM plans on marine flora and fauna.

Issue: Environmental Management Plans

The proposed EM plans provide a basis for interpreting the commitments set out in the EIS. However, there are some proposed performance criteria and actions that contain qualifiers such as “wherever possible” and “where practical”. It is DERM’s experience that interpretation (by construction supervisors and contractors for example) of qualified commitments often leads to them being ignored. The EM plans should state circumstances where the commitments apply or do not apply.

Recommendation

The EM plans should be reviewed to ensure that all performance criteria and actions that contain qualifiers are re-written to clarify the performance standards expected of contractors and others given the responsibility to implement the Plan. The performance standards should be clear, unambiguous and auditable. This should also ensure that any subsequent EM plan revisions are equally clear.

Release

Condition 3

Temporary workers accommodation sewerage systems

All on-site sewage treatment plants associated with temporary and longer-term workers' accommodation must be located above Q50 flood levels for temporary accommodation and Q100 flood levels for longer term accommodation.

Condition 4

Waste disposal

Prior to commencement of works, the appropriate methods for disposal of waste in accordance with reasonable requirements of local governments and DERM are to be ascertained and implemented.

Condition 5

Potable water

The proponent must ensure that all potable water consumed on site and at workers accommodation complies with the *Australian Drinking Water Guideline 2004*.

Condition 7

Temporary workers accommodation flood level

All temporary and longer term workers' accommodation is to be located above Q50 flood levels for temporary accommodation and Q100 flood levels for longer term accommodation.

Condition 8

Good Quality Agricultural Land

Any longer-term workers accommodation, must not be located on land identified as being Good Quality Agricultural Land Categories A and B.

Condition 9

Noise

Longer-term workers accommodation for the project must be designed to meet the noise design objectives at sensitive receptors set out in Table 1.

Table 1: Noise design objectives for workers accommodation

Time of Day Noise design objectives for indoors measured at the receptor in dB(A)

LAeq,adj,1hr LA10,adj,1hr LA1,adj,1hr Daytime and evening 35 40 45

Night-time 35 40 45

Condition 1

Cumulative Impacts Gas Fields

Within three months following final investment decision and prior to petroleum activities, a detailed assessment of cumulative impacts must be provided to the CG

Condition 2

Constraints Planning

A constraints planning and field development protocol for the development of petroleum activities in the gas fields to be submitted to the Coordinator-General for review prior to the issue of relevant Environmental Authorities for the gas fields.

Condition 3

Noise constraints plan for fixed plant and drilling activities in the gas fields

Noise constraints plans are to be submitted to the Coordinator-General for review prior to the issue of the relevant environmental authorities for the gas field.

Condition 4

Coal Seam Gas Water Management Plan

Prior to the issue of environmental authorities, the proponent must provide a Coal Seam Gas Water Management Plan (CWMP) to the Coordinator General. The CWMP is to be submitted to the Coordinator-General for review prior to the issue of environmental authorities for a petroleum lease.

The CWMP is to be provided to DERM as a component of the EM Plan submitted with applications for the relevant environmental authorities.

Note: the CWMP also needs to comply with the requirements of S 310D of the EP Act including the requirement that it nominate management criteria

Condition 5

Brine Management Strategy

The proponent will provide within 90 calendar days of the issue of this report, to the CG for review, a Brine Management Strategy

Condition 6

Operational Plan

The Operational Plan is to be submitted to the Coordinator-General for review prior to the commencement of petroleum activities in the gas fields.

Condition 7

The proponent and its contractors shall develop draft project area species conservation plans for the threatened flora species *Homopholis belsonii*, *Micromyrtus patula* and *Philothea sporadica*. These species conservation plans are to be presented to DERM and DEWHA for approval.

Where there is a requirement for clearing of plants protected under the *Nature Conservation Act 1992*:

a) clearing of plants must only occur in accordance with a clearing permit issued under the *Nature Conservation Act 1992*

b) for near threatened, rare, vulnerable and endangered species listed under the Nature Conservation (Wildlife) Regulation 2006, and species identified as critical and high priority under the DE RM "Back on Track" species prioritisation methodology, a Significant Species Management Plan detailing specific measures for the mitigation or offsetting of all impacts must be provided to DERM for approval.

Condition 8

The proponent and its contractor must include in any final Environmental Management Plan for gas field planning an objective that bioregional corridors be considered and maintained to the greatest extent practicable in the field development plan. A draft of this clause of the EMP shall be submitted to DERM with any application for environmental authority for gas field development.

Conditions 9 – Groundwater assessment, mitigation and monitoring

The proponent must provide to the CG for review an assessment of the environmental values, monitoring program, regional groundwater model and mitigation measures. The groundwater assessment is to be submitted to the Coordinator-General for review prior to the commencement of petroleum activities in the gas fields.

Condition 10 – Springs assessment, mitigation and monitoring

The proponent must provide to the CG for review an assessment of groundwater dependant ecosystems. The springs assessment is to be submitted to the Coordinator-General for review prior to the commencement of petroleum activities in the gas fields.

Notification regarding Millable Timber

Sufficient lead time should be provided for DERM to arrange timber salvage operations or the proponent will need to provide alternative solutions for responsible resource utilisation.

Water quality monitoring parameters

It is recommended that QGC install intermediate gauging stations (i.e. between the upper-most tenement and lower-most tenement) where discharges are proposed to develop flow data.

Water quality monitoring instrumentation

It is recommended that remote instrumentation designed to capture water quality data be validated by comparison to equivalent laboratory-based analysis results to ensure quality and reliability in the measures recorded.

80th percentiles instead of background +10% and second tier trigger level

It is recommended that the second tier trigger value be based on a similar approach for determining the first tier trigger value, but instead of using the 80th percentile, the 90th, or perhaps even the 95th percentile could be used. Exactly which percentile is adopted might be dependent on the variability of the parameter in question and should be developed in consultation with DERM.

High, moderate and low reliability trigger values It is recommended that where ANZECC (2000) trigger values are exceeded by natural background concentrations that locally-derived guidelines be developed in accordance ANZECC (2000) guidelines.

RTI DL RELEASE - EHP

GENERAL CONDITIONS FOR THE GAS FIELDS

Condition 11

Groundwater monitoring

The EM plans, developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the applications for petroleum leases for the gas fields, must include an extensive groundwater pressure monitoring program in all aquifers potentially affected by the petroleum activities.

Condition 12

Borrow pits

The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for gas fields, must include an assessment of the environmental values, potential impacts, mitigation measures for the siting, construction, operation, decommissioning and rehabilitation of borrow pits required for petroleum activities.

Condition 13

Access tracks in ESA's

Access tracks are not permitted within Category B or C Environmentally Sensitive Areas unless they are co-located with gas collection or CSG associated water pipelines, unless otherwise authorised by the administering authority.

Condition 14

Ramp-up gas

The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for a gas fields, must include an assessment of the environmental values, potential impacts, mitigation measures for any ramp up gas storage.

Condition 15

Dams

Aggregation dams and CSG water evaporation dams must:

- be designed with a floor and sides of material that will contain the wetting front and any entrained contaminants within the bounds of the containment system during its operational life including any period of decommissioning and rehabilitation
- have a system that will detect any passage of the wetting front or entrained contaminants through either the floor or sides of the dam
- either, be capable of repair to rectify any passage of the wetting front through either the floor or sides of the dam, or else be decommissioned and rehabilitated.

Brine dams must:

- be designed with a floor and sides of material that will contain the wetting front and any entrained contaminants within the bounds of the containment system during its operational life including any period of decommissioning and rehabilitation
- have a system for the collection and proper disposal of any contaminants that move beyond the bounds of the containment system
- have a system that will detect any passage of the wetting front or entrained contaminants through either the floor or sides of the dam
- either, be capable of repair to rectify any passage of the wetting front through either the floor or sides of the dam, or else be decommissioned and rehabilitated.

The system that is implemented to detect the passage of the wetting front through either the floor or sides of the dam must not only consist of monitoring groundwater aquifers.

The design, construction, operation, modification and decommissioning of any regulated dam that is part of a CSG project must be undertaken in accordance with DERM's *Manual for Assessing Hazard Categories and Hydraulic Performance of Dams* and the accompanying Guideline *Dams in Environmentally Relevant Activities*.

Definitions

Aggregation dam is a dam that receives and contains CSG water or CSG water concentrate. An aggregation dam must be designed and operated so that during any period of thirty (30) days, following the first ninety (90) days of operation of the dam, the total volume of water leaving the dam other than by evaporation must not be less than 85% of the volume of water that has entered the dam.

Brine is defined as saline water with a total dissolved solid concentration greater than 40 000mg/l.

Brine dam means a dam designed to receive, contain or evaporate brine.

CSG water is defined as underground water brought to the surface of the earth or moved underground in connection with exploring for or producing coal seam gas.

CSG water concentrate is the concentrated saline water waste stream from a water treatment process that does not exceed a total dissolved solid concentration of 40 000mg/l.

CSG evaporation dam is defined as an impoundment, enclosure or structure that is designed to be used to hold CSG water for evaporation.

Condition 16

Dam decommissioning

The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for a gas fields, must include an assessment of the disposal option for any contaminated material (i.e. salt or dam liners) in accordance with the waste management hierarchy consistent with the DERM Guideline: *Preparing an environmental management plan for coal seam gas activities*.

Condition 17

Dam decommissioning topsoil

A minimum depth of 0.25m topsoil will be placed over decommissioned storage ponds to ensure an adequate vegetal cover can be established.

Condition 18

Water course crossings

Where a riverine protection permit is not required, activities in water courses should be undertaken in accordance with the Guideline – *Activities in a watercourse, lake or spring associated with mining operations*, unless otherwise authorised by the administering authority.

Condition 19

Gas trunkline easements

The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for a gas fields, must include an assessment of the construction of co-located trunklines to minimise width and total disturbance required for the right of way..

Condition 20

Water monitoring sites

The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for the gas fields, should include upstream and downstream monitoring of water quality parameters where discharges are proposed.

Conditions 21

Receiving Environment Monitoring Program

The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for the gas fields, must include a receiving environment monitoring program to monitor and record the effects of the release of contaminants on the receiving environment, with the aims of identifying and describing the extent of any adverse impacts to local environmental values, and monitoring any changes in the receiving water.

Condition 22

Pad drilling (multiple drill holes from the one location)

The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for the gas fields, must include consideration of multi-well pad drilling and horizontal directional drilling where high environmental constraints are potentially impacted by the petroleum activities and should be included for rural residential areas.

Condition 23

Quarrying

Separation distances from CSG activities should be established in consultation with quarry operators and local governments to enable existing and planned quarrying to continue within the petroleum tenement areas.

Condition 24

Salinity Assessment

A salinity management plan will be prepared and will include:

- a risk assessment methodology which will identify the potential for secondary salinity

- a list of identified management tools and mitigations that will be used in those locations to prevent and manage secondary salinity
- a summary of disturbance and rehabilitation for each 12 month period of the environmental authority.

The outcomes of these risk assessments and the effectiveness of the management tools and planned mitigations is to be reported in each annual return.

Condition 25

Hydraulic fracturing chemicals

The EM plans, developed in accordance with section 310D of the Environmental Protection Act 1994 to support the applications for petroleum leases for the gas fields, must contain an assessment of the impacts from hydraulic fracturing chemicals and proposed mitigation measures to protect the environmental values where the use of hydraulic fracturing chemicals is proposed.

Condition 26

Synthetic drilling muds

Based on the model conditions for CSG activities, the model conditions stated below will be imposed on any Environmental Authority for the Gas Fields:

- Oil based drilling muds must not be used in the carrying out of the petroleum activity
- Synthetic based drilling muds must not be used in the carrying out of the petroleum activity other than with the written approval of the administering authority.

Condition 27

Monitoring bores

A network of monitoring bores should be installed at crucial locations within the groundwater monitoring network to provide a back-up and to calibrate the vibrating wire piezometers proposed to be used as the sole groundwater monitoring device.

Condition 28

Minimum standards for monitoring bores

All monitoring bores must meet the construction standard: the Minimum standards for the construction and reconditioning of water bores that intersect the sediments of artesian basins in Queensland, DNRM, 2004, Standard No. WMU/2004/1569.

8th October 2010

Ref CTS

The Coordinator-General
C/- EIS Project Manager: Australia Pacific LNG Project
Significant Projects Coordination
Department of Infrastructure and Planning
PO Box 15009
CITY EAST QLD 4002

Dear Mr Newton,

Australia Pacific LNG Project – Final Advice

I refer to your request for advice on the information provided by Australia Pacific LNG Pty. Ltd. in its Environmental Impact Statement (EIS) and in supplementary information. This letter, together with its attachment, gives the advice being provided by the Department of Environment and Resource Management (DERM) in response to your request.

The advice provided has regard to the draft EIS, and takes into consideration the supplementary information provided by the proponent in subsequent documents and discussions. Where sufficient information has been provided, specific conditions that should be attached to statutory approvals have been provided for inclusion in the Coordinator General's assessment report. Where additional information is required, conditions for inclusion in the Coordinator General's assessment report have been framed in the form of a request for further studies, reports or strategies.

It must be noted that there are several difficult issues that require special attention by the proponent. The majority of these must be addressed at the time the proponent makes an application for statutory approval. These issues have received considerable recent publicity and include: CSG groundwater management, aquifer injection, salts management, the hydraulic fracturing process, water quality, beneficial uses of water, surface water discharge and the protection of cropping lands. There will be considerable public expectation that these issues would be comprehensively addressed in the Environmental Management Plans (EMPs) required for each Environmental Authority (EA) application. It is always DERM's desire to have applicants lodge documentation that is sufficient to allow it to undertake its statutory assessment responsibilities without recourse to information requests.

Environmental Management Plans will be a key mechanism by which outstanding issues must be addressed. For each component of the project (the gas fields, the gas pipeline and the petroleum facility) it will be necessary for the proponent to revise existing draft EMPs or develop new EMPs to enable DERM to issue EAs under the *Environmental Protection Act 1994*. Such EMPs will need to be in accordance with the requirements of S310D of the *Environmental Protection Act 1994*.

The construction of the bundled gas pipeline crossing to Curtis Island at The Narrows is another issue of some contention. This is being resolved separately by your Department. In light of this, DERM has not further considered the single pipeline crossing option proposed by APLNG. DERM understands that the gas pipeline crossing for APLNG will now be a part of a bundled crossing proposal.

Should you have any queries regarding this matter, please contact Terry Loos of the Environmental Impact Assessments Branch on 3330 6057.

Yours sincerely

Dean Ellwood
Assistant Director-General
Environment and Natural Resource Regulation

Attachment: Department of Environment and Resource Management (DERM)

Advice and Recommended Conditions for the Coordinator-General's Evaluation Report

Appendix 1: EA Conditions, Gas Transmission Line

Appendix 2: EA Conditions, Liquid Natural Gas

Ref CTS 09666/10

23 JUN 2010

Department of
Environment and Resource
Management

The Coordinator-General
C/- EIS Project Manager: APLNG Project
Significant Projects Coordination
Department of Infrastructure and Planning
PO Box 15009
Brisbane City East Qld 4002 Australia

email : APLNG@dip.qld.gov.au

Attention: Mr Bruce Edwards

Dear Mr Edwards

DERM SUBMISSION ON THE EIS FOR THE APLNG PROJECT

I refer to your electronic correspondence of Thursday, 25 March 2010 inviting submissions on the Environmental Impact Statement (EIS) for the Australia Pacific Liquefied Natural Gas (APLNG) project.

The Department of Environment and Resource Management (DERM) has reviewed the EIS and has identified several issues on which clarification and further information is needed to enable a full assessment. Broadly, it is noted that while the EIS contains a lot of detailed information it is relatively short on the specifics of where infrastructure will be located, specific site impacts and how those impacts will be mitigated and monitored. Hence, DERM is unable to finalise conditions for the statutory approvals required, should the Coordinator-General determine it should proceed. The information being sought may be able to be provided by APLNG through a Supplementary EIS or other supplementary documentation.

Given that this is one of several similar proposals it is important that DIP and DERM continue to work with other Government Agencies to address the common issues of groundwater modelling, CSG water management, and the pipeline crossing to Curtis Island, so that more strategic and sustainable combined approaches could be taken.

The DERM submission is attached. I trust it will be of assistance. DERM officers will be pleased to discuss and elaborate on the points raised. For all queries regarding this submission please contact the DERM project manager Terry Loos on 3330 6057.

Yours sincerely

sch4p4(6) Personal information

Natasha Patterson
A/Assistant Director-General
Environment and Natural Resource Regulation

Level 7
400 George Street Brisbane Qld 4000
GPO Box 2454 Brisbane
Queensland 4001 Australia
Telephone + 61 7 3330 5550
Facsimile + 61 7 3330 5634
Website www.derm.qld.gov.au
ABN 46 640 294 485

Department of Environment and Resource Management (DERM) Submission on the Australia Pacific Liquefied Natural Gas Project (APLNG) Environmental Impact Statement (EIS)

General issues and recommendations covering the multiple components of the project:

Where practicable the following comments have been sub-divided into the three main elements of the projects, viz. the gas fields; the gas pipeline; the LNG plant on Curtis Island. Initially however, some general comments common to all elements are offered. It is expected that all matters raised will be addressed in supplementary documentation.

1.0. GENERAL COMMENTS

1.1. Issue: Front end engineering design (FEED)

Numerous sections of the EIS note that FEED is required to be undertaken before the final details of the proposal can be provided. In many cases the engineering design and associated mitigation measures are required for full impact assessment and the subsequent development of conditions for relevant statutory approvals. Examples include the:

- Material off-load facility – the construction method and design of the structure. The construction method and design of the proposed dredge spoil rehandling ponds proposed to be located adjacent to the haul road, including the management of actual and potential acid sulfate material.
- Product off-load construction details, particularly across mangroves, including the management of actual and potential acid sulfate material.
- LNG facility construction details including the design of the reverse osmosis water treatment plant and associated intake and outfall diffuser, the proposed plant to treat sewage and dispose effluent to land during construction and thereafter during ongoing operation; and the management of waste contaminants removed from the CSG prior to liquefaction.
- The construction of the gas transmission pipeline across ranges, problem soil areas and water course crossings. These still require detailed geological and soil investigations with engineering design responses to determine if the construction is possible in these areas or how construction will take place.
- Upstream infrastructure design and construction methods such as well drilling, compressor plants, capacity and ability to locate dams and construction camps appropriately - including sewage treatment plants, and plans for decommissioning and rehabilitation.
- Final consignment of the estimated salt load to be produced during the project.

Until sufficiently detailed information is provided on FEED, the DERM considers that there is insufficient information to finalise assessment of the EIS. Additionally, this information should provide certainty with respect to the constructability of the pipeline and other aspects requiring further detail.

Recommendation

Provide sufficient information to assess all components of the project. Plans and maps should be provided showing waste streams and discharge points, watercourse crossings etc. accompanied by detailed descriptions of the various components of the project. Information should be presented describing the mitigation measures to be implemented during all stages of construction and operation of the project. The basis for these measures should also be included.

1.2. Issue: Approvals

While mention is made of the types of environmental authorities that would likely be needed, the EIS does not clearly identify which approvals will be required for the various components of the project. For each component of the project the EIS should identify the necessary tenures, resource allocations and approvals which will be subject to an environmental authority under the *Environmental Protection Act 1994* (EP Act), or made assessable under Schedule 3 of the *Sustainable Planning Regulation 2009* as a material change of use, building works or for operational works. DERM requires this information in order to guide its advice to the Coordinator-General.

In addition, the triggers noted in the EIS in regard to the *Coastal Protection and Management Act 1995* are incorrect and should be amended to clearly identify the approvals required under this act. The *Coastal Protection and Management Act 1995* also contains permit requirements for the removal of quarry material. This aspect is not triggered by the *Sustainable Planning Act 2009* and should be addressed in the EIS.

Recommendation

The EIS should provide a clear statement of:

- components of the project that will be subject to an environmental authority under the EP Act; and
- components of the project that may require a material change of use or operational work approval under a local government planning scheme, or are made assessable by the *Sustainable Planning Act 2009* as a material change of use, and that will be subject to the approval by the Coordinator-General;

Components of the project that may require tenure, resource allocations and approvals under the *Coastal Protection and Management Act 1995*; and the extent to which any material change of use subject to the *Sustainable Planning Act 2009* will need to be approved by the Coordinator-General.

Information on associated ERAs should include:

- Site description for each ERA.
- The scale or intensity of each ERA, including clear details of yearly throughput.
- Detail on monitoring programs to proactively monitor for compliance and for potential impacts from each ERA.
- The proposed approach to periodic review of environmental performance and continual improvement.

1.3. Issue: Environmental offsets

Information is required to show that measures will be taken to avoid and minimise potential adverse impacts of the proposal. The EIS does not include information demonstrating why many impacts referred to in the document are unavoidable. Environmental impacts from development must first be avoided and if not avoided then minimised. Environmental offsets should be proposed to counterbalance any remaining loss of environmental values, consistent with the principles of the specific-issue offset policies under the framework of the Queensland Government Environmental Offset Policy 2008 (QGEOP).

Relevant specific-issue policies that should be addressed where applicable are:

- Vegetation management—*Policy for Vegetation Management Offsets*, September 2007, Department of Natural Resources and Water;
- Marine fish habitat—*Mitigation and Compensation for Works or Activities Causing Marine Fish Habitat Loss*, 2002, Department of Primary Industries and Fisheries; and
- Koala habitat—*Offsets for Net Benefit to Koalas and Koala Habitat*, 2006, Environmental Protection Agency.

Recommendation

Provide an offsets proposal covering the whole project in accordance with the QGEOP and its specific issue policies.

1.4. Issue: Financial Assurance

Financial assurance will be required prior to the issue of environmental authorities (petroleum activities) in accordance with section 312O of the EP Act. However, it is unclear how schedules of disturbance for financial assurance calculations will be determined without specific information regarding the scale of impacts.

Recommendation

The proponent should develop schedules of disturbance for all aspects of the project in accordance with the DERM guideline – *Financial assurance for petroleum activities*. Information should be provided demonstrating that the financial assurance estimates will be adequate for worst-case scenarios (including maximum possible areas of disturbance, maximum proportion of problem soil areas and maximum proportion of environmentally sensitive areas).

1.5. Issue: Impacts to wildlife listed under the Nature Conservation Act 1992

The EIS needs to acknowledge the requirements of the *Nature Conservation Act 1992* where appropriate.

Recommendation

Provide a clear identification of the requirements of the *Nature Conservation Act 1992* for the project. This will include applications for clearing permits for the taking of all native plants. A species management plan will be required to address impacts to native animals listed under the Act. The species management plant should be developed in consultation with DERM.

1.6. Issue: Inclusion of individual threatened species management guidelines (Volume 2 Chapter 8 Figure 8.8)

Individual threatened species management guidelines for works in the gas fields and the surrounding 100m buffer of identified habitat are referred to in the EIS, but not included.

Recommendation

Individual threatened species management guidelines for works in the gas fields and the surrounding 100m buffer of identified habitat should be included in the EIS, not just referred to. At least, a commitment should be made to develop these guidelines, in consultation with DERM, within a specified time frame and prior to commencement of pipeline construction activities and in accordance with statutory requirements.

1.7. Issue: Flora sections in EIS, particularly cycads.

Impacts to cycads and other plants of conservation significance require specific mitigation and offset measures. This has not been adequately discussed in the EIS.

Recommendation

The mitigation and offset measures to be applied for plants of conservation significance should be in accordance with the QGEOP. Specific measures to ensure the conservation of significant species include that:

- (a) translocations must have a minimum of 500 plants in the new area to be sustainable;
- (b) research is undertaken into the genetic variability of distinct populations; and
- (c) impacts from fragmentation shall be considered as part of the mitigation strategy.

The proponent may elect to undertake a recovery action for the cycad species as described under the Commonwealth Recovery Plan for Cycads.

1.8. Issue: Inclusion of Management Plans referred to in the report (Volume 2 Chapter 8 pp 52-53 & 56 and Figure 8.8)

Management Plans in relation to the following have been referred to in the report (page 55), but do not seem to have been included:

- Threatened species management guidelines
- Clearing management guidelines
- Weed management guidelines
- Feral animals management guidelines
- Rehabilitation and revegetation management guidelines
- Ecological fire management guidelines.

Recommendation

The following management plans should be included in the EIS:

- Threatened species management guidelines
- Clearing management guidelines
- Weed management guidelines
- Feral animals management guidelines
- Rehabilitation and revegetation management guidelines
- Ecological fire management guidelines.

1.9. Issue: Monitoring rehabilitation general comment (Volume 2, Chapter 8)

No reference has been made to establishing reference sites (benchmarks) for monitoring of rehabilitation.

Recommendation

At least two reference sites will need to be developed for each major ecosystem from which to develop benchmarks, and to provide on-going reference for environmental management and rehabilitation activities. The sites should be selected to represent the major natural ecosystems being significantly impacted by the project, and should be sufficiently removed from the project to be unaffected by the project's activities. The sites should be monitored at the same intervals and with the same methodology as that used for on-site monitoring.

1.10. Issue: Clearing native vegetation outside of petroleum tenure

All clearing of native vegetation outside of petroleum tenure will be subject to the provisions of the *Vegetation Management Act 1999*.

The EIS refers to project components located outside of proposed petroleum leases however provides little detail as to the nature, location and extent of these activities. Clearing remnant vegetation as per the *Regional Ecosystem and Remnant Map – Version 6.0* that is made assessable development under the *Sustainable Planning Act 2009* is subject to assessment against the relevant Regional Vegetation Management Code. The proponent will be required to submit an Operational Works application and demonstrate how proposed clearing meets the performance requirements of the relevant code.

Clearing regulated regrowth on freehold and leasehold land for agriculture and grazing purposes as per the *Regrowth Vegetation Map – Version 2.0* is subject to the *Regrowth Vegetation Code – Version 1.0*. The proponent will be required to submit a *Regrowth Notification Form* and abide by the minimum requirements of the code when clearing native vegetation is proposed within these areas. The *Regrowth Vegetation Code – Version 1.0* requires 'exchange areas' in particular instances.

Recommendation

The EIS should provide information on the likely extent of vegetation clearing outside of proposed petroleum tenure and consider land tenure, vegetation status (ie. remnant, non-remnant, regulated regrowth) and vegetation management status (ie. endangered, of concern, least concern).

The EIS should demonstrate how clearing native vegetation outside of petroleum tenure is consistent with the provisions of the *Vegetation Management Act 1999*.

1.11. Issue: Commercial timber salvage

It is likely that APLNG's operational works will require the clearing of native forest vegetation on both State Forest areas and other State-controlled lands, (e.g. roads), which may or may not be leased to a third party. Both cypress and hardwood timber has a commercial value and attempts will need to be made to salvage harvest any affected commercial timber.

As well as complying with any requirements under the *Vegetation Management Act 1999* and other relevant Acts, APLNG should provide DERM Forest Products with sufficient lead time (at least 6 months) so that it can arrange, if possible, any required timber

harvesting operations to salvage, in advance of any proposed clearing, the commercial timber on any area of State-controlled land, including State Forest and State leasehold land. (In the event that insufficient notification is provided to DERM to survey and remove millable timber prior to clearing then compensation provisions could be applied).

These arrangements may include the planning and scheduling of the timber harvesting operations and the supervision of the actual harvesting, which will be mostly undertaken by contractors engaged by the party (normally a sawmiller) with the contracted rights to the log timber to be harvested. Another alternative may be to arrange in some situations for APLNG to salvage the log timber from marked trees and to stack the resultant logs on the edge of clearing for later sale by DERM Forest Products.

If APLNG provides insufficient lead time for any required salvage harvesting operation, DERM Forest Products may issue APLNG with an account for the royalty value of the log timber cleared or destroyed.

APLNG, in advising DERM Forest Products of their scheduled vegetation clearing proposals, should provide details and maps of the location, nature and required timing of the proposed clearing operations. Subject to the specific details of the proposed works, DERM Forest Products will require APLNG to mark in the field the location of the area to be cleared to ensure that all parties are aware of the boundaries of the area to be harvested and cleared.

Whilst APLNG's current area of interest is within the 'Cypress Forest Management Area', the proposed pipeline route and proposed plant is also within the 'Western Forest Management Area'. The boundary between these two management areas approximates the northern boundary of the Western Downs Regional Council area.

Recommendation

As well as complying with any requirements under the *Vegetation Management Act 1999* and other relevant Acts, APLNG should provide DERM Forest Products with sufficient lead time (at least 6 months) so that it can arrange, if possible, any required timber harvesting operations to salvage, in advance of any proposed clearing, the commercial timber on any area of State-controlled land, including State Forest and State leasehold land. The advice should provide details of the scheduled vegetation clearing proposals, including details and maps of the location, nature and required timing of the proposed clearing operations. (Contact details for local contacts in DERM Forest Products can be provided when needed).

Trees identified for removal should be clearly marked in advance of clearing operations. Wherever possible, mature habitat trees (hollow-bearing) are to be retained. Fallen timber should be moved as little as possible and replaced once construction has been completed. Trees that are to be felled, except millable timber, should be retained on site and subsequently moved back onto the cleared corridor and left as ground habitat.

1.12. Issue: Authorised quarry material removals

APLNG will be required to be authorised under the *Forestry Act 1959* to obtain quarry material which is the property of the Crown / State unless expressly provided in another Act, or unless the contrary is proved. Quarry material on lands the property of the Crown comprised in any lease or other entitlement granted under the *Petroleum and Gas (Production and Safety) Act 2004* ('P&G Act') is the absolute property of the Crown.

To illustrate, the cutting of a drill pad, the levelling of a construction site or formation of a road would reasonably require the removal of, or interference with, quarry material from the immediate 'construction' area as an incidental activity; however, any additional quarry material required for that activity, sourced from outside the immediate 'construction' area requires an authority under the *Forestry Act 1959*.

Recommendation

Note that DERM Forest Products will require notification from APLNG to obtain State owned or controlled quarry material from appropriate locations and under agreed terms and conditions, where required.

The supplementary documentation should provide a draft copy of the proposed access plan covering all the State controlled lands affected by the proposed coal seam gas operations in the Surat Basin, along the proposed pipeline route and on Curtis Island. This would provide another opportunity for APLNG to obtain advice and assistance from DERM Forest Products to ensure compliance prior to the commencement of significant on-site activities.

1.13. Issue: Stock routes

Relevant mapping and lists of stock routes, reserves for travelling stock, and lands dedicated by the Minister for grazing, watering or camping purposes are available from the DERM.

A stock route is a road or route ordinarily used for travelling stock or declared under section 9 of the Land Protection (Pest and Stock Route Management) Regulation 2003 to be a stock route. Stock routes are classified based on their usage and the proposal intersects stock routes classified as secondary, minor and inactive. Stock route reserves are lands dedicated by the Minister for grazing, watering or camping purposes under section 31 (1) of the *Land Act 1994*.

The proposal has the potential to inhibit the ability of travelling stock to traverse the stock route network. The DERM Stock Route Management Unit must be consulted at the design stage to determine potential impacts to travelling stock and to the stock route network in the specified areas.

Furthermore, all local governments affected by the proposal must be engaged to ensure that they are aware of, and can manage, any potential disruptions to the stock route network. Specifically, the following local governments may be directly impacted by the proposal:

- Banana Shire Council;
- Central Highlands Regional Council;
- Gladstone Regional Council;
- Maranoa Regional Council;
- North Burnett Regional Council; and
- Western Downs Regional Council.

Recommendation

Provide a detailed assessment of the values and impacts to the Stock Route Network. Appropriate mitigation measures should be provided to prevent and or minimise the potential impacts on environmental values. Include information on how the project

satisfies the requirements of the *Land Protection (Pest Management and Stock Route Management) Act 2002*. Consider the impacts of activities of CSG field developments on management and operation of the Stock Route Network, having regard to the following comments:

- The relevant DERM Senior Lands Officer (Stock Routes) and local government stock route officer must be consulted from the early planning stages.
- Where there are to be permanent disruptions to the stock route network, DERM requires realignment/replacement with corridors of similar width and suitable country type to allow for the unimpeded movement of travelling stock. Current classifications of stock routes have no bearing on whether consideration needs to be given to their replacement/realignment as usage of stock routes by travelling stock is subject to change.
- Where there are to be temporary disruptions to travelling stock (i.e. from the installation of buried infrastructure), suitable arrangements must be negotiated with the relevant local government prior to the commencement of works.
- Options for permanent or temporary diversions of stock routes that are considered unsafe to travelling stock and drovers, as well as the travelling public will not be supported.
- The provision or replacement of adequate watering facilities and other travelling stock infrastructure may be necessary, particularly where existing facilities become redundant due to the proposal.
- Any part of the stock route network disturbed or affected by the proposed works must be rehabilitated upon completion of the project. Where revegetation is required, native vegetation, including pastures, must be used to return the area to its pre-disturbed state.

1.14. Issue: Acid Sulfate Soils

The Terms of Reference for the proposal (Section 3.2.2.1) require site specific acid sulfate soil investigations to be undertaken. The EIS Executive Summary (Section 4.6.3 Acid Sulfate Soils) states these detailed investigations will be undertaken at a later date. No detail is provided in the EIS (Attachment 6.0, 7.0) for the proposed disturbances of acid sulfate soils for example volume, depth and specific location. DERM will provide advice on the site specific Acid Sulfate Soil Management Plans as required in the Terms of Reference, should the proposal proceed.

Recommendation

Undertake the Acid Sulfate Soils investigations and provide site specific Acid Sulfate Soils Management Plans as required by the Terms of Reference for the proposal.

1.15. Issue: EM Plan detail (Volume 2, Chapter 24, EM Plan)

The environmental plans are generic and refer to various 'guidelines', 'management measures', 'regulatory requirements' which will form part of the implementation strategy of the EMPs. This level of detail does not meet the statutory requirement of an EM Plan under s310d of the EP Act for petroleum and gas activities.

Recommendation

All aspects of the EMPs, must be provided in sufficient detail to allow review by the Department in order to determine the suitability of these plans to adequately mitigate all significant impacts. Similarly, all proposed monitoring programs, additional surveys and ecotoxicological testing proposals must be provided for this review.

1.16. Issue: Lack of detailed information provided on non-Indigenous cultural heritage survey (Volume 2, Chapter 19, Table 19.2.1)

The EIS indicates that field studies were undertaken for the gas fields; however no information is provided to identify the specific areas surveyed or details of the places identified during those field studies.

Recommendation

That maps (or other appropriate data) are provided indicating the location of field studies for non-indigenous cultural heritage places and details of field studies and sites identified are provided (including photographs of identified sites; location details, and detailed description). A table similar to 19.2 should be provided for those locations located during the field investigation.

1.17. Issue: Non-Indigenous Cultural Heritage (Vol 3, table 19.3)

Defence Road which includes stone bridges and camp should be identified as being potentially of State Significance. Table 19.3 lists these places as being of local significance. DERM is of the view that these places may be of State Significance. Potential impacts on these sites should be considered in this light.

Recommendation

Recognise the potential for State Significance of these places and due consideration given to the proposed mitigation measures.

1.18. Issue: Non-Indigenous Cultural Heritage (Vol 3, table 19.3).

The pipeline route crosses Mount Larcom Goldfield and the EIS has indicated that no surface features have been identified. The EIS has not provided any assessment of the potential for sub-surface remains.

Recommendation

DERM recommends that:

- o the Mount Larcom Goldfield, including surface features, be adequately recorded and described with respect to their relationship to the proposed pipeline route;
- o an assessment of the subsurface archaeological potential be provided; and
- o mitigation measures be provided taking into account any the potential for subsurface archaeological sites.

1.19. Issue: Non-Indigenous Cultural Heritage (Chapter 19 & Vol 5 Attachments 39-41).

The EIS indicates that field studies were undertaken, however no information is provided to identify the specific areas surveyed or details of the places identified during field studies.

Recommendation

Field studies for non-indigenous cultural heritage places should be described including photographs of identified sites; location details, and detailed descriptions of the field studies.

1.20. Issue: Timing of water course diversions

It is not appropriate to assume meteorological events are “likely” to be favourable for all project construction activities and to therefore assume any impacts are likely to be localised and temporary.

The project plan should adopt a firm construction phase strategy that aims to maximise water course diversion activities taking place in the dry season and thereby minimise the risk of wet weather mobilising disturbed soils/sediments (no matter how localised or temporary). A non-negotiable approach should be adopted in areas that could potentially impact upon threatened artesian spring communities.

Recommendation

It is recommended that APLNG adopts a firm construction phase strategy that aims to maximise the water course diversion activities taking place in the dry season in order to minimise the risk of wet weather mobilising disturbed soils/sediments. A non-negotiable “dry season only” water course diversion strategy should be adopted where a potential to impact upon threatened artesian spring communities exists.

1.21. Issue: Volume 2, Chapter 24 EM Plan, Section 24.22.5 Storage Ponds

This section of the EM Plan states that the storage ponds can only be decommissioned when the water used to flush the process equipment and pipelines has been collected. This suggests the section is only discussing the water treatment facilities storage ponds and not other storage ponds.

Recommendation

The supplementary documentation should provide details of how the decommissioning of evaporation ponds containing associated water and brine storage ponds will be undertaken.

2.0. GAS FIELDS

2.1. CSG WATER MANAGEMENT AND RELATED ISSUES

2.1.1. Issue: DERM Guidelines on Coal Seam Gas projects

DERM on 31 March 2010, subsequent to receipt of the EIS, released the following guidelines:

- *Preparing an environmental management plan (EM Plan) for Coal Seam Gas (CSG) activities;*
- *Approval of coal seam gas water for beneficial use; and*
- *Model conditions for level 1 environmental authority for coal seam gas activities.*

Recommendation

The supplementary documentation should address these guidelines and revise the relevant sections of the EIS to reflect their requirements.

2.1.2. Issue: Current policy reforms in the management of CSG water

In 2009, the Queensland Government released its 'Blueprint for Queensland's LNG Industry'. The Blueprint contains several policy statements aimed at improving the environmental management of water produced while exploring or extracting coal seam gas (CSG). This includes the introduction of, "an adaptive environmental approval regime". These policy statements have now been drafted as regulatory reforms through the South-East Queensland Water (Distribution and Retail Restructuring) and Other Legislation Amendment Bill 2010 which was passed by the Parliament on 19 May 2010. This is proposed to be introduced in early July 2010.

This reform will amend the *Environmental Protection Act 1994*. In particular the reforms propose amendments to enhance the Environmental Management Plan (EM Plan) provisions of s310D of the EP Act with a focus on the management of CSG water. The reforms also enhance the circumstances under which an environmental authority can be amended. These include the need to submit a revised CSG-EM Plan and a requirement for an annual return which must include an evaluation of the effectiveness, against approved criteria, of the management of CSG water through the implementation of the CSG-EM Plan.

The transitional provisions also require that the holder of an existing CSG authority must within one year after the commencement day give the administering authority a revised (CSG) EM plan for the existing CSG authority. In effect, all CSG projects, existing and future, will be required to comply with the new provisions. It would be in the best interests of all parties if the conditions for all approvals are able to be set consistent with the CSG-EM Plan provisions of the new legislation. As a first step, all current proponents should prepare a CSG-EM Plan consistent with the new provisions (and the recently released guidelines).

Recommendation

The proponent be advised of the statutory reforms recently passed in the South-East Queensland Water (Distribution and Retail Restructuring) and Other Legislation Amendment Bill 2010 and address the matter in the supplementary documentation.

2.1.3. Issue: The proposed discharge of CSG water to the Condamine River.

It is noted that the discharge of relatively large volumes of CSG water to watercourses is proposed. This option is not favoured in principle because these discharges could disrupt how environmental flow and water supply security objectives are met, as contained in the corresponding statutory Water Resource Plans. It may also have certain water quality implications where drinking water supplies are involved.

However, where discharge to surface waters is unavoidable, at a minimum the CSG-EMP should be based on certain fundamental principles as follows: (i) discharges to generally undeveloped ephemeral tributary streams should be avoided; (ii) discharge to large water storages (dams, weirs) is preferable; (iii) offstream storage capacity may be needed to hold water during times when any discharge is undesirable; (iv) any discharges should mimic natural flow patterns and not disrupt statutory flow objectives; and (v) the cumulative impacts of all possible such discharges in each river basin should be assessed. The option of re-injecting water into a suitable aquifer – the preferred option - is discussed in S 2.8. on groundwater management.

The EIS does not provide water volumes to determine how the proposed options of APLNG owned and operated agricultural use, crops and plantations, existing agricultural water supply, coupled with the opportunistic discharge of high quality treated water to watercourses will be sufficient to manage the amount of associated water produced. It is noted the EIS recommends discharging treated CSG water to the Condamine River for an initial period of 3 - 5 years. The maximum volume of water to be discharged is noted to be approx 24,000 megalitres per year (65 ML/d) from the Talinga and Condabri sites (although there appears to be potential to have a maximum discharge of the order of 60 000ML/yr (165 ML/d)).

The report appears to be relying heavily on hydrologic modelling (Volume 5: Attachment 23) to demonstrate that discharging the specified volumes of water will comply with the environmental flow objectives (EFO) and water allocation security objectives (WASO) specified in the Water Resource (Condamine & Balonne) Plan 2004 (WRP). In addition to the EFO and WASO comparison, flow duration curves have been provided as a measure of the extent to which a discharge regime follows the natural flow variability. The report does not appear to include any statistical or graphical data of Water Allocation Security Objectives (WASO) for the various model runs.

It would appear reasonable for the proponent to aim to demonstrate a compliance of the proposed discharge against the EFOs and WASOs at the model nodes; however, it is also important to recognise that the EFO variability allowed in the plan would have been designed to accommodate the flow variability needed to operate the existing irrigation schemes – not a new water source discharge. That is, this analysis should assess impacts against the full intent of the WRP.

It is noted that the modelling undertaken by the EIS consultant (Volume 5: Attachment 23) shows that the EFOs are relatively sensitive to the volume of water being discharged (i.e. a 50 ML/day discharge appears acceptable but 60 ML/day does not). Given that there are other project proposals considering the discharge of treated CSG water to the Condamine River, the sensitivity of this finding highlights the point that an assessment of

the cumulative impacts of all possible discharges against the provisions of the WRP should be undertaken.

The cumulative impact assessment for associated water (Volume 2, Chapter 25, Section 25.2.8: Associated Water, p10-11) provides no information on the amount of associated water that may be generated by the other CSG projects which are in the vicinity of APLNG tenements. Also, the EIS only considers the water from gas fields that are part of this LNG project; it does not include APLNG gas fields which have existing approvals. Therefore, it is not possible to determine whether the total amount of associated water produced for a given area can be beneficially used or adequately disposed of to minimise environmental harm.

While the EIS makes mention of the Category 1 Options and includes an Adaptive Associated Water Management Plan, it would seem to fall short of providing strong argument why it is not possible to adopt the Category 1 - Preferred Management Options during the initial period (in particular, direct discharge to a large dam storage managed by a water service provider, for instance the Chinchilla Weir storage).

The Adaptive Associated Water Management Plan (Volume 5: Attachment 24) targets a number of options for further development which are consistent with Category 1 - Preferred Management Options. However it is noted that these options make no mention of a CSG water aggregation and disposal system which was a feature of the governments "Management of water produced from coal seam gas production" - Discussion paper (May 2009).

The recommendation of the report (Volume 5: Attachment 22 Section 7.9) is for water to be discharged to the Condamine River as the preferred option and discharge to other proposed locations (presumably tributaries) limited to opportunistic releases during periods of river flow. The discharge regime to be adopted is based on Option 3: discharge factored based on average seasonal flows or Option 4: discharge triggered by watercourse flows according to Volume 5: Attachment 22 (Section 7.8.5 - Possible discharge regime).

It is noted that Option 3 was not modelled hydrologically using the IQQM. It is also noted that the recommendations seem to provide a brief description of the discharge regime for Option 2 and 4. Therefore it is unclear which option is actually being promoted (i.e. Option 2 or Option 3) and so it is not possible to give a definitive response to the recommended discharge regime. Anyway, discharge to tributary streams should not be given favourable consideration because of the impact on their natural flow regimes which have been largely unaffected by existing development.

The report would appear to make no mention of the storage requirements for CSG water during periods when it is not possible to dispose of treated water under the proposed discharge regime. In the interest of completeness it is considered desirable to understand the storage requirements depending in the different flow regime options.

The report would appear to make no mention of any proposed measuring of the volume of water to be discharged to each watercourse. A minimum requirement would be time and event metering at the point of discharge to record the rate of discharge, volume of discharge and the time of discharge.

Recommendation:

In the supplementary documentation the proponent should be asked to provide:

- Revised hydrologic modelling to enable the assessment of the cumulative impacts of the current and potential discharges to the relevant reaches of the Condamine River. The current and potential water discharge information can be accessed from DERM.
- Additional information as to why it is not possible to adopt Category 1 – Preferred Management Options.
- Clarifying information on the options to be adopted for the discharge regime under Volume 5: Attachment 22 (Section 7.8.5 - Possible discharge regime).
- Additional details such as a map showing the location of the proposed discharge points and the relative volumes and how discharges would be staged – through to the maximum possible discharge.
- Modelled output data for the various discharge options to test against the WRP objectives.
- Information on the storage requirements during periods when it is not possible to dispose of treated water under the proposed discharge regime.
- Information in relation to the measurement of discharge water.

The proposed Associated Water Management Plan (CSG-EMP) detailing each of APLNG's proposals for treatment, use and disposal of CSG water.

2.1.4. Issue: Changes to water chemistry in receiving waters (Volume 2 Chapter 9 Section 9.4.2) through discharge of RO permeate and other wastewater

Section 9.4.2 (identifies the potential impact of dilution of 'constituent concentrations, such as calcium' in the receiving waters where permeate is discharged. The potential change(s) in the chemistry of receiving water is not supported by reference to scientific literature. An extensive and detailed review of the scientific literature is required to support the mitigation and remediation of such impacts and to determine and assess the extent of such impacts. Many of the receiving water river systems under consideration provide supply to both irrigation and urban uses. The discharge of permeate represents a significant potential impact for which limited assessment of the potential ecological and physiochemical impacts has been undertaken and no robust mitigation has been proposed.

Particular emphasis must be given to changes in the water chemistry as it relates to potential alteration of physical parameters. The ecotoxicity of permeate and whole effluent toxicity (including sub-lethal effects) must also be clearly assessed to provide a more comprehensive assessment of associated risks.

The proponent has indicated the need to undertake toxicity testing to determine suitable concentration based on the 90-95% species protection level (Volume 5 Attachment 17, Table 5-3). The proponent should investigate achievement of higher levels of protection where the proposed release of permeate will be sustained for the extended period considered for the proposed development. Consultation is required with DERM scientific staff when considering the outcomes of toxicity testing.

With regard to drinking water supplies it is noted that the township of Condamine has a reticulated drinking water supply drawing upon the Condamine River into which it is proposed to discharge treated CSG water. There may be other potential drinking water uses including, say, as drinking water supply to mine workforces.

Therefore CSG source water characterisation studies (which are not limited to contaminants normally found in drinking water as CSG Water may have other contaminants) and toxicology studies are needed which demonstrate that the discharge of the treated CSG Water to the Condamine River will not have any potential adverse human health effects.

The level of fluoride in water is a concern. Table 24.15 of Volume 2, Chapter 24 EM Plan provides a summary of the key associated water quality parameters for the Spring Gully gas field. The table shows the concentration of fluoride at Spring Gully to be 5.9mg/L. In Table 6.11 of Volume 5 Attachments, Attachment 5: Adaptive Water Management Plan – gas fields the water quality of the Spring Gully permeate shows the Fluoride concentration to be 0.05mg/L.

In view of the fact that the township of Condamine downstream of the proposed discharge points on the Condamine River has a reticulated drinking water supply drawing upon the river, APLNG may be required to have an approved water quality management plan to protect drinking water supplies in accordance with the *Water Supply (Safety and Reliability) Act 2008* (WSSR Act) and associated requirements of the Office of the Water Supply Regulator. This matter is under consideration by DERM and is being separately discussed with APLNG.

Recommendation

- The supplementary documentation should provide an analysis of the likely ecological impacts on the receiving waters of all discharges in relation to their physico-chemical qualities. This analysis should review and assess aquatic monitoring data from existing water treatment and discharge facilities where these have indicated the dilution of 'constituent components' is having a detrimental impact on the ecology of the receiving waters.
- The supplementary documentation should provide a detailed review of the scientific literature as it relates to the ecological and physiochemical impacts of RO permeate discharge on freshwater ephemeral systems and demonstrate the ecological benefit of proposed mitigation including 'appropriate remedial actions'.
- The undertaking of a comprehensive eco-toxicological investigation to assist in the assessment of the proposal is desirable. The proponent should include specific compound and whole effluent toxicity assays and provide detail on non-lethal effects. Local species should preferentially be used in any such studies. The proponent should consider achieving a higher level of environmental protection than that currently proposed.
- The supplementary documentation should confirm the capability to reduce fluoride levels using RO and explain how a significant reduction is achieved.
- In view of the fact that the township of Condamine downstream of the proposed discharge points on the Condamine River has a reticulated drinking water supply drawing upon the river, and there may be other potable water uses, it is requested that CSG source water characterisation studies (which are not limited to contaminants normally found in

drinking water as CSG Water may have other contaminants) and toxicology studies are undertaken which demonstrate that the discharge of the treated CSG Water to the Condamine River will not have any potential adverse human health effects.

2.1.5. Issue 3: Risk assessment for elevated boron concentrations

Given that the permeate discharge is proposed to mimic existing flow patterns (i.e. higher rate of permeate discharge during periods of higher flow rates in the system), does the resulting mixture of permeate and natural waters exceed the 90-95% species protection trigger value for boron, and how often is the above exceedance expected to occur (e.g. percentage occurrence of exceedance for each magnitude of exceedance category, expressed as $B < 99\% \text{ PL}$, $99\% \text{ PL} < B < 95\% \text{ PL}$, $95\% \text{ PL} < B < 90\% \text{ PL}$, $90\% \text{ PL} < B < 80\% \text{ PL}$, or $B > 80\% \text{ PL}$)?

The abundance of various types of alga is likely to be seasonally variable as are the post-discharge environmental boron concentrations; presenting data on algal species abundance vs. estimated environmental boron concentrations for each statistically significant differing month or season would assist in interpretation of the 'medium residual risk rating'.

One possible approach to presenting this information would be:

Monitoring Site A Environmental Risk Assessment for environmental Boron concentrations

Month (or Season)	Alga Abundance - Average Conc'n (mg/L)		Percentage Est. Env. B Conc'n occurring within each ANZECC/ARMCANZ (2000) Protection Level category					Risk Rating
	Alga Sp. 1	Alga Sp. 2	<99%	>99% <95%	>95% <90%	>90% <80%	>80%	
January (or Spring)	20	30	5	45	55	5	0	Low
February (or Summer)	35	30	0	15	70	10	5	Medium
March (or Autumn)	20	50	0	5	30	50	15	High
Etc								
Overall	15	25	10	20	50	10	10	Medium

In this way (or some other similar approach) DERM would be able to better understand the risk assessment process used. It would also assist in identifying periods of the year with higher risk and thereby provide information that could assist in refining discharge strategies to reduce overall environmental risk.

Recommendation

The supplementary documentation should provide additional detail on how the risk assessment for boron was performed.

2.1.6. Issue: Volume 3, Chapter 11 Water Resources Section 11.4.2 Surface Water Impacts Paragraph 1 on page 20.

Refers to Volume 3 Chapter 24 for an outline of the disposal of hydrotest water in the EM Plan. However, the correct reference should be Volume 3 Chapter 3, Section 3.5 Hydrostatic Testing.

2.1.7. Issue: Volume 3, Chapter 3 Project Description - Section 3.5.1

Section 3.5.1 states that a maximum of 100ML of potable water will be required for testing.

Recommendation

The supplementary documentation should confirm this requirement as being for potable water only or will other sources of water be sourced? If so, these other sources should be identified.

2.1.8. Issue: Volume 3, Chapter 3 Project Description - Section 3.5.1

This section also states that a “few” temporary storage ponds of 20ML in size will be required to hold test water – this would suggest a storage pond would be required every 20km along the pipeline. Given a pipeline length of around 400km, this would require around 20 temporary storage ponds would be required.

Recommendation

The supplementary documentation should confirm the proposal to use a significant number of temporary storage ponds and their number, design, construction, location, management and rehabilitation. Also, provide advice as to the process under which hydrotest water will be transported along the completed sections of pipeline. Can the ‘used’ hydrotest water be returned to an appropriate water treatment plant holding pond for processing through an RO plant?

2.1.9. Issue: Volume 3, Chapter 3 Project Description - Section 3.5.2 Test water Management

It is noted that it is proposed to use biocides, oxygen scavengers and corrosion inhibitors in the hydrotest water.

Recommendation

The supplementary documentation should provide an impact assessment of the use and disposal of waters containing any additives.

2.1.10. Issue: Estimated Capacity and Feasibility of Location of Required Dams

Estimated capacities and approximate location of the planned dams that will be required for the various sites, have not been provided in the EIS. Such details are necessary to properly assess and mitigate the potential environmental hazards under various scenarios of failure for those dams.

At page 20 of Volume 2 Chapter 11, it is stated that facilities including some dams may be subject to flooding at ARI 10. This is an unacceptable standard of flood immunity for facilities that may be critical to operations and avoiding environmental harm. There appears to be no discussion of the issue of erosion protection in the EIS. In short, the

current details provided in the EIS do not allow for adequate consideration of potential environmental harm or appropriate mitigation.

Recommendation

The supplementary documentation should provide maps and text setting out the locations and basic capacities of proposed test and production wells and dams, such as are known, that are likely to be regulated, within the context of contours at suitable scale, environmental features and facilities on various sites. It should also provide the site selection criteria (based on flood levels, agriculture, ecosystems etc) that will be used to locate dams in the future phases of the development.

The supplementary documentation should describe the basic methods that will be used to mitigate the potential environmental hazards under various scenarios of failure for those dams.

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2.2. AQUATIC ECOLOGY

2.2.1. Issue: Aquatic Ecology and Water Quality Impact Assessment (Volume 5 Attachment 17 Section 1.3)

Section 1.3 (Volume 5; Attachment 17) indicates that the full scope of the proposed development and potential impacts were not known at the time of assessment. The present assessment in the EIS is for the planning phase of the project. This places a significant limitation on the validity of the assessments that have been undertaken and demands that the proposal be reassessed in more detail when the final scope of the proposal is available. The environmental impact statement released for public comment and review is inadequate to assess the impacts of the final proposal.

Recommendation

The supplementary documentation should revise the impact assessment to fully reflect the final proposed development and provide supporting information (including detailed modelling) necessary to analyse the project's impact on the aquatic ecology of the region.

2.2.2. Issue: Data acceptance (Volume 5 Attachment 17 Section 3.4.2)

The proponent has not detailed which data passed/failed the quality control procedures of the standardised AusRivAS methodology that was applied in the APLNG assessment. The proponent has provided detailed criteria for the acceptance or rejection of water quality data. A similar process should be undertaken for the analysis and interpretation of macroinvertebrate data which is considered a critical aspect of QA/QC for the acceptance or rejection of data.

Recommendation

A similar process to that undertaken for water quality data should be undertaken for the analysis and interpretation of macroinvertebrate data which is considered a critical aspect of QA/QC for the acceptance or rejection of data.

2.2.3. Issue: Interpretation of Macroinvertebrate data (Volume 5 Attachment 17)

The interpretation of macroinvertebrate data is preliminary and has not been undertaken in a manner that adequately describes the current ecological condition of the waterways in the project area nor the assessment of potential impacts related to the proposed development. It is noted that, "Taxa richness ranged between 13 and 35 **species** at each site sampled, with four sites registering three or more PET taxa." The AusRivAS protocol normally only requires that Order or Family level identification of macroinvertebrates be performed. Were these "species" in fact Families?

The models and predictive variables used in the analysis of macroinvertebrate data should be detailed. Group membership of each site should also be contained in the supporting information to allow for transparent interpretation of the data analysis processes undertaken.

Recommendation

A detailed interpretation of the macroinvertebrate community data (with an accurate taxonomical identification) should be provided particularly relating the existing land use, water quality, and habitat data reported in the EIS to the observed invertebrate community. The validity of the models applied should be assessed and detailed by the proponent, particularly given the extended dry period experienced across the region prior to the assessment being undertaken.

2.2.4. Issue: Criteria for determining consequence (Volume 5 Attachment 17 Table 3-4 & Volume 5 Attachment 18 Table 3-4)

The criteria for determining consequence are not considered appropriate.

Recommendation

The consequence classification of 'catastrophic', 'critical' and 'major' should be grouped to represent a single classification defined in a manner consistent with that presently outlined for the classification of 'Critical'.

'Serious' and 'Moderate' should be pooled and contained in the single classification of 'Major'.

'Minor' and 'Moderate' should be pooled to form the classification of 'Serious'.

A new classification for 'Minor' should be redefined representing very minor short term impacts only.

The risk assessment should be reapplied to all Sections of the EIS as they relate to potential impacts to the aquatic ecology of the region and proposed mitigations revised to reflect the residual risks.

2.2.5. Issue: Border Rivers catchment (Volume 5 Attachment 17)

No aquatic fauna and water quality survey data is provided for the Border Rivers catchment. Important wetlands occur within the study area and detailed assessment of these sites would greatly assist the assessment of potential impacts resulting from the proposed development. The lack of data and absence of referenced literature used to describe the existing environment and assess potential impacts impedes DERM's assessment of the nature and extent of any potential impacts.

Recommendation

The proponent should provide a thorough and detailed assessment of the aquatic ecology, water quality and geomorphology of the Border Rivers catchment that is supported by robust survey data and reference literature.

2.2.6. Issue: Comments on biomass of fish (Volume 5 Attachment 17 Section 4.2.1)

Comments relating to the biomass of fish at sites are not supported by data contained in the EIS.

Recommendation

Provide supporting survey data used to describe the ecological condition of streams including fish assemblage structure within the project area.

2.2.7. Issue: Site selection (Volume 5 Attachment 17)

The inclusion of 'reference' sites in the assessment appears confusing and the proponent has indicated that some sites are of limited relevance to the assessment process. Site selection should be undertaken within clearly defined objectives in order to collect data which allow a comprehensive description of the existing environment and assessment of potential impacts of the Project.

It is noted that reference is made to survey locations which could not be accessed because the landholder would not provide permission to access private property.

Recommendation

The supplementary documentation should more clearly define the objectives of the aquatic ecological surveys and ensure that reference sites are selected and sampled in order to establish both the baseline conditions that exist within a representative sample of the study area and monitoring any potential future impacts associated with the development and operation of the entire LNG collection and distribution system. Where the 'reference' sites are intended to form part of a baseline assessment within the framework of an ongoing monitoring program, this should be clearly stated and the selection of sites justified within the context of specific objectives.

Reference to sites that were not assessed in the present study should be removed and alternative sites with similar characteristics selected and assessed to ensure that adequate areas are sampled to establish baseline condition across the range of strata/habitats that exist across the study area.

2.2.8. Issue: Species review (Volume 5 Attachment 17, Table 4-6)

The review of species contained in the 'significant' species table is limited.

Recommendation

Table 4-6 (Volume 5; Attachment 17) should be expanded to include all species within the project area and a more extensive review of species sensitivity, threatening processes and existing management plans to support these communities.

2.2.9. Issue: Macroinvertebrate community data (Volume 5 Attachment 17, Section 4.3.1)

A more detailed interpretation of the macroinvertebrate community data would be advantageous to the overall assessment of existing condition of wetlands in the study area.

Recommendation

The description of the macroinvertebrate communities as contained in Section 4.3.1 would benefit from a detailed description of the tolerances of all taxa observed and taxa predicted to occur though not observed at each site.

2.2.10. Issue: Mitigation of impacts on Murray Cod (Volume 5 Attachment 17, sections 5.4.1 & section 6.1)

It is inappropriate to consider that the residual risk to Murray Cod (listed as vulnerable under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999, the EPBC Act*) or any other species, as a result of the proposed activity is mitigated in any way by existing artificial population maintenance through stocking. The use of the term 'noteworthy' species within the context of assessing the potential environmental impact of the proposed APLNG project is contrived.

Recommendation:

The supplementary documentation should provide a detailed review of the scientific literature to inform assessment of potential impacts to the aquatic ecology of the region, not just limited to Murray Cod.

2.2.11. Issue: Aquatic ecology survey locations (Volume 5 Attachment 17, Figures 2-1& 2-2)

The imagery of the aquatic ecology survey locations is of poor quality and impedes reasonable assessment of the EIS. The proponent has not provided detailed location information of the proposed pipeline alignment within the gas fields including the high pressure network. This impedes the identification and assessment of impacts not reported by the proponent in the EIS and prevents a reasonable assessment of proposed developments.

Recommendation

Location data should be provided to the Department in (GDA94) decimal degrees. Shape files or similar data that provide accurate location of all proposed infrastructure should be provided to the Department and include, though not be limited to, well heads, roads, high pressure and gas collection delivery pipelines, water delivery pipelines; water treatment facilities; proposed associated water discharge locations; aquatic ecology survey locations and proposed aquatic ecology construction and operation monitoring locations. Detailed high resolution images and provision of shape files should be provided for the Department to assist in the assessment of impacts. Data should identify all proposed infrastructure crossing of waterways including roads, gas pipeline and water pipelines.

2.2.12. Issue: Lack of detailed surface water monitoring program, Volume 2, Chapter 11

There is inadequate detail in establishing a suitable surface water monitoring program. Nowhere in the EIS is there a detailed surface water monitoring program. DERM guidelines provide guidance on the design and content of surface water monitoring programs.

Recommendation:

The supplementary documentation should propose a surface water monitoring program to be developed, installed and maintained by personnel possessing appropriate qualifications and experience in the fields of hydrology and surface water monitoring. The Surface Water Monitoring program must be able to detect any significant risks and changes to surface water quality and flows due to activities occurring as a result of this project. The program must include but not be limited to:

- records kept of planned and unplanned releases to watercourses;
- locations of monitoring points, parameters to be measured, frequency of monitoring, procedures for event monitoring, monitoring methodology used, and trigger values;
- procedures to establish background surface water quality;
- a rationale containing details on the program purpose, program conceptualisation and verification of assumptions; and
- reporting and auditing procedures.

2.3. GROUNDWATER MANAGEMENT

2.3.1. Issue: The need to ensure the management of groundwater is sustainable

It is noted that up to 10,000 wells (maximum of 600 per year) will be drilled, with an average well spacing of 750m.

The groundwater modelling and impact identification sections of the EIS are in general comprehensive. However, there are several matters to do with the modelling, identification of environmental values and the mitigation of impacts that require greater clarity in the supplementary documentation. For instance, the Terms of Reference required the identification of all types of groundwater dependent ecosystems (GDE) occurring in the project area or potentially impacted by project activities. In this regard the GAB Resource Operations Plan establishes a register of springs which support significant environmental and cultural values in the GAB plan area. The EIS omits reference to this springs register. Because not all environmental assets are identified, it follows that impact identification is incomplete and mitigation is likely to be inadequate.

The EIS also mentions that injection of associated water is being investigated. In general the management of CSG water, including injection, must be in accordance with the guideline on preparing an environmental management plan for coal seam gas activities. These guidelines require, *inter alia*, that water for injection (or re-injection to the same aquifer) must be undertaken where this is unlikely to have a detrimental impact on the identified environmental values and water quality objectives of the waters in the target formation and surrounding environment. Any proposal to re-inject poorer quality water during or at the end of the operational phase of the gas field would need to be supported by a quantitative risk assessment.

The focus on adaptability of the proposed monitoring program is acknowledged. However, it is important to note that based on the projected groundwater level drawdown the currently proposed monitoring network is considered inadequate, particularly in the Gilbert Gully development area, where there are no Walloon Coal Measures monitoring bores. Additional monitoring sites should be established to ensure appropriate baseline data is available in all areas.

The proponent should develop a Groundwater Monitoring program that is submitted for review and approval prior to the approval of the project. It will need to be integrated with other relevant monitoring programs. The Groundwater Monitoring program must be able to detect any significant risks and changes to groundwater quality and pressure heads due to activities occurring as a result of this project. The results of the monitoring should be made available to stakeholders.

Recommendation

- Provide a groundwater model that includes all the aquifers potentially affected, both directly and indirectly, by extraction of groundwater from the Walloon coal measures by the project and neighbouring operations to the extent information regarding neighbouring operations is available.
- Provide a detailed monitoring strategy that provides objectives and rationale for how potential impacts on groundwater values will be identified including linkages with the hydrogeological conceptualisation, model validation, trigger points and

actions that will be taken to avoid or minimise the impacts. Both the modelling and monitoring work will need to be developed in an integrated way with the upcoming work of the Queensland Water Commission in these matters. It is important to commence collecting baseline data including a comprehensive inventory of bores and of water levels in advance of the full the implementation of the new regime (preferably 12 months in advance where practicable).

- Provide a clearer conceptualisation of the hydrogeological linkage between the coal seams and the Condamine River Alluvium, and a quantitative assessment of the expected impact of CSG extraction activities on the alluvium.
- Advise how the potential gas leakage from production wells, should it occur, is to be mitigated.
- The supplementary documentation should define “make good” intentions and other measures to redress impacts where supplies to agricultural and potable water supplies would be affected. Recently announced legislative amendments propose to relocate the “make good” provisions from the Petroleum and Gas Act to the Water Act and to expand them. The expansion will provide for the Queensland Water Commission to carry out monitoring modelling and management in areas where the impacts of CSG operations overlap. As APLNG is aware, ‘Trigger thresholds’ for ‘make good’ provisions concerning falls in water level caused by CSG operations have been announced. In the event that significant impacts on these groundwater resources become evident, what measures will the proponent take to investigate, mitigate and reverse these impacts?
- It will be important for APLNG to enter into discussions with the QWC about transitioning the implementation of groundwater modelling, groundwater monitoring and the management of the ‘make good’ provisions.
- Enhance the discussion and listing of the environmental values of groundwater and groundwater dependent ecosystems. Provide stronger support for the assertion that there would be a low risk of impacts on springs.
- A trigger threshold of 0.2m has also been set for drawdown in springs. The supplementary documentation should define “make good” intentions and other measures to redress impacts where GAB springs are significantly impacted. Mapping showing the projected drawdown of 0.2m in relation to GAB springs should also be provided.

2.3.2. Issue: Projected Groundwater Level Drawdown (Volume 2, Chapter 10, Section 10.4.1 & Volume 5 Attachment 21, Section 6.2.2)

From these sections, the projected drawdown on the Walloon Coal Measures is not clear. Volume 2, Section 10, Figure 10.11 illustrates the areas of the Walloon Coal Measures where a drawdown of greater than 5m (the trigger level) is projected. However, no general discussion of the actual magnitude of drawdown in the Walloon Coal Measures (such as that provided for the overlying and underlying aquifers) could be found in the EIS.

Recommendation

The supplementary documentation should provide modelling information on groundwater drawdown over the life of the gas fields development and operation phases. A useful way to present this information would be to graph cumulative water level drawdown year by year for each gas field.

2.3.3. Issue: Groundwater Quality Impact (Volume 2, Chapter 10, Section 10.4.1 & Volume 5 Attachment 21, Section 6.2.4)

The EIS states that groundwater quality is unlikely to be affected due to depressurizing the Walloon Coal Measures and the subsequent transmission of groundwater from the overlying and underlying aquifers to the Walloon Coal Measures.

It is considered likely that while the water that remains in the overlying and underlying aquifers may not experience a change in water quality, the water that moves into the Walloon Coal Measures is likely to reduce in quality. This likely reduction in water quality will be caused by the transmitted groundwater from overlying and underlying aquifers interacting with and taking on the properties of Walloon Coal Measures aquifer material, which has been acknowledged as being of lower quality than the source aquifers.

Recommendation

That the supplementary documentation discuss:

- the likely extent to which groundwater from overlying and underlying aquifers might enter the Walloon Coal measures and the adverse water quality implications of this; and,
- any short-term and long-term mitigation measures intended if the development is shown to impact on groundwater water quality.

2.3.4. Issue: Groundwater use during construction and operation (Volume 5 Attachment 21, Section 6.4.2)

Table 6.5 in this section provides some breakdown of what groundwater is anticipated to be required during the construction and operation phases of the project. This table however does not provide an estimated total supply figure or identify over what time period this water will be required.

Recommendation

Undertake an assessment of groundwater requirements for the construction and operational phases of the Project and provide this information in the supplementary documentation.

2.4. SOILS MANAGEMENT

2.4.1. Issue: Inadequate soils mapping (Vol 2, Ch 5, Sect. 1.3.3, Soils, pp 5-11 —also Vol 5, Ch 5, Sect 2.3.2, Field Investigations, p9 refers)

The methodology for soils investigations is described in the Vol 5 Ch 5 Attachment (Geology, Topography, Geomorphology and Soils Assessment—Gas fields). This report provides data on 39 observation locations, selected on the basis of being “... *in proximity to proposed significant infrastructure sites initially selected by Australia-Pacific LNG.*” The data from these sites was correlated with reports provided by DERM for the Land Resource Area (LRA) mapping for the Roma, Chinchilla, Murilla, Tara, Wandoan, and Central Downs areas. It should be noted that LRA mapping is at a broad scale, and any one LRA may include several different soil types.

As the site selection for the observed soils was based on specific criteria for possible significant infrastructure, it is likely that they are not representative of all soils that may be impacted by the proposed gas field developments. Of particular concern is that the location of gas wells with associated access and gas/water pipelines can be located on soils in landscapes not similar to those identified for significant infrastructure sites.

To properly identify agricultural land of good quality and potential risks of resource degradation more detailed soil and geotechnical investigations should be undertaken at a scale of 1:10 000 to accurately identify and map those soil types that were recognised at the broad-scale land systems mapping as high risk soils. There should be a particular focus on Class A cropping lands. Detailed analysis should then be made of representative soils within the study area including analysis of incremental horizons at least to the depth of expected interference or trenching.

More detailed soil mapping will have benefits in locating access and pipeline corridors in low risk soils and designing necessary mitigation measures, as well as more clearly mapping suitable cropping lands. Such mapping will also benefit selection of land that may be used for beneficial use of treated associated CSG water.

Recommendation

Soils within the Project should be described and mapped at a scale of 1:10 000 where infrastructure or earthworks are to be installed. An assessment should be made of the agricultural land suitability of identified soils, using the *Guidelines for agricultural land evaluation in Queensland* (Land Resources Branch 1990). There should be a particular focus on Class A cropping lands. Suitable assessment should provide for soil descriptions for all soil horizons to a depth at least 120cm and include:

- horizon differentiation and depths, field texture, colour, mottles;
- profile depth, stability, permeability, erodibility, drainage, soil structure, rockiness;
- salinity, sodicity, nutrient status, contaminants, pH, electrical conductivity; and
- a measurement of dispersibility.

The area mapped and described should include all areas potentially affected by the Project including associated infrastructure corridors.

2.4.2. Issue: Attachment 6. Geology, Topography, Geomorphology and Soils Assessment – Pipeline 5.2 – Soil field assessment and 5.2.1 – Soil types and occurrence

Soil descriptions provided in Table 1 Appendix B are not in accordance with the Australian Soil and Land Survey Field Handbook (McDonald et al. 1990). Soil samples for laboratory analysis should have been collected in the upper subsoil as well as the lower subsoil in all profiles to allow correct diagnosis of Soil Orders. A review of the soil descriptions in Table 1 and the analytical data in Table 2 Appendix B revealed inaccurate allocation of Soil Orders to some profiles, e.g. S6 and S10 are Sodosols, not Chromosols.

Recommendation

Correct inaccurate descriptions in Table 1 Appendix B. and 5.0 Existing Soils, Table 5.3, Soil group descriptions

2.4.3. Issue: Publicly available land resource data and GQAL digital data not used (Volume 5: Attachment 11: Conics GQAL Discussion Paper – Gas Fields)

This report states that only a limited number of Land Resource data and GQAL mapping datasets are available digitally. This is incorrect. GQAL mapping for the entire region that is the subject of this EIS is available from DERM.

This mapping is also the basis for GQAL mapping in each local government planning scheme. It seems that the EIS unnecessarily completed an exercise to assign GQAL classifications to the subject area. There may be some discrepancy between the GQAL areas calculated in this EIS and existing GQAL mapping held by the department and local governments.

Recommendation:

The proponents/consultants obtain the recognised GQAL digital datasets from DERM and check that the GQAL classifications assigned in the EIS are in agreement with the data used by the department and local governments across the region.

2.4.4. Issue: Soil surveying and mapping (Volume 5, Chapter 5, pg 9)

The report states that a sampling intensity of approximately one location (observation) every 1044ha was considered adequate to represent soils within the study area.

However borehole locations seem to have been determined primarily by where areas were going to be disturbed, not necessarily on delineating the different soils in the area. This section also lumps together a number of different soil types derived from data provided in Land Resource studies. The figures depicting different soils then regroup these soils into different units that are difficult to differentiate by colours/shadings given in the map legends.

Recommendation

Undertake in more detail soils investigation at an appropriate scale and provide detailed soil analysis using sites that are representative of all areas that will be impacted by development of the gas fields.

2.4.5. Issue: Lack of detailed soils monitoring program, Volume 2, Chapter 5

The EIS does not propose a Soil Monitoring Program. The Soil Monitoring program must be able to detect any significant risks and changes to soil quality due to activities occurring as a result of this project. Existing soils monitoring programs, such as that for the Pongamia plantation at Spring Gully, and DERM guidelines provide guidance on the design and content of a soils monitoring program.

Recommendation

Undertake a Soil Monitoring Program designed and conducted by a person/s possessing appropriate qualifications and experience in the fields of soil science and in the design of suitable soil monitoring programs. The program must include but be not limited to:

- locations of monitoring points, parameters to be measured, frequency of monitoring, monitoring methodology used, and trigger values;
- locations of soil monitoring equipment (e.g. tensiometers);
- procedures to establish baseline soil quality;
- a rationale containing details on the program purpose, program conceptualisation and verification of assumptions; and
- Reporting and auditing procedures

2.4.6. Issue: Impacts on Good Quality Agricultural Land, GQAL (Vol 2, Ch 5, Sect. 1.4.3, GQAL, pp 19-20 —also Vol 5, Ch 5, Sect 5.3, p81)

This section recognises that the gas fields development will have an impact on the region's good quality agricultural land (GQAL). The last paragraph of this section (p20) states: *"While it is likely some permanent loss of GQAL will occur, this loss is not considered significant in the regional context."* This statement should be reviewed in relation to the following:

- Inadequate mapping of soils without a clear assessment of GQAL
- No assessment of cumulative impacts from possible associated infrastructure such as powerlines and gas/water pipelines.
- No assessment of cumulative impacts from other similar CSG developments, coal mines, power stations, and their associated infrastructure, including power, road and rail developments.

In February 2010 the Government announced the development of its Policy on Strategic Cropping Land. In advance of the further development and implementation of this policy, investigations should be undertaken to avoid location of infrastructure on land of good agricultural quality. With the flexibility of location and drilling techniques (e.g. pad drilling) for gas wells there should not be a need to locate wells within a cropping area. In irrigation areas, well heads should be located on existing tracks and headlands.

Recommendation

The supplementary documentation should provide an assessment of possible cumulative impacts of all proposed elements of the project on the good quality agricultural land of the region and its agricultural productivity.

2.4.7. Issue: Commitment to pad drilling (Volume 2, Chapter 3, Section 3.2.4: Well site selection and drilling program planning, p15)

The EIS states “In environmentally sensitive locations, the option for drilling multiple wells from a single pad or other innovative technology may be considered if technically feasible“. Other CSG companies have indicated that pad drilling will be technically feasible. Therefore, as pad drilling has the potential to greatly reduce the impact on cropping land and vegetation, APLNG should either commit to its use, or detail the reasons why it cannot be implemented.

Recommendation

APLNG either commit to the use of pad drilling or detail the reasons where and why this technique cannot be implemented for the project.

2.4.8. Issue: Siting of structures requiring substantial earthworks (Vol 2, Ch 5, Sect. 1.5.2, Topography and geomorphology, dot point 4, pp 25-26 —also Volume 5, Attachment 5, Section 7.2, pg 101, 2nd dot point)

This dot point states “Major facilities including, gas plant, water transfer stations, waste treatment facilities, and brine and water storage ponds, should be sited on relatively level sites (where practicable) for ease of landform rehabilitation following gas field completion”.

Recommendation

The supplementary documentation should commit to:

These structures should not be located in areas within the 1:100 yr ARI (average recurrence interval) of flooding and the structures should be designed and located so that they are protected from any potential adverse consequences of regional or local flooding to appropriate AEP standards during operations as specified in relevant regulatory documents; and to the probable maximum flood level following decommissioning and rehabilitation.

2.4.9. Issue: Sodic Soils (Volume 2, Chapter 5, Section 1.5.3: Water diversion, erosion and sediment control, p27)

Exposing sodic subsoils may lead to severe gully erosion; therefore care should be taken during the construction of erosion control measures in areas of sodic soils.

Recommendation

The supplementary documentation should commit to care being taken with the construction of banks to control runoff in sodic soil areas. Alternative construction methods may be required and should be considered to avoid exposing sodic subsoils.

2.4.10. Issue: Diversion/concentration of flows on flood plains (Vol 2, Ch 5, Sect. 1.5.3, Soils, Water diversion, erosion and sediment control, pp 27-28; Table 5.8 Summary, pp33–41)

Care is required when locating access tracks, pipeline corridors and runoff control structures on floodplains. Such works and measures may divert and/or concentrate flood flows resulting in erosion.

Recommendation

Any infrastructure works on floodplains (including access tracks and roads, gas wells, pipelines, contour banks, sediment control structures) should be designed and located so as not to result in unacceptable increases in upstream flood levels; and so as not to concentrate or divert flood flows that may result in erosion or damage to lands and infrastructure, whether on-site or not.

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2.5. AIR QUALITY

Air Quality Impact Assessment of Gas Fields (Katestone Report)

2.5.1. Issue: Concentration values are not referenced to the oxygen levels

Exhaust gas concentration values are provided in Tables 9, 11 and 13 of the Katestone Report. These concentration values are not referred to any oxygen reference levels. This information is important for the licence conditions and for comparison against the best practice source emission standards.

Recommendation:

Specify the O₂ reference level of concentration values of all major emission sources provided in Tables 9, 11 and 13.

2.5.2. Issue: High ground level nitrogen dioxide concentration is predicted at few locations

The predicted maximum incremental and cumulative ground level concentration (GLC) of criteria air pollutants are presented in Tables 38 and 42. The maximum predicted nitrogen dioxide concentration under normal and abnormal operating conditions is reported as 241.2 µg/m³. This is about 96.5 percent of the EPP (Air) quality objectives. In addition to this, Figure 37 indicates that maximum nitrogen dioxide concentration exceeded the EPP (Air) air quality objectives at three locations in the Undulla Nose area. The explanation for such very high GLCs and their proximity to the sensitive receptors is not provided in the EIS.

Recommendation:

Specify the reason why very high nitrogen dioxide concentrations are estimated at some locations and describe the mitigation control measures to minimise the NO_x emissions.

2.5.3. Issue: The concentration contours are not readable

The concentration contours and their levels provided in Figures 22 to 37 are not very clear. In some figures it is hard to read the contour levels.

Recommendation:

Redraw the concentration contours and their levels given in Figures 22 to 37.

2.5.4. Issue: Odour emissions from the gas wells

It is expected that small quantities of gas will be released even at the initial stages of well dewatering (see Section 4.3.1 Katestone Reprt). It is not clear that the sources such as the initial stages well dewatering, gas dehydration and the groundwater storage and treatment facilities will be responsible for the generation of odour nuisance in the area, as some of these facilities may be located close to the sensitive receptors. Also not clear if any H₂S gas testing results are available now.

Recommendation:

Clarify the fate of odour generated from the gas well dewatering, gas dehydration and the groundwater storage and treatment facilities.

2.6. OTHER ISSUES

2.6.1. Issue: Potential environmental impacts in the SWOT (Vol 5 Attachment 24)

The EIS identifies timeliness to negotiate with the regulator, and commercial demands to develop infrastructure for the disposal of CSG water as a threat. It is noted that the SWOT places little emphasis on the management of potential environmental impacts – in particular of the options for disposal of CSG water which should be the primary consideration of the assessment of environmental impact for which this document has been compiled.

Recommendation

The Proponent to provide sufficient detail with the support of their own research/scientific literature to demonstrate the capacity of wetlands (including streams) in the region to receive CSG water without adverse impact to ecological function and processes. This detail should be used to facilitate an informed assessment of the potential impacts resulting from the options for disposal of CSG water.

2.6.2. Issue: No definitive option for final salt disposal (Vol 2, Ch 3, Sect 3.2.8: Process description, p28)

The EIS states that final salt disposal options are still under investigation. Approval from DERM will be required for any brine management and disposal strategy.

If encapsulation of salt is the preferred option, details will have to be provided to show how the integrity of the storage site will be managed to prevent leakage. A contingency plan addressing what actions will be implemented, if there is seepage from the site, is required. Monitoring of the surrounding groundwater and soils will be a requirement of any approval and should continue for a minimum period of 10 years after the completion, filling and sealing of any storages. Any such sites should be located on stable landscapes and not alienate Good Quality Agricultural Land (GQAL).

Should the brine management and disposal strategy involve the construction of secure landfills, the landfills should be located in geomorphically and hydrogeologically stable locations that will not impact on GQAL or on other natural resources. Brine ponds will need to be constructed and lined to prevent leakage and located at least one kilometre from mapped water courses. The landfills should not be located in areas with a 1:100 yr ARI (average recurrence interval) of flooding and the landfills should be designed and located so that they are protected from any potential adverse consequences of regional or local flooding to the probable maximum flood level.

A monitoring program of the surrounding groundwater and soils and should be implemented and continue for a minimum period of 10 years after final use of these works/measures.

Recommendation

The supplementary documentation should clarify the proposed final salt disposal option.

A contingency plan addressing what actions will be implemented, if there is seepage from the site, is required. If encapsulation of salts or the use of landfills is the proposed

approach a monitoring program of the surrounding groundwater and soils and should be implemented and continue for a minimum period of 10 years after final use of these works/measures.

The supplementary documentation should also provide details of the proposed location of brine storage ponds for the project where these are known and the site selection criteria (based on flood levels, agriculture, ecosystems etc) that will be used to locate ponds in the future phases of the development. Also the criteria to be used to determine when a brine pond is full and suitable for encapsulation

It is noted that 'small amounts of brine may be blended for reprocessing through the RO plant'. The supplementary documentation should advise which of the potential six WTFs is to include brine ponds as part of the water treatment facility.

All management options for brine and salt should be considered in accordance with the State's 'Guidelines on Preparing an Environmental Management Plan for CSG Activities'. Volume 5 Attachment 17, Table 5-3 identifies the risk of brine pond overflow to be medium. Additional mitigations should be identified and outlined in detail within the supplementary documentation to demonstrate how the residual level of risk of contamination from brine pond overflow can be reduced to 'low'.

The supplementary documentation should propose a detailed Groundwater Monitoring program including details of proposed monitoring for shallow groundwater systems and soils adjacent to water containment ponds, brine ponds and brine encapsulation areas.

The elements for this program to include, but not be limited to:

- locations of monitoring points;
- parameters to be measured;
- frequency of monitoring;
- monitoring methodology used;
- trigger values;
- procedures to establish background groundwater quality; and
- a commitment to on-going monitoring for a minimum period of 10 years after decommissioning of any associated water or brine storage facilities.

The program should detail what issues will be specifically addressed at each monitoring site, the reasoning behind all site selections including reference sites and include a rationale containing details on the program purpose, program conceptualisation and verification of assumptions. This program is likely to be subject to review and approval by the relevant agencies prior to the approval of the project.

2.6.3. Issue: Use of low quality water for dust control on roads (Volume 2, Ch 3, Section 3.3.4: Water, Table 3.5, p38)

The EIS identifies that low quality CSG water will be used for dust suppression. Depending on the water chemistry of the associated water and the chemistry of both the road construction materials and local soils, there is potential for increased erosion, particularly of table drains and cross drainage from the use of associated water. A monitoring program is required, with more intensive monitoring targeted to areas where solodic soils occur and solodic materials have been used for road base.

Recommendation

The supplementary documentation should discuss the provisions of the recently published DERM beneficial use guidelines in relation to the use of CSG water for dust suppression. A commitment to accord with the minimum standards will be required.

2.6.4. Issue: Potential impacts of drilling waste (Volume 5 Attachment 17, Table 5-1)

The potential impacts of drilling waste and hydrostatic test water release are not suitably mitigated.

Recommendation

The proponent should review existing State guideline for the containment and disposal of drilling and hydrostatic test water wastes. The EMP should be updated to reflect this guideline.

2.6.5. Issue: Innovation and environmental design Volume 2, Ch. 3 Section 3.1.3

It is noted that to help minimise possible adverse environmental impacts, several innovative approaches are under further investigation. It is desirable that the Supplementary documentation discuss progress with the further investigation of these designs.

Recommendations

The supplementary documentation should:

- Provide details of 'reduced lease sizes', what is included in the description of a lease and for the various drilling stages and what are the corresponding areas of disturbance.
- Provide details of the availability and proposed frequency of use of the 'alternative drilling rigs'.
- Provide further details on aquifer injection possibilities (with due regard to current and future use of the aquifers).
- Provide details of what options are proposed to reduce noise whilst drilling.
- Regarding the use of micro-turbines, what percentage of wellhead compressors will involve the use of this equipment? Is APLNG proposing to use this equipment throughout the EIS project, if not what are the selection criteria for equipment location?
- Regarding the chemicals used in gas processing facility, the supplementary documentation should clarify the amount of chemicals to be stored is the maximum amount at any one time.

2.6.6. Issue: Fraccing, Volume 2, Chapter 3, Section 3.2.4

It is understood that biocides, corrosion inhibitors and other chemicals are used in drilling, completions and stimulation operations.

Recommendations

The supplementary documentation should provide:

- a complete inventory of biocides, corrosion inhibitors and other chemicals used in drilling, completions and stimulation operations;
- details of toxicity study data for each active ingredient and the any mixture toxicity information;

- advice on where, when and how often fracing is to be undertaken and the potential environmental impact of fracing;
- a risk assessment demonstrating that fracturing activities will not result in environmental harm to the receiving environment (based on a mass balance demonstrating what concentrations and absolute masses of chemicals will be left *in situ* subsequent to fracturing and include the results of any previous fracing fluid monitoring undertaken); and
- a long term monitoring program of fracturing fluid chemical concentrations in water produced from wells that have been fractured.

2.6.7. Issue: Volume 2, Chapter 24 EM Plan, Section 24.15.3 – Noise and Vibration
Re; Drilling, paragraph 1– The proponent should consult potentially affected residents (sensitive receptor) prior to commencing drilling. Recommend a risk assessment approach.

Recommendation

The supplementary documentation should provide information on noise monitoring and modelling of fracing and cavitation activities and advise of proposed mitigation measures to be taken in the event these cause a nuisance.

3.0. THE GAS PIPELINE

3.1. Issue: Co-location Opportunities (Volume 3, Chapter 3, Section 3.2.2: Pipeline Co-location, p14)

The alignment of the proposed pipeline needs to be reconsidered. While mention is made of project liaison with similar project alignments in the area, comparison of the proposed pipeline route for this project and other existing and proposed road, pipeline and power line alignments, it appears that the proposed route for the pipeline could be improved significantly to minimise clearing of vegetation and disturbance of land and soils. This may also reduce the overall cost of clearing for the pipeline and access tracks and other associated infrastructure.

APLNG and Arrow's decision to co-locate their two pipeline routes for approximate 120km is supported. However, GIS data suggests there are further opportunities for co-location along the majority of the route with the Surat Gladstone Pipeline (SGP) and the Queensland Curtis LNG project.

Recommendation

Prior to approval being given for the project, discussions should be held between the Department of Infrastructure and Planning, Department of Employment, Economic Development and Innovation and all the LNG proponents to ensure that gas pipelines are co-located wherever possible in common easements to minimise impacts on natural resources, the environment and existing land uses.

3.2. Issue: Clarification of the location of the QCLNG Pipeline (Volume 1, Chapter 5, Figure 5.1, p9)

The location of the QCLNG pipeline is unclear from Figure 5.1. It appears to be co-located with the GLNG pipeline however the Queensland Curtis LNG EIS identified that the export pipeline was in a similar location to the Surat Gladstone pipeline and the proposed APLNG pipeline. All current and proposed pipeline routes should be accurately identified. This may allow opportunities for co-location to minimise impacts on property management, and land, water and vegetation resources.

Recommendation

Clarify the location of the QCLNG pipeline on Figure 5.1.

3.3. Issue: Impacts of proposed pipeline on corridors of State significance (Volume 3 Chapter 8, p32)

The impacts of proposed pipeline on corridors of State significance have not been dealt with in sufficient detail. Figure 8.3, page 32 shows that the proposed pipeline crosses over, or intersects with, four corridors of State significance.

Recommendation

Describe in more detail the impact of the pipeline development on corridors of State significance and the proposed mitigation measures to minimise the impacts.

3.4. Issue: Subsidence (Volume 3, Section 3.13: Decommissioning and Rehabilitation, p59)

One of the proposed options for decommissioning is to abandon the pipeline and leave it to corrode in-situ. Given the proposed pipeline is to have a diameter of 1066mm there is the potential for ground subsidence and consequent flow concentration and erosion.

Recommendation:

The supplementary documentation should address the risks associated with the decommissioning phase of the pipelines including the potential for subsidence impacts following abandonment in situ. The EIS should provide strategies to address potential issues of subsidence impacts in sensitive environmental areas and on GQAL along the proposed pipeline routes.

3.5. Issue: Lay-downs and camps (Volume 3 Chapter 8)

More detail needs to be included in the EIS concerning the construction and location of any lay-down areas and temporary camps during construction of the pipeline.

Recommendation

Where lay-downs and camps are established during construction of the pipeline, these facilities are not to be constructed in remnant vegetation and should be kept to the minimum size practicable. Wherever possible, vehicle access should be along existing roads and tracks. Where new access tracks are required, they should be positioned and designed to have minimal impact on vegetation, soils, water courses and existing farming operations.

3.6. Issue: Saline seepages (Volume 3, Section 3.4.9: Trenching, p29)

The last dot point on this page refers to a possible need for dewatering a trench due to rainfall. It should also be noted that trenching may intersect shallow saline seepages that will require dewatering and safe disposal of the saline material.

Recommendation:

The supplementary documentation should acknowledge that pipeline trenching may intersect saline seepages. Where trench dewatering is required then water quality analysis should be carried out prior to disposing the water to the land surface. The proponent should define measures that will allow safe disposal of such seepage water based on water quality analysis.

3.7. Issue: Protocols in relation to length and time of trenches or excavations left open (Volume 3, Chapter 8 p52)

The following is noted:

“Trenching will occur progressively to minimise the period of time the trench is open and the length of open trench. The length of open trench at any one time will be the minimum practicable”; and,

“trenches should be backfilled as soon after operations as possible to minimise the length and time trenches are left open, etc.”

Protection to minimise risks of fauna falling into trenches at night should also be considered.

Recommendation

Expand the commitment to include the following:

"Where practicable, trenches or any excavations should be backfilled as soon after operations as possible to minimise the length and time trenches are left open, especially overnight, so preventing fauna from falling into the trenches. Unfilled trenches will be inspected each morning prior to operations commencing and trapped fauna will be retrieved and relocated to suitable habitat".

3.8. Issue: Major water resource infrastructure (Volume 5 Attachment 17 Section 2.2.2)

The failure to identify major water resource infrastructure within the Dawson River Catchment indicates inherent undefined limitations in the assessment of impacts.

Recommendation

Existing major infrastructure and proposed developments within the Dawson River catchment should be identified and contained in the assessment of potential impact on the aquatic ecology of the region. Where appropriate, these should be assessed as part of the cumulative impact on the aquatic ecology of the Dawson River catchment.

3.9. Issue: Land use and planning; Land tenure, Volume 3.

The proposed pipeline corridor crosses RA18 Proposed Castlehope Dam Site as identified under the *Mineral Resources Act 1989*.

The Central Queensland Regional Water Supply Strategy (CQRWSS) does not include Castlehope Dam as a preferred option to meet the short term needs (10 to 15 years) identified in the Strategy. This does not preclude it from being developed some time in the future.

The Queensland Water Plan 2005-2010 identifies that Queensland has relatively few future storage sites with development potential, these sites are to be protected to ensure their availability should they be needed. At this time, DERM is of the view that the Castlehope Dam storage site must be protected from irreversible loss and planning for development projects will need to consider the future establishment of a Dam at this site.

Recommendation

As the proposed pipeline corridor crosses the Castlehope Dam restricted area, it is advised that future planning for the project needs to consider the possibility of the site being given development priority in a future revision of the CQRWSS.

3.10. Issue: Geology, Topography, Geomorphology and Soils Assessment – Pipeline 5.1 – Soil desktop assessment, 5.1.1 – Soil types and occurrence, Attachment 6.

The thickness of the surface layer in the texture contrast soils should be referred to as thin, moderately thick, and very thick in line with the Family criteria in the Australian Soil Classification and as shown in Table 5.4 Topsoil thickness classification, rather than shallow, moderately deep or deep, which are descriptions for depth.

The texture contrast soils with a sodic subsoil (Sodosols) are potentially dispersible and erodible if disturbed, and should be mapped separately from the non-sodic texture contrast soils (Chromosols). The characteristics and management required for the

Sodosols are discussed in details in this section and in Section 5.2.3 Sodic soils and dispersion, however their distribution is not shown in Figures 5.1a to 5.1f.

It is almost impossible to accurately distinguish between 42 different pastel colours and patterns.

Recommendation

Correctly describe soils in Table 5.2 Study area soils according to the Australian Soil Classification.

The distribution of soil types 2bi, 2bii, 2ci and 2cii should be shown separately in Figures 5.1a to 5.1f. There should be correlation of the mapping of these potentially erodible soils with the mapping of Study area erosion hazard in Figures 5.2a to 5.2f.

The soil units should be coded 1a, 1b, etc on the map.

3.11. Issue: Geology, Topography, Geomorphology and Soils Assessment – Pipeline 5.3 – Agricultural land capability, Attachment 6

The Agricultural Class Land status (or GQAL classification) of the land systems shown in Table 5.1 Study area land systems is incorrect in some instances and this is also reflected in incorrect mapping of the agricultural land classes and good quality agricultural land in figures 5.3a to 5.3c. For example, Hillmore land systems is ALC C3, not A, Conloi is C2, not B, Gelobera is C3, not C1.

An assessment of the Agricultural Land Class of each polygon for each land system was undertaken by DERM and this information was used in the Good Quality Agricultural Land maps in the Local Authority strategic plans. The Agricultural Land Classes (and Good Quality Agricultural Land shown in Figures 5.3a to 5.3c) should reflect the same data shown in the strategic plans for the local authorities. If there is variance with this data, an explanation should be provided.

Recommendation

Correct the Agricultural Class Land status (or GQAL classification) of the land systems shown in Table 5.1 Study area land systems and in Figures 5.3a to 5.3c Study area Good Quality Agricultural Land.

Update the data in Table 5.18 GQAL area occupied by gas pipeline construction/operation and other relevant comments.

3.12. Issue: Attachment 6, Geology, Topography, Geomorphology and Soils Assessment – Pipeline 7.3.2 – Topsoil and Subsoil Management

The Executive Summary Section 4.0 Impact assessment includes the following: “Proposed rehabilitation measures in GQAL areas ----- will include reinstatement of the original landform and soil profile to minimise productivity losses and maintain cropping efficiency.”

If successful rehabilitation is to be undertaken where the pipelines passes through Class A and B cropping land, and the original soil profile is to be reinstated, the upper layers of suitable subsoil should also be stripped and stockpiled, separate to the topsoil and deeper subsoil. For the soil in Class A and B land to be rehabilitated so it can be cropped efficiently with minimum productivity losses following pipeline construction, an equivalent rooting depth into suitable soil similar to that prior to disturbance is required. Depending on the soil type, the rooting depth down to deeper potential sodic or saline layers will vary, but will generally exceed 0.6 m. As an example for a deep cracking clay

with low subsoil sodicity and salinity, 0.1-0.3 m of topsoil and 0.5-0.75 m of suitable upper subsoil placed separately over the backfilled lower subsoil material, which may be sodic or saline, should provide a suitable profile for cropping. During backfilling, successive layers should be pressed firm but not compacted.

The amount of surplus excavated subsoil material is likely to be large, in the order of 350,000 m³, considering the soil displaced by the pipeline of diameters ranging from 762 mm up to 1067 mm over a length of 430 km. There will be even more surplus excavated material if 15,000 m³ of padding material is brought in. The disposal and rehabilitation of this material needs to be further considered as in most cases it will not be suitable material for immediate rehabilitation without a suitable topsoil cover. Being subsoil material, it is likely to be clay which could be strongly alkaline and sodic, or strongly acid with high aluminium levels, and/or saline and therefore difficult to rehabilitate.

Recommendation

Detail proposals for reinstatement of the original landform and soil profile as outlined in the Executive Summary Section 4.0 Impact assessment. This should include stripping and stockpiling separately the upper layers of subsoil as well as the topsoil in Class A and Class B lands.

Provide further information about and strategies for the disposal and rehabilitation of surplus excavated subsoil material.

3.13. Issue: Volume 2, Chapter 3, Section 3.3.3 – Ramp-up gas

It is understood that ramp-up gas for the LNG Plant is to be sent to the Darling Downs Power Station (DDPS).

Recommendation

The supplementary documentation should explain how gas will be provided to the DDPS when the ramp-up gas is diverted to the LNG plant.

4.0. THE LNG PLANT ON CURTIS ISLAND

4.1. Issue: The Narrows pipeline crossing

There is insufficient information in the EIS to assess the potential environmental impacts of the Gas Transmission Pipeline crossing of The Narrows (Humpy Creek to Laird Point) including the Kangaroo Island wetlands. A general construction methodology has been provided for the gas transmission pipeline but the methodology does not address the inter-tidal areas that the pipeline would be traversing. Part A, sections 2 and 3 and Part B, sections 1.2, 2.2, 2.4, 3.2 and 3.4 of the TOR required that this information be provided in the EIS.

In addition, it is unclear how the proposed route in the EIS relates to the route and construction methodology provided by the joint proponent Technical Working Group for the crossing of The Narrows.

It is understood that the likelihood of HDD as the method to facilitate the pipeline crossing of The Narrows has lessened and that a bundled crossing of all four LNG proponents' pipelines may be the preferred option.

Nevertheless there may be significantly increased construction phase environmental impacts associated with the bundled pipeline trenched crossing option. Other concerns include a higher risk of compounded problems should something go wrong with one of the pipelines given the proximity of each of the proponents' pipes to one another.

Furthermore, the trenching option for crossing The Narrows also requires rock armouring of the pipeline, a feature that protrudes from the surface of the sea bed, thereby creating a permanent obstacle for environmental processes such as tidal movement and associated sediment transport, biota movement as well as forming a potential hazard to boating.

The potential environmental risk associated with The Narrows crossing makes this issue critical for the project. It is unlikely that DERM would be willing to recommend any preliminary approval for the crossing based on the level of information provided to date.

Recommendation

A detailed illustrated and site specific construction methodology for the crossing of the Kangaroo Island wetlands and The Narrows should be provided, including information on necessary ancillary works. The methodology should be supported by a site specific Acid Sulfate Soils Management Plan.

An assessment should be provided of the potential impacts to the values of the Kangaroo Island wetlands, Port Curtis, and the Great Barrier Reef Coast Marine Park:

- based on the proposed construction methodology and associated mitigation measures; and,
- that would result from up to four proposed pipeline crossings using similar construction methodology and mitigation measures.

4.2. Issue: Volume Crossing the Narrows, 3 Chapter 3 Section 3.8.1

Where separate HDD construction is proposed a HDD management plan will need to be developed during the design phase to address key environmental issues.

Recommendation

The HDD management plan should be included in the supplementary documentation and should include information on:

- effects on the environment from unexpected release of contaminants or fluid breaking through the surface;
- contingency plans that take into consideration the known and potential risks associated with the site, including possibility of the rock being either deeper or shallower than expected, and the possibility of the rock being harder than expected thereby causing difficulties with the proposed drilling method;
- discussion on the proposed use, treatment (including acid sulfate soils) and placement or stockpiling of spoil and long term disposal plans;
- a plan showing the total area of disturbance; including any associated machinery pads, pipe feeding areas or construction areas;
- details of how water quality (turbidity and sedimentation) will be maintained and monitored, including water monitoring parameters and how these parameters will be maintained during the operation;
- a plan or discuss in detail the sediment and erosion control methods to be implemented during works;
- details of a response plan, with appropriate triggers, which will be initiated in response to any significant impacts on coastal management from the works;
- details as to the quantity and nature of any likely contaminants which could be released into the marine environment and safeguards to be employed to avoid or minimise the risk;
- any rehabilitation measures to be undertaken after the works have been successfully completed and include future remediation works after works completion.

4.3. Issue: Wetlands Crossing Volume 3, Chapter 3, Section 3.8.3

Further information is required for adequate assessment of the environmental effects of trenching across the mud flats.

Recommendation

Include further information detailing:

- further information needs to be provided on the potential for displacement of estuarine mud and potential subsequent impact on water quality (turbidity, pH, metals) through dispersion by the strong tidal flows;
- contingency plans that take into consideration the known and potential risks associated with the site,
- details of how water quality (turbidity and sedimentation) will be maintained and monitored, including water monitoring parameters and how these parameters will be maintained during the operation;

- a plan or discuss in detail the sediment and erosion control methods to be implemented during works;
- details of a response plan, with appropriate triggers, which will be initiated in response to any significant impacts on coastal management from the works;
- details as to the quantity and nature of any likely contaminants which could be released into the marine environment and safeguards to be employed to avoid or minimise the risk;
- any rehabilitation measures to be undertaken and monitoring sites after the works have been successfully completed and include future remediation works after works completion.

4.4. Issue: Seawater intake

No specifics of the seawater intake have been provided, such as mesh size and intake velocity. Intake velocity should be no greater than 0.5m/s to avoid entrapment of fish, turtles, dugong, dolphins etc. It is understood plankton entrainment is largely unavoidable.

Recommendation

The supplementary documentation should provide additional detail on the seawater intake structure so that the hazard it poses to fish and megafauna can be properly assessed.

4.5. Issue: Diffuser discharge

No details of additives have been provided. No estimation of chlorine or chloramine residuals has been provided, nor how dechlorination will be achieved (it is assumed through addition of sodium bisulphite). It is understood that these details may not be available until greater certainty about the design of the desalination and sewage treatment processes are known.

It is desirable that the following information be provided when available:

- Material safety data sheets for all RO process additives (including, where possible, specific compounds present in the commercial formulations).
- The dilution profile achieved by the diffuser under the worst case (minimum ambient current speed that can be modelled) and average case.
- The distance from the diffuser where potential contaminants achieve the ANZECC/ARMCANZ (2000) trigger values for 95% protection level of species or the background concentration of specific contaminant under worst-case and average-case mixing scenarios.
- A desktop demonstration that no acute toxicity for any contaminant at end-of-pipe concentrations otherwise through direct toxicity assessment (if deemed necessary by DERM).
- The estimated distance from the diffuser where the discharge plumes make contact with the seabed or affect other environmental values.
- The potential for accumulation of diluted brine in depressions on the seabed.
- The potential of a depleted oxygen zone (due to excess sodium bisulphite dosing).
- The possible mitigation strategies to minimise impacts (such as for example where discharge plume contacts seabed before ANZECC/ARMCANZ (2000) trigger levels are not achieved that the diffuser be redesigned, or wastewater treatment

plant effluent be mixed with brine to decrease pre-discharge EC, or discharge only occur at higher ambient current speeds etc.).

- The diffuser maintenance program (to maintain diffuser performance).
- The diffuser modelling validation (may be required).

Recommendation:

The supplementary documentation should provide diffuser modelling output data and greater detail on contaminants of concern associated with the diffuser discharge.

4.6. Issue: Dredging

The EIS provides insufficient detail in relation to dredging activities associated with the navigation channel, swing basin, and the Materials Offloading Facility to allow DERM to recommend conditions of approval to the Coordinator-General. The EIS is unclear as to whether any part of the dredging activities would be within the petroleum tenure.

Recommendation

The EIS should consider whether all or part of the dredging needed for this project will be subject to the Coordinator-General's approval through this EIS process for APLNG, or as part of the Western Basin Dredging Project EIS.

The dredging component of the EIS should clearly state:

- a) the worst case scenario in terms of more than one dredging operation in progress at any one time and/or consecutive dredging operations resulting in extended impact time for sensitive habitats (e.g. seagrass);
- b) the flow rate and assumed discharge concentration of suspended solids from reclamation areas;
- c) the methods to be adopted to prevent release of acid to waters from spoil containing acid sulphate soils.

4.7. Issue: Volume 4, Chapter 12, Section 12.4.4 Reclaim area and revetments

The EIS contains insufficient information for assessment of the reclamation and construction of the revetments.

Recommendation:

Provide further information including:

- a) any potential effects of the reclamation works on surrounding seagrass communities and the means by which adverse impacts will be avoided,
- b) further information needs to be provided on the potential for displacement of estuarine mud as a result of the revetment works and reclamation and potential subsequent impact on water quality (turbidity, pH, metals) and seagrass (sedimentation) through dispersion by the strong tidal flows in the adjacent channel. Design and construction measures to be used to prevent significant environmental impact in the short and long term should be discussed in detail.
- c) contingency plans that take into consideration the known and potential risks associated with the site,
- d) details of how water quality (turbidity and sedimentation) will be maintained and monitored, including water monitoring parameters and how these parameters will be maintained during the operation,

- e) a plan or discuss in detail the sediment and erosion control methods to be implemented during works,
- f) details of a response plan, with appropriate triggers, which will be initiated in response to any significant impacts on coastal management from the works,
- g) details as to the quantity and nature of any likely contaminants which could be released into the marine environment and safeguards to be employed to avoid or minimise the risk,
- h) any rehabilitation measures to be undertaken and monitoring sites after the works have been successfully completed and include future remediation works after completion.

Air Quality Impact Assessment of LNG Facility of Curtis Island (Katestone Report)

4.8. Issue: Odour (H₂S) emissions from the acid gas removal unit

It is specified in Section 4.4.2 of the Katestone Report that the acid gas removal unit will not have a thermal oxidiser for treating the odours gases (at this stage). According to the EIS if the gas testing results shows that H₂S is greater than 4 ppm, then a thermal oxidiser will be installed. In terms of odour concentration this is approximately 800 odour units (ou) (H₂S odour threshold or 1 ou = 0.005 ppm). The actual impact from the facility depends on the mass emission rates. It is not clear when the information on H₂S concentrations in the gas will be available. Is this information to become available after or before the commissioning of the plant? This information is important for the environmental licence conditions.

Additionally, should a thermal oxidiser be installed it will need to be operated optimally. At hotter temperatures the oxidiser could create NO_x and SO_x (nitrogen and sulphur oxide compounds). DERM will need to be kept informed on this option.

Recommendation:

Clarify the stage when the decision will be made on the installation of the thermal oxidiser. Also clarify when the information on H₂S concentrations will be available to DERM. Reconsider the trigger level in terms of the commitment to installing a thermal oxidiser given the potential high levels of H₂S emissions.

4.9. Issue: Cumulative impacts assessment methodology is not clear

The cumulative air impact assessment from the LNG facility incorporates: (a) the background concentration from the existing and approved industrial, (b) the estimated concentration from the other five LNG projects proposed for the region, and (c) the concentration from the Australia Pacific LNG facility in isolation. The background concentration of nitrogen dioxide is estimated using GAMSv3 model. This includes existing and approved industrial sources in the region. The proposed Australia Pacific LNG facility was modelled using a fine resolution micro-scale dispersion model (CALPUFF). It is not clear how the other LNG projects proposed for the Gladstone airshed are modelled. The estimated total mass emissions of air pollutants expected to be released from these LNG projects are also not provided in the EIS.

Recommendation:

Specify how the other five LNG projects proposed in the Gladstone airshed are modelled. Also, provide a summary of air pollutants expected to be released from the other LNG facilities.

4.10. Issue: Results of cumulative air quality impact assessment need clarification

The maximum 1-hour predicted concentrations of oxides of nitrogen at the sensitive receptors are provided in Table 36 (Katestone Report). The table specifies estimated ground level concentrations (GLCs) in three groups: (a) APLNG facility in isolation, (b) existing and approved industries (GAMSV3) and other five proposed LNG plants and (c) APLNG facility with existing and approved industries (GAMSV3) and other five proposed LNG plants. It is not clear why the cumulative impact from all sources (i.e. the values in the 6th and 7th columns of Table 36) is exactly the same as the impact from “existing and approved industries and other five proposed LNG plants” (i.e. the values in the 4th and 5th columns). The cumulative GLCs at the receptors from the APLNG facility plus all other sources are expected to be greater than the GLCs from other sources.

Recommendation:

Clarify why the estimated GLC values in column 4 and 5 are the same as in column 6 and 7 of Table 36 (Katestone Report). Please make sure that all values are added to determine the cumulative impact of existing and proposed industries. The same issue is identified for non-routine operations-scenario 2 (see values in Table 42).

4.11. Issue: The concentration contours of cumulative impact is not clear

The maximum 1-hour predicted concentration contours of oxides of nitrogen are provided in Figures 14, 15 and 16 (Katestone Report). These figures provide spatial distribution of GLCs from three categories of sources: (a) APLNG facility in isolation, (b) existing and approved industries (GAMSV3) and other five proposed LNG plants and (c) APLNG facility with existing and approved industries (GAMSV3) and other five proposed LNG plants. In order to demonstrate a clear picture of the cumulative impact, Figure 16 must have an extra concentration contour at 10 µg/m³. Without this concentration contour it is hard to find a difference between Figures 15 and 16.

Recommendation:

In order to demonstrate a clear picture of the cumulative impact from all sources, add an extra concentration contour at 10 µg/m³ in Figure 16. Please also make sure that the concentration contour levels are readable in these figures.

4.12. Issue: The source(s) of air quality objectives of hydrocarbon is not provided

The air quality objectives used for the assessment of hydrocarbons are provided in Table 40 (Katestone Report). However, the source(s) of these air quality objectives is not specified.

Recommendation:

Specify the source(s) of air quality objectives used for the assessment of hydrocarbons (Table 40, Katestone Report). Please also clarify what will be the cumulative impact of speciated hydrocarbon released from all proposed LNG facilities in the area.

Santos Gladstone LNG Project

Department of Environment and Resource Management (DERM) Advice and Recommended Conditions – Coordinator-General (CG) imposed conditions for the Evaluation Report

This attachment provides advice to the Coordinator-General on matters raised previously by DERM in response to the publication of the draft EIS, in light of publication of the Supplementary EIS and subsequent Santos documents and discussions. Recommendations are made as to how to resolve the issues and conditions proposed where possible that could be attached to any approval of the Santos Gladstone LNG Project.

Conditions contained in this attachment are recommended to be imposed as Coordinator-General conditions. The attachment has been broken up into the following sections: *General issues (this applies to the whole project); Gas fields; Gas transmission pipeline; Marine infrastructure; and other activities (outside of petroleum tenure).*

General issues, advice and recommended conditions covering all components of the project

Issue: Environmental Offsets

DERM has agreed to an offsets package that was developed for the Western Basin dredging component of the LNG Industry development. However, this agreed offsets package only addresses major capital dredging spoil disposal. Offsets will be required for unavoidable impacts associated with the loss of vegetation and biodiversity for the gas fields, pipeline construction, tidal works the LNG Facility and any workers' accommodation or other to support development on Curtis Island.

The revised Environmental Offset Strategy – Gladstone LNG Project, received 3 March 2010, provides an outline of a proposed approach to offsets that could satisfy the principles set out in the Queensland Government Environmental Offset Policy 2008 (QGEOP) and potentially assist the government meet its target for expansion of the conservation estate. However, the Strategy is broad based and is not presented in the form of a detailed offsets package for consideration by DERM and other agencies. Gladstone LNG has undertaken to provide such a package in the near future.

Principle 3 of QGEOP requires that offsets achieve an equivalent or better environmental outcome. This principle is not reflected directly in the strategy, but it is understood that it is Gladstone LNG's intention to develop a package which meets all the QGEOP principles. It is likely that a combination of the proposed "Traditional" and "Strategic" approach will enable the offset package to meet DERM's requirements for both terrestrial and coastal matters. A fully strategic approach would not necessarily meet the QGEOP requirement that offsets provide environmental values as similar as possible to those being lost or satisfy the requirements of the *Vegetation Management Act 1999* and other specific issue policies where triggered. It is important that package includes identifiable offsets for unavoidable impacts on threatened species and high value ecosystems.

In addition, the QGEOP requires that proponents consider measures to be taken to avoid and minimise potential adverse impacts of the proposal before offsets are considered. The lack of planning detail evident in the draft EIS and EIS Supplement means that Gladstone LNG has not addressed why some impacts are considered to be unavoidable. This issue was raised in the previous submission by DERM and is required to be addressed in Part A, section 3 and Part B, sections 3, and specifically section 3.3, Nature Conservation of the Terms of Reference.

Recommended condition

The following condition should be imposed in the CG evaluation report:

An Environment Offsets Program, consistent with the *Queensland Government Environmental Offset Policy 2008* and specific issue policies, must be provided to the Coordinator-General for approval before an application is made for environmental authorities covering gas field development, pipeline construction and LNG facility construction and operation.

The program must address, but not be limited to, impacts on vegetation and biodiversity arising from:

- exploration, development and operation of the coal seam gas fields;
- construction and operation of the gas transmission pipeline;
- construction and operation of the LNG facility;
- construction of marine infrastructure;
- other activities (e.g. construction camps, port works for the project, ancillary works).

The program must detail:

- the principles adopted for the environmental offsets strategy;
- the procedure to identify the requirements for environmental offsets for specific components of the project over the life of the project;
- relevance to any legislative requirements for offsets;
- the mechanism to secure and manage the environmental offset for long term protection of values;
- the location, size and values of the offsets;
- any management measures, including funding, required to maintain or enhance values for the life of the offset; and
- a system for reporting to the CG on offset arrangements, their management and how offset values are met and maintained.

It is recommended that the Coordinator-General be responsible for this condition in consultation with DERM and DEEDI.

Issue: Cumulative Impacts

The draft EIS and EIS Supplement provide only limited qualitative cumulative impact assessment. For example, the Australia Pacific LNG Project is mentioned but no detail is provided or assessment made on cumulative impacts on matters such as habitat loss over large areas of gas field development or reductions in groundwater quantity and quality. Part A, section 2 of the TOR requires the cumulative impacts to be fully examined and addressed as does Part A, section 3. Part B, section 3 of the TOR requires cumulative impacts to be addressed for impacts to land; impacts to nature conservation (including sensitive environmental areas, terrestrial flora, terrestrial fauna, aquatic flora and fauna, marine flora and fauna); impacts to water resources (including surface water, groundwater and coastal environment); impacts to air (including impacts on the Gladstone Air Shed); impacts from noise and vibration; and impacts on cultural heritage of the Terms of Reference.

Information is available within the Department of Infrastructure and Planning about the proposed extent of development for other LNG projects and associated proposals to allow a more detailed cumulative impact assessment across the region. DERM recognises that the government is putting in place strategies and plans to identify cumulative impacts for social and economic issues in the Surat Basin and to cover impacts on the quality and quantity of groundwater. However, detailed planning by Santos for various aspects of the project should take into account the potential cumulative impacts of multiple facilities being developed on Curtis Island, multiple pipelines constructed by various proponents within and broad scale gas field development across the whole of the Surat Basin region.

Recommended conditions

The following conditions should be imposed in the CG evaluation report:

The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for a petroleum facilities licence for the LNG Plant on Curtis Island, should provide a detailed assessment of cumulative impacts addressing:

- impacts of noise on sensitive receptors arising from the development of multiple LNG facilities on Curtis Island, including demonstration of the ability to comply with the Noise EPP over the life of the project;
- impacts to the Gladstone Air Shed from air emissions arising from multiple LNG facilities on Curtis Island, including demonstration of the ability to comply with the Air EPP over the life of the project;
- impacts on flora and fauna arising from multiple LNG and other port development on Curtis Island,
- the marine environment, impacts on marine biological values and water quality arising from port infrastructure and emissions to water from multiple LNG Plants and supporting infrastructure on Curtis Island.

The EM Plans developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the applications for petroleum and pipeline leases for the gas fields and pipelines should provide a detailed assessment of cumulative impacts addressing:

- Regional impacts on terrestrial flora and fauna, biodiversity values, listed species and ecosystems,
- riparian habitats,
- surface and ground water environmental values,
- soils, including ability to support ongoing agricultural production.

Note: further conditions relating to EM Plans for components of the project are listed in following sections.

Issue: Inadequate project description including basic design and construction methodology

There is insufficient detail in the draft EIS and EIS Supplement on the design and construction methodology for the LNG facility, gas transmission pipeline and gas field infrastructure. Part A, section 1.2 requires a description of the project including: the coal seam gas field development plan; gas transmission corridor; LNG facility; and associated infrastructure. This section of the TOR requires specific locations detailed on illustrated maps. Part B, section 2.2 of the TOR requires that the proponent provide types and methods of construction; the equipment; the disturbance involved; the length of construction and staging of the proposal for all components of the project. In addition, section 310D of the *Environmental Protection Act 1994* requires proponents to prepare an EM Plan that includes:

- a detailed description of the project;

- the environmental protection commitments the applicant proposes for the activities to protect or enhance the environmental values under best practice environmental management;
- contain enough other information to allow the administering authority to decide the application and conditions to be imposed on the environmental authority;
- include a rehabilitation program for land proposed to be disturbed under each relevant resource authority for the application.

The EIS and Supplementary EIS have not provided the detail prescribed by the legislation and which has been provided by other applicants seeking environmental authorities for petroleum and gas activities. Part B, sections 1.8 and 4 of the TOR require that the legislative requirements be identified and addressed in the EIS.

Therefore, the mitigation measures, which are based on a project description and construction methodology that lacks detail, inadequately describe how the project will achieve acceptable standards of environmental performance necessary to convince DERM that performance can be achieved. A more detailed and illustrated description of the design and construction methodology is required, accompanied by an adequate assessment of the potential impacts and mitigation measures for the project. The significant areas which require further information include:

- the construction method and design of the materials off-load facility structures including any temporary structures both on Curtis Island and on the mainland;
- product export jetty construction methodology, particularly across inter-tidal areas;
- LNG facility construction details including the design of power plants, the reverse osmosis water treatment plant, sewage treatment plant, and associated intake and outfall diffuser, and the waste management of contaminants removed from the CSG prior to liquefaction;
- the construction methodology for the gas transmission pipeline across: Curtis Island, The Narrows; ranges; problem soil areas; and watercourses that still require detailed geological and soil investigations to determine the possibility of horizontal directional drilling;
- upstream infrastructure design, location and construction methodology including compression and water treatment facilities.

Sufficient information should be provided to assess all components of the project. The construction methodology should form part of this information. Plans and maps should be provided showing waste streams and discharge points accompanied by detailed descriptions of the various components. Information should be presented describing the mitigation measures to be implemented during all stages of construction of the project. The basis for these measures should also be included.

Recommended conditions

The following conditions should be imposed in the CG evaluation report:

The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for a petroleum facilities licence for the LNG Plant on Curtis Island, should provide:

- a construction schedule and methodology, including plans and maps showing discharge points and emission controls for both construction and operational phases;
- detailed design information for sewage treatment and reverse osmosis plants, power plants, concrete batching, chemical storage and other environmentally relevant activities planned for the licence area;
- engineering design drawings for operational works in the intertidal area for the materials off-load facility, jetties and wharves;
- design of any outfalls and diffusers for emissions to Port Curtis including detailed analysis of existing water quality, effluent contaminants, acute and chronic toxic effects of contaminants on fauna and flora and any long term ecological effects;

- detailed list of waste streams including their handling, treatment and disposal arrangements;
- the environmental protection commitments proposed for the activities to protect or enhance the environmental values under best practice environmental management
- a rehabilitation program for land proposed to be disturbed during construction and following cessation of LNG activities on Curtis Island.

The EM Plans developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the applications for pipeline leases should provide:

- a construction schedule and methodology including plans and maps showing how the pipeline will be constructed through specific vegetation and soil types, topography and across riparian areas to avoid or minimise environmental harm;
- details on how the Santos pipeline will be constructed in common use infrastructure corridors in conjunction with other proponents and services to minimise cumulative impacts, both on the mainland and Curtis Island;
- detailed engineering design plans and coastal process modelling for the proposed crossing of The Narrows;
- details on waste management, treatment and disposal, including hydro static test water;
- maintenance and rehabilitation plan following construction to protect soil values and prevent weed invasion.

The EM Plans developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the applications for petroleum leases for the gas fields should provide:

- a construction schedule and methodology including plans and maps showing the location of facilities and discharge points and emission controls for compressor plants, water treatment, sewage treatment and other environmentally relevant activities proposed to be undertaken on the tenement;
- a commitment and a process to ensure that constraints mapping provided in the EIS documentation is incorporated into operational plans over the life of the project.

Note: further conditions relating to EM Plans for components of the project are listed in following sections.

Issue: Financial Assurance for Environmental Authorities

Financial assurance is required prior to the issue of environmental authorities (petroleum activities) as required by section 312O of the *Environmental Protection Act 1994*.

The proponent has not provided schedules of disturbance with sufficient information, regarding the scale of impacts that is necessary, for financial assurance calculations. The proponent should develop schedules of disturbance for all aspects of the project in accordance with the DERM guideline – *Financial assurance for petroleum activities*. Sufficient information should be provided for DERM to be satisfied that the financial assurance estimates will be adequate for worst-case scenarios (including maximum possible areas of disturbance, maximum proportion of problem soil areas and maximum proportion of environmentally sensitive areas).

This is a legislative requirement that needs to be met before an environmental authority can be issued so no recommended condition is proposed.

Third Party Auditing

It is becoming common practice to require holders of environmental authorities and development approvals to be required to undertake a third party audit, at the holder's expense, of the holder's compliance with conditions.

Recommended conditions

It is recommended that the CG impose the following condition in relation to third party auditing for the life of the gas fields:

1. Compliance with the conditions of this CG's report and environmental authority(s) must be audited by an appropriately qualified third party auditor, nominated by the holder of environmental authority(s) and accepted by the CG and administering authority, within one year of the commencement of these petroleum activities, and annually thereafter.
2. Upon receipt of the third party audit report, the holder of the environmental authority(s) must submit a copy to the CG and the administering authority.
3. The third party auditor must certify the findings of the audit in the report.
4. The financial cost of the third party audit is borne by the holder of the environmental authority(s).
5. The holder of the environmental authority(s) must immediately act upon any recommendations arising from the audit report and:
 1. investigate any non-compliance issues identified; and
 2. as soon as practicable, implement measures or take necessary action to ensure compliance with this authority.
6. Subject to condition (1), and not more than three (3) months following the submission of the audit report, the holder of this authority must provide written advice to the CG and administering authority addressing the:
 1. actions taken by the holder to ensure compliance with the CG's report and environmental authority(s); and
 2. actions taken to prevent a recurrence of any non-compliance issues identified.

Gas field issues, advice and recommended conditions

Adequacy of EM Plan

The EM Plan provided with the EIS and supplementary EIS does not meet the requirements of section 310D of the *Environmental Protection Act 1994*. The Act sets specific requirements for the content of an EM Plan and this has been elaborated in the DERM Guideline *Preparing an environmental management plan (EM Plan) for Coal Seam Gas (CSG) activities*. Santos will need to provide this further information when detailed planning and design work is completed within the area for which the petroleum lease is being sought.

Recommended conditions

The following condition should be imposed in the CG evaluation report:

1. Prior to any application for environmental authority (petroleum activities), a draft environmental management plan (EM plan) must be provided to the DERM for review.
2. The EM plan must be prepared in accordance with the DERM published guideline: *Preparing an environmental management plan (EM Plan) for Coal Seam Gas (CSG) activities*.
3. Any comments made by DERM should be incorporated into a revised EM Plan that will need to accompany Environmental Authority applications.
4. The initial EM Plan provided under this condition must cover sufficient field development to supply gas for one LNG train, or 1200 gas wells whichever is the greater.

5. The EM Plan must specifically include:

- An Operational Plan that provides detailed information about the activities to be carried out under the environmental authority.
 - The activities identified in the Operational Plan must incorporate but not be limited to the petroleum activities set out in the approved Work Program and/or Development Plan for the relevant petroleum authority as required under the *Petroleum Act (1923)* or the *Petroleum and Gas (Production and Safety) Act 2004*.
 - The Operational Plan must be consistent with the requirements of the environmental authority(s) and include, but not be limited to:
 - a stated period, not exceeding 3 years, to which the Plan applies;
 - a description of the existing infrastructure for conducting the petroleum activities;
 - a description of proposed infrastructure that will be developed during the term of the Operational Plan
 - a map or maps that:
 - i. record the location of the infrastructure in place for conducting the petroleum activities that exists at the commencement of the period of the Operational Plan, including but not limited to:
 - regulated dams;
 - wells;
 - transmission flow lines;
 - gas processing facilities; and
 - water treatment facilities;
 - ii. records the location of approved additional infrastructure that will be developed for the conduct of the petroleum activities during the period of the Plan.
 - a description of proposed infrastructure that will be developed during the term of the Operational Plan
 - for proposed disturbance or vegetation clearing in an Environmentally Sensitive Area (ESA) provide details on the scale and extent of the disturbance or clearing and if required a commitment to provide an environmental offset
 - for each site to be disturbed, a description of the rehabilitation activities to be performed during the period of the Operational Plan, including but not limited to:
 - i. location (eg tenure, coordinates) and disturbance type (eg well lease, flow line, access track);
 - ii. area to be rehabilitated;
 - iii. use of reference sites;
 - iv. species compositions; and
 - v. post-disturbance land use;

- a description of progressive rehabilitation carried out including performance in relation to the requirements set out in the environmental authority and the proposed rehabilitation activities set out in the previous Operational Plan
- calculation of the financial assurance for the proposed maximum disturbance expected during the period of the Operational Plan.

Note: where the CSG fields are intended to be operated under separate environmental authorities, separate EM Plans can be provided under this condition.

Issue: Constraints based management of ecological impacts

Sections 3.2.1, 3.3.1 and 3.3.5 of the TOR require the proponent to identify and map sensitive environmental areas. The constraints-based approach to management of ecological impacts does not provide sufficient information on the total potential impacts of the project. In addition, the proposed constraints classes do not encompass DERM's entire current category A, B and C environmentally sensitive areas. Also, the proposed field management protocols for Class E constrained areas do not automatically require pre-construction surveys to be undertaken. DERM would require these surveys to be undertaken for all constrained areas including Class E.

The constraints-based approach should include everything listed in DERM's current category A, B and C environmentally sensitive areas. Also, more detail is required on the potential impacts to sensitive areas. In addition, a detailed explanation is required on how the figures in the EIS Supplement were calculated for areas of disturbance.

Recommended condition

The following condition should be imposed in the CG evaluation report:

Prior to lodgement of any application for environmental authority for a petroleum activity in the proposed gas fields expansion area, Santos is to provide to DERM for review a revised constraints management strategy that:

- includes all category, A, B and C environmentally sensitive areas. Category C Environmentally Sensitive Areas must include:
 - Nature Refuges as defined under the *Nature Conservation Act 1992*;
 - Koala Habitat Areas as defined under the *Nature Conservation Act 1992*;
 - State Forests or Timber Reserves as defined under the *Forestry Act 1959*;
 - Declared catchment areas under the *Water Act 2000*;
 - Resources reserves under the *Nature Conservation Act 1992*;
 - An area identified as "Essential Habitat" for a species of wildlife listed as endangered, vulnerable, rare or near threatened under the *Nature Conservation Act 1992*;
 - Any wetland shown on the Map of Referable Wetlands available from DERM's website; or
 - "Of concern" regional ecosystems identified in the database maintained by DERM called 'Regional ecosystem description database' containing regional ecosystem numbers and descriptions.
- commits to undertaking and documenting field surveys for all classes of constraint prior to commencing petroleum activities
- describes the likely impacts on sensitive areas from the various types of petroleum activity including total areas of disturbance during construction and operation of petroleum facilities and supporting infrastructure

- commits to incorporating constraint commitments into operational plans for the life of the project.

Issue: Proposed release of desalinated water into Lake Nuga Nuga

Section 2.5.2.1 required details of the management of associated water in line with DERM's Operational Policy on "Management of water produced in association with the petroleum activities (associated water)". The EIS Supplement indicates that up to 5% of the associated water generated in the Arcadia field may be discharged into Lake Nuga Nuga as a measure of last resort. This proposal is not supported by DERM. Lake Nuga Nuga is listed under the Directory of Important Wetlands and has significant environmental values. The lake also borders Nuga Nuga National Park.

The EM plan should provide a proposal for the disposal of associated water that would not discharge into, or otherwise impact on, the values of Lake Nuga Nuga. The proposal should include an assessment of the potential impacts and provide appropriate mitigation measures.

It is understood that Santos has agreed that desalinated associated water will not be discharged into Lake Nuga Nuga and therefore a recommended condition has not been provided.

Issue: Inadequate assessment of groundwater values

Section 3.4 of the TOR required a description of the existing environment for water resources that may be affected by the project. The EIS Supplement has not included DERM's requested whole-of-project groundwater dependent ecosystem assessment. Information on groundwater dependent ecosystems in the project area can be sourced from the *Hydrogeological Framework Report for the Great Artesian Basin Water Resource Plan Area* (DNRW, 2005) referred to in the EIS Supplement. This is just one of the studies carried out to inform the development of the Water Resource (Great Artesian Basin) Plan 2006.

The EM plan should assess the potential impact on the environmental values detailed in the Department of Natural Resources and Mines *Great Artesian Basin Water Resource Plan: Ecological Assessment of GAB springs in Queensland* (Fensham & Fairfax 2005) and *The AGE Report* (2005) on potential river base flow from aquifers of the Great Artesian Basin. The springs and river reaches documented in these reports are listed on the springs register established under the Great Artesian Basin Resource Operations Plan.

Issue: Impacts to Springbok Sandstone aquifers

Section 3.4.1 of the TOR required an assessment of potential impacts of the project on water resource environmental values. The EIS predicts there will be significant depressurisation in the Walloon Coal Measures, without assessing the potential impact on the Springbok Sandstone aquifers. The Springbok Sandstone aquifers are excluded from the groundwater flow modelling. This results in a failure to assess possible impacts on springs in the Adori Sandstone, which is a time equivalent with the Springbok Sandstone and is potentially hydraulically connected to the Springbok (meaning depressurisation in the Springbok might extend to the Adori springs). The EIS does not contain information supporting the finding that the project poses no risk to springs or base flow watercourses. Of particular concern are the recharge springs in the Precipice Sandstone and Adori Sandstone.

An assessment must be undertaken to adequately assess the potential impacts on recharge springs and baseflow watercourses that would result from the induced leakage from the Precipice and Springbok Sandstone aquifers.

Issue: Groundwater mitigation not linked with impacts

Section 3.4.1 of the TOR required a description of practical measures for protecting or enhancing water resource environmental values. The Supplementary EIS does not provide the required detailed assessment of mitigation measures that will appropriately avoid and/or minimise impacts on groundwater values. It also does not provide the recommended clear, reasoned, evidence-based discussion and assessment of all mitigation measures to be adopted by the project. The mitigation measures are not linked to specific impacts, for example depressurisation and impacts on specific springs, or with risks posed by possible poor condition of existing bores which intersect the coal seams.

The Gas Field EM plan section on Groundwater Management has the Management Objective “to protect the quality of the existing groundwater resources”, but does not address the quantity of supply to existing users. The quantity of supply to existing users and the environmental values associated with groundwater, such as springs, should also be protected. Mitigation measures in the EIS for impacts on quantity and environmental values are therefore inadequate.

The EM plan should provide an assessment of the mitigation measures that address the potential impacts on the environmental values. Specific information is required addressing the quality and quantity of supply to existing users and impacts to springs. The EIS should consider make good options to address impacts on springs. For example, consideration could be given to reinjection, reconfiguration of extraction regimes, use of offsets (such as replacing other water users’ take with associated water from the project), and rehabilitation of existing bores to address potential induced inter-aquifer leakage (that could be a result of depressurisation caused by the project).

Issue: Monitoring strategy details

The Supplementary EIS does not provide any detail of the groundwater monitoring strategy for the CSG Gas Field’s. It simply states that a water monitoring strategy is being developed. More detail should be provided on the objectives and rationale for the monitoring strategy and how these link with the hydrogeological conceptualisation, model validation, the identified impacts of the project and the proposed mitigation strategies.

Issue: Regional groundwater modelling inadequate

Section 3.4.1 of the TOR required an assessment of potential impacts of the project on water resource environmental values. The Supplementary EIS states that the proponent is currently developing a more sophisticated model of regional groundwater. The current model does not include the Gubberamunda or Springbok formations and the potential linkage with springs.

The EM plan should describe the results of the more sophisticated modelling. In particular a commitment is expected that: (a) the Gubberamunda and Springbok formations will be included given that there is significant use and possible connections with springs from these formations; and (b) the Australia Pacific LNG Spring Gully operations will be adequately incorporated in the model.

Recommended conditions

The following conditions relating to the protection of groundwater values should be imposed in the CG evaluation report:

Prior to lodgement of any application for environmental authority for a petroleum activity in the proposed gas fields expansion area, Santos is to provide to DERM for review a revised regional groundwater model that includes all the sandstone aquifers potentially affected, both directly and indirectly by extraction of groundwater from the Walloon coal measures by Santos and neighbouring operations.

The EM Plans developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the applications for petroleum leases for the gas fields should provide:

- an assessment of the potential impact on the environmental values detailed in the former Department of Natural Resources and Mines publication *Great Artesian Basin Water Resource Plan: Ecological Assessment of GAB springs in Queensland* (Fensham & Fairfax 2005) and *The AGE Report* (2005) on potential river base flow and springs from aquifers of the Great Artesian Basin, including in the springs register established under the Great Artesian Basin Resource Operations Plan;
- an assessment of the potential impacts on recharge springs and baseflow watercourses that would result from the induced leakage from the Precipice, Adori and Springbok Sandstone aquifers;
- mitigation measures that address the potential impacts on river base flow and springs including a monitoring program, trigger points and actions that would be taken to avoid or minimise the impacts;
- mitigation measures that address the potential impacts on the quality and quantity of supply to existing users including make good options such as reinjection, reconfiguration of extraction regimes, use of offsets (such as replacing other water users' take with associated water from the project), and rehabilitation of existing bores to address potential induced inter-aquifer leakage (that could be a result of depressurisation caused by the project);
- a detailed monitoring strategy that provides objectives and rationale for how potential impacts on groundwater values will be identified including linkages with the hydrogeological conceptualisation, model validation, trigger points and actions that will be taken to avoid or minimise the impacts.

Issue: Impact of roads and access tracks on aquatic ecosystems

Section 3.3.1.1 of the TOR required discussion of a range of matters including impacts on species, communities and habitats and proposals to mitigate potential impacts. The construction of approximately 6500km of roads and access tracks represents a significant potential impact on land, water quality and aquatic ecosystems in the project area. The magnitude of this potential impact is not adequately described or assessed in the draft EIS or EIS Supplement, nor do the proposed mitigations reflect the extent of the potential impact.

The magnitude of impacts to aquatic ecosystems from road and track construction needs to be adequately identified, assessed and appropriately mitigated.

Issue: Water quality monitoring for aquatic ecosystems

Section 3 of the TOR required definition of environmental values by reference to background values and documents such as the ANZECC (2000) Guidelines. Baseline water sampling has only occurred during times when water flow was low or negligible. The collection of additional baseline water quality data during times of flow is required to meet the ANZECC & ARMCANZ (2000) water quality guidelines and the *Queensland Water Quality Guidelines* (2006) for the monitoring of ephemeral waterways. Sufficient baseline data is required prior to activities commencing at reference sites in order to detect potential impacts of the development.

The monitoring plan for surface water, and the subsequent assessment of aquatic ecological impacts, should be revised to include a thorough representation of sites upstream and downstream of the CSG field areas and sites upstream and downstream of the proposed pipeline route within the same catchment area. DERM requires that monitoring of water quality and aquatic biology at control and reference sites should commence as soon as practicable and in advance of the construction phase of the GLNG project to determine localised baseline data. Reference and control sites should be selected so as to represent "close or completely natural state" aquatic habitats as required by the *Queensland Water Quality Guidelines* 2006.

The monitoring plan should also require that water quality sampling should occur at various stages of flow. Reference can be made to DERM's *Monitoring and Sampling Manual 2009 – Environmental Protection (Water) Policy 2009*; Version 1 September 2009 for more information. The measured parameters should reflect the potential impacts of the development activity, including, but not necessarily limited to, monitoring of turbidity near to areas of soil disturbance.

Issue: Prolonged flows in ephemeral systems

Section 3.4.1 of the ToR required an assessment of the potential impacts of surface water flow on downstream creeks. The EIS and supplementary EIS did not identify or address the potential impacts of changing an ephemeral system into a continual, or near continual, flow system through prolonged discharges of amended associated water or desalinated water. In addition, the occurrence of permanent freshwater springs along the watercourses is likely in some locations, which could be significantly impacted by non-natural flows. The revised EM plan should address proposals to discharge to ephemeral drainage systems, and detail how potential environmental impacts on the systems, including springs, would be identified, avoided or managed, particularly in relation to any flora and fauna susceptible to potential increases in flow or salinity. The cumulative impacts from similar discharges from other CSG fields should also be considered and assessed.

Issue: Environmental monitoring aquatic ecosystems

Section 3.4.1 of the ToR required a description of environmental values in relation to surface waterways. To achieve this a separate monitoring strategy for aquatic ecosystems should be developed for perennial and ephemeral systems. It is not appropriate to apply the same approach to both systems. The collection of samples in ephemeral systems needs to be flexible and event-based whereas perennial waters can be monitored on a more regular basis. There is no mention of aquatic sediment sampling in the EIS or supplementary EIS. Consequently, the revised EM plan should address the sampling of sediments around discharge locations where cooling discharge water may precipitate dissolved contaminants. Discharge of desalinated water that has not been properly treated may scavenge minerals from sediments in the initial discharge area.

Issue: Biological Monitoring Parameters for aquatic ecosystems

Section 3.4.1 of the ToR required a description of environmental values in relation to surface waterways. No biological monitoring parameters have been identified in the EIS or supplementary EIS. The sampling of diatoms should be continued and supplemented by other commonly used biological indicators. Macro-invertebrates should be included in the list of indicators, and monitoring by rapid assessment techniques should follow the *Queensland Australian River Assessment System (AusRivAS) SAMPLING AND PROCESSING MANUAL*, (August 2001). Sampling should particularly be undertaken in the period 4 to 6 weeks after rain events. Sampling for fish should be performed where fish related environmental values exist. Biological sampling should be carried out at key sites, particularly where historical data exists, such as DERM monitoring stations. The minimum frequency of sampling for biological data should be tailored to the ecology of the region. Sampling may be conducted at regular intervals in areas with perennial systems, but in ephemeral systems sampling should be event-based. More than one sampling occasion should occur within any given wet season, and preferably after each rainfall event, to ensure sufficient data is accumulated to develop a baseline dataset as soon as possible (i.e. within the first 2-3 years). Biological sampling should also occur more frequently at sensitive sites or where it is proposed to discharge associated water.

Issue: Photographic records

Section 3.4.1 of the ToR required identification potential impacts to water resource environmental values. A photographic record of aquatic ecosystem sampling sites should to be maintained in conjunction with the CGS associated water management plan. Photographs are especially useful to observe changes at sites that are not otherwise recorded. Photographs should be taken from the exact same location(s) at each site on each visit. Any unusual observations should also be photographed, e.g. the presence of precipitated material on rocks or banks, dead animals, alternative sources of pollution etc. These photographs should be date stamped and presented as part of the annual reports.

Issue: Water Monitoring Parameters

In Appendix A of Attachment D3, *Associated Water*, the surface water metal and metalloid parameters have been determined for “total” concentrations while it is proposed that groundwater quality will be determined for “dissolved” metals. Such reporting would be inappropriate for comparison with relevant guidelines. Both “total” and “dissolved” concentrations should be determined for surface water and groundwater samples in order to adequately allow comparisons to guideline trigger values. Mercury should also be included in the monitoring list. In addition, water level data should be supported by flow rate data and stream discharge data where gauging stations exist or will be installed.

Recommended conditions

The following conditions relating to the protection of surfacewater values should be imposed in the CG evaluation report:

Prior to any application for an environmental authority for petroleum activities within the gas fields Santos is to provide to DERM for review a water quality monitoring program that:

- meets the ANZECC & ARMCANZ (2000) water quality guidelines and the *Queensland Water Quality Guidelines* (2006) for the monitoring of ephemeral and perennial waterways;
- includes evidence that monitoring reference sites have been established both upstream and downstream of proposed well field sites to gain baseline data on water quality, flow parameters, water level, representative flora and fauna and natural riparian habitat characteristics;
- proposes a photographic record of reference sites;
- measures parameters of water and sediment that include but not limited to those included in Appendix A of Attachment D3, *Associated Water* of the EIS and mercury, with metal and metalloid concentrations determined for both total and dissolved forms;
- identifies and samples microscopic, invertebrate and vertebrate indicator species of aquatic ecosystem health
- includes trigger points that would indicate impacts on aquatic values and resulting actions to mitigate or minimise the impacts.

The EM Plans developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the applications for petroleum leases for the gas fields should provide:

- The identification of impacts on surface water quality arising from road and track construction including avoidance and mitigation measures;
- Impacts on the aquatic ecology of prolonged flow in ephemeral streams arising from release of treated associated water;
- A monitoring program agreed by DERM in accordance with the previous condition.

Issue: Requirements under the *Water Supply (Safety and Reliability) Act 2008*

Section 3.4.1 of the ToR required information in relation to water supply and usage. The proposed uses of treated associated water include: municipal use in Roma; industrial use in Roma; and irrigation. The proponent should ensure the supply of water to other entities complies with the requirements of the *Water Supply (Safety and Reliability) Act 2008*. This may include registering as a water service provider if there is to be a charge for the water.

As this is a legal requirement, no conditions have been proposed.

Issue: No definitive option for brine management

Section 3.4.1 required an assessment of potential impacts of management of brine from RO plants and mitigation measures to deal with these impacts. The Supplementary EIS states that no definitive final containment option has been selected for brine management. This does not provide confidence that an appropriate brine management and disposal option is available to the proponent.

Recommended condition

The following condition relating to the long term management of brine should be imposed in the CG evaluation report:

Prior to any application for an environmental authority for petroleum activities within the gas fields Santos is to provide to DERM for review a formal proposal for brine management including an assessment of the potential impacts of options considered and appropriate mitigation measures for the preferred option.

Issue: Lack of soil surveys

Section 3.2.2 of the ToR specified that a soil survey of the sites affected by the project should be conducted at a suitable scale. Also the TOR stated that landform descriptions and soil profiles should be mapped at a suitable scale and described according to the Australian Soil and Land Survey Field Handbook. The draft EIS and EIS Supplement have not provided this information.

Recommended condition

The following condition relating to the protection of groundwater values should be imposed in the CG evaluation report:

The EM Plans developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the applications for petroleum leases for the gas fields should provide:

- soils management procedure for areas to be disturbed by petroleum activities to prevent or minimise the impacts of soil disturbance. These procedures must include but not be limited to:
 - establish baseline soils information for areas to be disturbed including soil depth, pH, electrical conductivity (EC), chloride, cations (calcium, magnesium and sodium), exchangeable sodium percentage (ESP), particle size and soil fertility (including nitrogen, phosphorous, potassium, sulphur and micronutrients);
 - a soils monitoring program outlining parameters to be monitored, frequency of monitoring and maximum limits for each parameter;
 - identify soil units within areas to be disturbed by petroleum activities at a scale of 1:10000, in accordance with the “*Guidelines for Surveying Soil and Land Resources, 2nd Edition*” (McKenzie et al. 2008), “*Australian Soil and Land Survey Handbook, 3rd Edition*” (National Committee on Soil and Terrain 2009) and “*The Australian Soil Classification*” (Isbell 2002);
 - develop soil descriptions that are relevant to assessment for agricultural suitability, topsoil assessment, erodibility and rehabilitation, for example:
 - shallow cracking clay soils;
 - deep cracking clay soils;

- deep saline and/or sodic cracking clay soils with melonholes;
- thin surface, sodic duplex soils;
- medium to thick surface (say >15 cm), sodic duplex soils; and
- non-sodic duplex soils;
- detailed mitigation measures and procedures to manage the risk of adverse soil disturbance in the carrying out of the petroleum activity; and
- for areas of good quality agricultural land, detailed methods to be undertaken to minimise potential impacts.

Issue: Associated water management

The associated water management strategies presented in the EIS and Supplementary EIS do not provide enough detail to enable an assessment of the adequacy of the strategy. The Supplementary EIS forecasts total production of approximately 985,500 ML, or 985.5 gigalitres (GL) of associated water over 20 years (calculated from the associated water tables in the Supplementary EIS). The approximate salt load from the project would equate to hundreds of thousands of tonnes salt.

In addition, the EIS and Supplementary EIS propose the use of "amended" associated water for irrigation, as a beneficial use of the water. The proposed salt concentration to be used would be less than 2,500 mg/L (TDS), and <3,500 uS/cm. The "amendment" treatment process does not involve removal of salts. The salt would be released to the environment through irrigation and dust suppression. The remaining associated water would be treated by reverse osmosis for other beneficial uses.

The associated water management strategy will be required to comply with the outcomes prescribed in the following documents once they are finalised:

- DERM (2009) Draft Guideline: *Approval of coal seam gas water for beneficial use* (Section 13(4) of the *Environmental Protection Act 1994* and Part 6A of the Environmental Protection (Waste Management) Regulation 2000)
- DERM Healthy Headwaters study: *Characterisation of salinity limits related to use of CSG water for irrigation* (DERM, Jan 2010)

Based on the information presented in the EIS and Supplementary EIS, the proposed associated water management strategy would not be consistent with the standards proposed in the documents currently being developed by DERM. The Santos proposal to irrigate and suppress dust with large quantities of saline water (<2,500 mg/L (TDS) and <3,500 uS/cm) is likely to cause long-term problems for soils, waters, vegetation, ecosystems, crops and future land use. These levels are in excess of the limits proposed in DERM's draft guideline listed above. The associated water management strategies do not provide any certainty for the management of significant volumes of associated water nor the salt load that it contains.

Recommended condition

The following condition relating to the protection of groundwater values should be imposed in the CG evaluation report:

The EM Plans developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the applications for petroleum leases for the gas fields should provide a detailed associated water management plan that meets the requirements set out in the DERM Guideline: *Preparing an environmental management plan (EM Plan) for Coal Seam Gas (CSG) activities*.

Note: further conditions relating to EM Plans for components of the project are listed in following sections.

Model Conditions

DERM, in consultation with Australian Petroleum Production and Exploration Association (APPEA), is developing 'Model Conditions' that could be accepted by environmental authority holders to apply to coal seam gas fields. It is intended that the Model Conditions will be agreed with APPEA and that they would be applied to CSG field construction, operation and rehabilitation. Currently, the Santos EIS and supplementary information outlines petroleum activities that would not comply with the Model Conditions. For this project, it is intended to develop activity and site specific conditions based on the Model Conditions that would allow Santos to conduct petroleum activities in a way that would protect or enhance the environmental values. Before any conditions can be recommend for an Environmental Authority an EM Plan that meets the requirements of section 310D of the *Environmental Protection Act 1994* as set out in the guideline: *Preparing an environmental management plan (EM Plan) for Coal Seam Gas (CSG) activities* will need to be provided. However, the Model Conditions should provide an indication of the environmental standards required for petroleum activities.

The draft Model Conditions are provided in Attachment 4 for the information of the CG. While the final Model Conditions could be applied where an EM Plan demonstrates compliance with the condition, DERM does not recommend they be applied to the Santos gas fields at this stage.

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Gas transmission pipeline issues, advice and recommended conditions.

Issue: The Narrows crossing

There is insufficient information in the EIS and Supplementary EIS to assess the potential environmental impacts of the Gas Transmission Pipeline crossing of The Narrows (Humpy Creek to Laird Point) including the Kangaroo Island wetlands. The current information does not demonstrate that the construction of the pipeline, in a technically constrained area, is possible. A general construction methodology has been provided for the gas transmission pipeline but the methodology does not address the inter-tidal areas that the pipeline would be traversing. Part A, sections 2 and 3 and Part B, sections 1.2, 2.2, 2.4, 3.2 and 3.4 of the TOR required that this information be provided in the EIS.

In addition, it is unclear how the proposed route in the EIS and Supplementary EIS relates to the route and construction methodology provided by the joint proponent Technical Working Group for the crossing of The Narrows.

A detailed illustrated and site specific construction methodology for the crossing of the Kangaroo Island wetlands and The Narrows should be provided, including information on necessary ancillary works. The methodology should be supported by a site specific Acid Sulfate Soils Management Plan.

An assessment should be provided of the potential impacts to the values of the Kangaroo Island wetlands, Port Curtis, and the Great Barrier Reef Coast Marine Park based on the proposed construction methodology and associated mitigation measures.

An assessment should be provided of the cumulative impacts to Kangaroo Island wetlands, Port Curtis, and the Great Barrier Reef Coast Marine Park that would result from up to four proposed pipeline crossings using similar construction methodology and mitigation measures.

Issue: Assessment of wetlands and aquatic values

The overall approach to the identification and assessment of wetlands and other aquatic values in proximity to the pipeline is inadequate. The assessment has not used the existing available mapping and information including Queensland Wetland Mapping. Whilst the Supplementary EIS prescribes a process by which aquatic ecosystems (including wetlands) would be allocated to Sensitive Area Criteria, in the constraints mapping for the gas fields, there is a lack of evidence that an appropriate level of assessment of the pipeline route has been undertaken to adequately identify the values. This has significant implications in relation to proposed mitigation and monitoring protocols for actions including construction, rehabilitation and maintenance of watercourse crossings. Part B, section 3.4.1 of the TOR requires that the environmental values, potential impacts and mitigation measures be identified for water resources. Part B, section 3.4.1, of the TOR specifically refers to wetland mapping.

A detailed assessment of aquatic values along the pipeline route should be provided. Site specific data should be included that accurately and comprehensively describes the environmental values and ecological condition at each aquatic site. The information should be used to determine the location of each watercourse crossing and site specific mitigation measures.

The information must also demonstrate that mitigation measures for permanent creek crossings are consistent with AS2885 – *Pipelines – Gas, Liquid and Petroleum* and the *Australian Pipeline Industry Association Code of Environmental Practice*. Those documents provide the approach to be taken when determining the optimal route selection as well as engineering standards that must be applied to the construction of the pipeline, including:

- minimisation of adverse impacts on fauna and significant habitat areas

- minimisation of impacts on riparian, aquatic and water dependent flora and fauna
- minimise erosion and sediment impacts
- maintain water quality and water flow requirements
- maximise rehabilitation success of achieving long term site stability.

In addition, the design of all creek crossings and waterway barrier works should take account of the matters discussed in *Waterway barrier works development approvals* (Fish Habitat Management Operational Policy FHMOP 008, DPI&F, July 2009). The Department of Employment, Economic Development and Innovation (DEEDI) and DERM departmental staff should be engaged in the preliminary planning and design of all creek crossing and waterway barrier works.

Issue: Ground truthing of terrain and soils mapping

The draft EIS and EIS Supplement has not provided any ground truthing of the terrain and soils mapping, particularly of likely problem areas, both for the original pipeline route and the amended route. Part B, section 3.2.2 of the TOR required that this information be presented in the EIS. The EM plan should include appropriate ground truthing of sensitive soil and landform areas along the pipeline corridor. An assessment of the potential impacts should be provided along with appropriate mitigation measures.

Issue: Cross-referencing of project and DERM datasets

The land system studies of the Isaac-Comet, Dawson-Fitzroy, Balonne-Maranoa and Capricornia Coastal Lands are principal sources of data that DERM uses when assessing impacts and to make decisions regarding suitability assessment, land management and planning. The draft EIS and EIS Supplement have not provided the necessary cross referencing between terrain units and land systems and the component land units and soils. For example, it is not clear what land system, land unit and soil “Tb4/8.11” refers to. It has also not been made clear how the variation in the soils affects the suitability and agricultural land class assessment. Part B, section 3.2.2 of the TOR required that this information be presented in the EIS. The soils in the terrain units described and mapped in the EIS and supplementary EIS should be cross-referenced to the land units and land systems in the various land system studies previously undertaken across the area.

Issue: Variations between project and DERM data for ALC and GQAL mapping

In its submission on the EIS, DERM requested that where the assessment of Agricultural Land Classes (ALC) and Good Quality Agricultural Land (GQAL) is at variance with DERM’s datasets, the reason for the difference should be stated and explained. However, this has not been addressed in the Supplementary EIS. The supplementary EIS stated that the mapping has been modified in parts by the more detailed terrain unit mapping undertaken for the gas pipeline corridor assessment. However, the details of where this occurs have not been provided, nor has there been any explanation or justification for the change. Part B, section 3.2.2 of the TOR required that this information be presented in the EIS. Where the assessment of Agricultural Land Classes and Good Quality Agricultural Land is at variance with DERM datasets, particularly where ALC A, B and C1 are involved, the reason for the difference should be stated and explained in the EM plan.

Issue: Minimising Disturbance to Strategic Cropping Land

In order to restore productive value to good quality cropping land (Class A Good Quality Agricultural Land), it is necessary to replace both the topsoil and subsoil in the correct sequence. The EIS and Supplementary EIS do not address this issue. Part B, section 3.2.2 of the TOR required that this information be presented in the EIS. The construction methodology of the pipeline will require further segregation of soil layers during trenching in order to be able to return a suitable soil profile. The soils mapping provided is not sufficiently detailed to support up front identification of cropping land that needs special treatment and it will depend on the final location of the trench.

Pre-construction soil surveys of the gas pipeline construction corridor is required to identify actual or potential good quality cropping land, sodic soils, and other potential soil management issues. Site specific construction management plans should be developed to ensure that good quality cropping land is returned to pre-construction productivity or potential, and that potential erosion problems are effectively managed. Measures to restore good quality cropping land may include further segregation of soil layers during trenching and ripping to reduce the effects of compaction by heavy equipment.

Issue: Use of existing seed stock for rehabilitation in riparian areas

Reliance on seed stock contained in the replaced topsoil would not be a suitable option for rehabilitation of riparian habitat as it may not establish the necessary diversity of plants within the required time. The application for the pipeline environmental authority should provide site-specific watercourse crossing rehabilitation procedures. Each procedure should include supplementary sowing of seed for the required diversity of species and density of plantings. Soil and fertilizer preparation should be based on expert local knowledge. Advanced specimens of trees, shrubs and ground cover plants should be planted in all disturbed riparian areas to expedite the rehabilitation of these habitats. The restored riparian habitat shall at a minimum be as wide and deep as that present prior to disturbance. Part B, section 2.4 of the TOR required that this information be presented in the EIS.

Issue: *Rheodytes leukops* and *Elseya albagula* nesting habitat

The mitigation of potential impacts resulting from the construction of pipeline crossings in areas of potential habitat for *Rheodytes leukops* (Fitzroy turtle) and *Elseya albagula* (white throated snapping turtle) are not adequately addressed. All pipeline construction works and site preparations in catchment areas that may support *R. leukops* and *E. albagula* should be undertaken outside of breeding and nesting periods. Horizontal directional drilling should be undertaken at all wetland crossings within the known distribution of *R. leukops* and *E. albagula* with a minimum buffer width exceeding the maximum recorded lateral distance of nesting from the waterway. This information was required in Part A, section 2 and part B, sections 3 and 3.3 which required the EIS to address the impacts on endangered species.

Issue: Inadequate assessment of impact from hydrostatic test water

The assessment of impacts and mitigation measures for the hydrostatic testing of the gas transmission pipeline are inadequate and not consistent with the *APIA Code of Environmental Practice* or the guiding document commissioned by APIA - *Analysis of Hydrostatic Test Water: Final Report* for APIA (2005).

The EIS and supplementary EIS do not state how hydrostatic test water will be reused, recycled or disposed of after it has served its purpose. The proposed water quality limits for hydrostatic test water exceed ANZECC & ARMCANZ (2000) freshwater trigger values significantly and therefore it would be unsuitable for discharge to watercourses. These hydrostatic test water quality limits are not compatible with the response to this issue addressed in Part 2, Section 6, *Response to submissions*, in the Supplementary EIS.

Part B, section 3.3 of the TOR required that this information be provided.

A detailed assessment of impacts from hydrostatic test water along the pipeline route should be provided with the application for the pipeline environmental authority. Source water quality data and characteristics of additives should be provided along with the proposed disposal method. The information should be used to determine the site specific mitigation measures including monitoring and reporting.

Issue: Neutralisation of biocides

While biodegradable biocides are preferable to those that are non-biodegradable, if they are not neutralised prior to discharge they still have the potential to harm aquatic ecosystems. For example, if superchlorination were used to disinfect pipelines, the chlorine could impact on the environment, and DERM would require the chlorine to be neutralised (such as by sodium metabisulfite) prior to any proposed discharge to natural waterways. The EIS has not discussed whether or how biocides will be neutralised prior to discharge. Part B, section 3.3 of the TOR required that this information be provided.

The EM plan should be amended to clearly state how and when biocides will be made inactive before any discharge.

Issue: Koala Habitat

Once the pipeline route has been decided, more specific details should be included in relation to the pipeline traversing Koala Habitat, under the Nature Conservation (Koala) Conservation Plan 2006. Detailed information should be provided in the EM plans submitted with the pipeline EM plan in relation to actual or potential disturbances of Koala Habitat Areas. More specific mitigation measures should be provided and should include habitat offsets for residual impacts. This information was required by Part B, section 3.3.1 of the TOR.

Recommended conditions for the gas transmission pipeline:

It is recommended that the CG impose the following conditions requiring the assessment of pipeline EM plan(s) prior to applications for an environmental authority(s):

Gas Transmission Pipeline

1. Prior to any application for environmental authority (petroleum activities), a draft environmental management plan (EM plan) must be provided to the DERM for review.
2. The EM plan must be prepared in accordance with the DERM published guideline: *Preparing an environmental management plan (EM Plan) for Coal Seam Gas (CSG) activities*.
3. Comments made by DERM should be incorporated into a revised EM Plan that will need to accompany Environmental Authority applications.
4. The EM Plan must specifically address:
 - Gas Transmission Pipeline crossing of The Narrows (Humpy Creek to Laird Point) including the Kangaroo Island wetlands:
A detailed illustrated and site specific construction methodology and schedule for the crossing of the Kangaroo Island wetlands and The Narrows should be provided, including information on necessary ancillary works. The construction methodology must be supported by a detailed Acid Sulfate Soils Management Plan.

The proposed construction methodology and associated mitigation measures should ensure that potential impacts to the values of the Kangaroo Island wetlands, Port Curtis, and the Great Barrier Reef Coast Marine Park (including Graham Creek) are avoided, mitigated or offset. Reference should be made in particular to removal of marine plants, disturbance to acid sulfate or potentially acid sulfate soils, minimisation of turbidity, minimisation of sedimentation and protection of marine mega-fauna.

An assessment should be provided of the cumulative impacts to the values of Kangaroo Island wetlands, Port Curtis, and the Great Barrier Reef Coast Marine Park that would result from two or more proposed pipeline crossings using similar construction methodology and mitigation measures.

- The pipeline route on Curtis Island:
A detailed illustrated and site specific construction methodology for Curtis Island should be provided, including information on necessary ancillary works and cumulative impacts arising from parallel construction of other gas pipelines, roadways, water pipelines and telecommunication cables to service multiple LNG facility sites.
- Aquatic values impacted by the Gas Transmission Pipeline, including:
A detailed assessment of aquatic values (including animal breeding places) along the pipeline route should be provided. Site specific data should be included that accurately and comprehensively describes the environmental values and ecological condition at each aquatic site. The information should be used to determine the location of each watercourse or wetland crossing and site specific mitigation measures to protect the values identified.
The information must also demonstrate that mitigation measures for permanent creek crossings are consistent with AS2885 – *Pipelines – Gas, Liquid and Petroleum* and the *Australian Pipeline Industry Association Code of Environmental Practice*. Those documents provide the approach to be taken when determining the optimal route selection as well as engineering standards that must be applied to the construction of the pipeline, including:
 - minimisation of adverse impacts on fauna and significant habitat areas
 - minimisation of impacts on riparian, aquatic and water dependent flora and fauna
 - minimise erosion and sediment impacts
 - maintain water quality and water flow requirements
 - maximise rehabilitation success of achieving long term site stability.
 In addition, the design of all creek crossings and waterway barrier works should take account of the matters discussed in *Waterway barrier works development approvals* (Fish Habitat Management Operational Policy FHMOP 008, DPI&F, July 2009).
- Protection of flora and fauna during construction and operation, including reduction or disruption to habitat. Particular mention should be made of any potential disruption to Koala or endangered species habitats.
- Scheduling of construction to protect the breeding and nesting seasons of the endangered Fitzroy and White Throated Snapping Turtles where applicable.
- Rehabilitation of disturbed riparian areas including use of locally sourced species and intensive planting.

- Soils ground truthing, including:
Identification of all sensitive soil and landform areas along the pipeline corridor including Good Quality Agricultural Land, cross referenced to known information on land units and land systems. Any variation between identified land values and DERM data sets should be identified and explained. An assessment of the potential impacts should be provided along with appropriate mitigation measures and construction methods applicable to the identified soil types or landforms.
- Protection and restoration of good quality agricultural land that could qualify as strategic cropping land under the Government's draft discussion paper Protection of Strategic Cropping Land;
- Hydrostatic test water, including:
A detailed assessment of impacts from hydrostatic test water along the pipeline route should be provided. Source water quality data and characteristics of additives, particularly biocides) should be provided along with the proposed storage, treatment and disposal methods. The information should be used to determine the site specific mitigation measures including monitoring and reporting.

Conditions to be imposed for the environmental authority for the gas transmission pipeline can be found in Attachment 2. These conditions would only apply where an EM Plan has demonstrated that the environmental standards in the conditions could be achieved.

Crossing of the Narrows (Humpy Creek to Laird Point) including the Kangaroo Island wetlands, alternative routes:

A joint proponent Technical Working Group has presented departments with a comprehensive route and construction proposal that would allow multiple gas pipelines to be installed in the one location. This joint proposal is inconsistent with that proposed by Santos for its own purposes. DERM recommends that the joint proposal be fully assessed with a view to adopting the proposal as the preferred option should there be a need for multiple gas pipelines to supply LNG facilities on Curtis Island.

Recommended conditions

1. The proposed Santos route and construction methodology for the Gas Transmission Pipeline crossing of The Narrows (Humpy Creek to Laird Point), including the Kangaroo Island wetlands, should only be used where information can be provided demonstrating that only one or two gas transmission pipelines will be constructed across the Kangaroo Island wetlands.
2. Where more than two gas transmission pipelines will be constructed across the Kangaroo Island Wetlands, then the route proposed by Queensland Gas Company on behalf of Queensland Curtis LNG, Gladstone LNG, Australia Pacific LNG and Shell Australia LNG should be used where the construction is consistent with the document: *GLNG Pipeline FEED – Report of Mechanised Marine Crossing Installation Concept*, dated 24 February 2010.

LNG Facility issues, advice and recommended conditions

Issue: LNG process description

The operational description of the LNG Facility is inadequate. The draft EIS is unclear with respect to inputs and outputs of the facility. Section 3.8.3.8 and Table 3.8.6 of the draft EIS specify chemicals to be consumed by the plant. However, the fate of these chemicals is not described in this section (3.8.3.8, LNG Facility Inputs and Outputs) or section 5, Waste. This issue was not addressed in the EIS Supplement. The TOR required that this information be provided as specified in Part B, sections 1.2 and 3.7.

The EM Plan should include a detailed illustrated description of the LNG process. The description should include all inputs and outputs (as well as fugitive emissions), including the characterisation of all wastes that would result from processes at the plant. Section 310D of the *Environmental Protection Act 1994* requires that the EM plan describe the location and the method of disposal for all wastes, assess the consequential impacts of waste disposal, and propose mitigation measures for all potential impacts.

Issue: Sewage treatment plant (STP) effluent

The draft EIS proposed that STP effluent would be managed through onsite irrigation or shipped to a Gladstone STP during various phases of the activity. In contrast, the current proposal provided in the EIS Supplement is to dispose of all STP effluent, treated to secondary standard, to Port Curtis through the reverse osmosis plant diffuser.

Discharge of a waste to surface waters should only be considered when there is no practical alternative, particularly when those surface waters are in a World Heritage Area and adjacent to the Great Barrier Reef. The EIS Supplement has not provided any assessment determining that discharge to surface waters is the only feasible option for the disposal of the waste. Part B, sections 2.6.2 and 3.4 of the TOR required that this information be provided.

In addition, secondary treated effluent would result in high nitrogen loading (555kg/day calculated from data presented in modelling assumptions), phosphorus loading of 278kg/day (also calculated from data presented in modelling assumptions), and other contaminants. The discharge of these nutrients and other contaminants in close proximity to high ecological value sites would lead to an unacceptable impact to the water quality and ecological health. The proposal is not consistent with the Environmental Protection (Water) Policy 2009. Therefore, DERM does not support this proposal.

It should be noted that DERM's experience with other projects proposing discharge to Port Curtis, is that the Commonwealth Government has set a stringent "no acute toxicity" policy for these discharges. The Commonwealth has also required a comprehensive monitoring program of Port Curtis water quality, flora and fauna to determine the long term chronic toxicant, or ecosystem change impacts. Conditions have been set to enforce these requirements. DERM has adopted this approach for other projects and expects LNG effluent releases to meet the same criteria.

The EM plan should contain a suitable proposal, consistent with the *Environmental Protection Act 1994* and subordinate legislation for the disposal of STP effluent. Information describing the potential impacts and mitigation methods should be included.

Issue: Reverse osmosis chemicals, backwash water and intake line

The draft EIS and EIS Supplement have not provided sufficient information to assess the discharge of reverse osmosis concentrate from the desalination plant. It appears that the discharge of reverse osmosis concentrate (a different waste stream from STP effluent) could be managed appropriately. However, the EIS Supplement has not addressed the impacts and mitigation measures for: the backwashing waste stream; the characteristics and quantities of chemicals used in the cleaning process; or the detailed description of the intake line for the desalination plant. Part B, section 1.2 of the TOR requires that this information be provided.

Sufficient information should be provided to assess the reverse osmosis concentrate discharge to Port Curtis. The information should address: the backwash water used in the reverse osmosis cleaning water; the quantity and characteristics of the chemicals used in the reverse osmosis cleaning water; and the intake line for the desalination plant.

Issue: Other environmentally relevant activities and approvals

The draft EIS and EIS Supplement have not provided sufficient information to assess other environmentally relevant activities proposed for the Curtis Island site. These activities could include concrete batching, chemical storage, power generation and bulk goods handling. In addition there are other approvals likely to be required for operational works in the tidal area associated with materials off-loading facilities, jetties and ship loading facilities.

Sufficient information should be provided about these activities to enable DERM to meet its statutory obligations to identify impacts and mitigation opportunities to allow appropriate conditions to be set. It is understood that Santos is preparing detailed design and engineering plans for initial tidal operational works in time for their assessment as part of the significant project process.

Issue: MOF approvals and disposal of dredge spoil on Curtis Island

The EIS and Supplementary EIS propose to dispose of up to 100,000m³ of dredge spoil for filling activities on Curtis Island. While the management of dredge spoil is possible, the activity seems to be outside the guidance provided in the Western Basin Master Plan. The EM Plan and Construction Environmental Management Plan should detail the construction methodology and mitigation measures that will protect the environmental values, consistent with the Western Basin Master Plan.

Issue: CORMIX modelling

The draft EIS and EIS Supplement has not addressed the suitability of the CORMIX program for predicting the mixing of reverse osmosis concentrate (a waste denser than Port Curtis receiving water) with the receiving water.

The EM plan should provide an assessment of the suitability of the CORMIX program for modelling the near-field mixing of the dense reverse osmosis concentrate with receiving water. If the assessment shows the CORMIX model cannot provide the necessary level of prediction, the modelling should be repeated using an appropriate model. Part B, section 3.3.5 of the TOR required that this information be presented in the EIS.

Issue: Provision of ASS borehole log information

In the submission on the original EIS, DERM requested missing borehole logs of onshore cores numbered 41 to 52 inclusive to assess the sediment characteristics at these locations for suitability for fill placement and likely acid sulfate soil disturbance. Appendix L4 Land – *Acid Sulfate Soils* of the supplementary EIS states that these borehole logs have been provided to DERM as requested. However, DERM is not aware of these borehole logs being received and they do not appear to be contained in the Supplementary EIS Attachments Part 3 G2 or Part 3 E5. Part B, section 3.2.2 of the TOR required that this information be presented in the EIS.

Recommended conditions for the LNG facility:

It is recommended that the CG impose the following conditions:

LNG Facility

1. Prior to any application for environmental authority (petroleum activities), a draft environmental management plan (EM Plan) must be provided to the DERM for review.

Release

2. The EM Plan must be prepared in accordance with the DERM published guideline: *Preparing an environmental management plan (EM Plan) for Coal Seam Gas (CSG) activities*.
3. Any comments made by DERM should be incorporated into a revised EM Plan that will need to accompany Environmental Authority applications.
4. The EM plan must specifically address:
 - Identification of all environmentally relevant activities conducted in the petroleum tenure and other approvals required for this component of the project to proceed
 - A construction environmental management plan (CEMP). The CEMP must include the following information:
 - detailed design plans showing the exact extent of the works proposed;
 - details of the proposed construction methodology detailing significant construction stages, timeframes and proposed environmental controls;
 - environmental monitoring and a sampling program which details baseline data collection and provides the basis for ongoing monitoring of specified parameters for the period the works, including appropriate triggers for mitigation and cessation of works;
 - specific reference to the disposal of dredge spoil within the area, including provisions for the management and treatment of acid sulfate or potentially acid sulfate soils and the protection of terrestrial habitats from saline leachate;
 - any potential impacts or effects of the proposed works upon the environment and the means by which adverse impacts will be avoided or mitigated;
 - details of a response plan, with appropriate triggers, which will be initiated in response to any significant impacts on the environment from the works.
 - identification and characterisation of all wastes and emissions produced by the facility and its associated support infrastructure including its source, handling, treatment, disposal or release to the environment.
 - Sewage treatment plant and desalination plant
 - A detailed assessment of impacts from the discharge of treated sewage and brine should be provided. Source water quality data and characteristics of additives should be provided along with the proposed treatment and disposal method. The information should be used to determine the site specific mitigation measures including monitoring and reporting.
 - Eco-toxicity of effluent at point of release, mixing zone and cumulative impacts of contaminants in the marine ecosystem over time.
 - Adequacy of modelling to predict dimensions and duration of mixing zone.

Conditions to be imposed for the Environmental Authority for the Petroleum Facilities Licence can be found in Attachment 2. These conditions would only apply where an EM Plan provided by Santos has demonstrated that the standards could be achieved.

Note: further conditions relating to dredging of the MOF can be found in the next section.

Marine infrastructure issues, advice and recommended conditions:

Issue: Laird Point dredge spoil disposal

There are significant issues that must be addressed for the Laird Point dredge spoil disposal component of the project. The proposal is not consistent with the Government's intent for the LNG industry. The dredge disposal option proposed is not consistent with the Port of Gladstone Western Basin Master Plan or the Port of Gladstone Western Basin Dredging Project.

In addition, it appears unlikely that owners consent could be obtained for the site. The proponent has not demonstrated that owners consent can be obtained for the land subject to the work.

Section 263 of the *Sustainable Planning Act 2009* requires that owners consent be provided for any application to be made for the subject land, owned by Australia Pacific LNG Pty Ltd and located within the Gladstone State Development Area. Australia Pacific LNG Pty Ltd has advised in meetings, that a dredge spoil facility on their land is not appropriate and would have significant implications for their project.

Consequently, DERM cannot support the dredge disposal facility proposed for Laird point.

However, for completeness, DERM has been requested to assess this component of the project. The proposal involves the loss of 6 ha of mangroves and 31 ha of salt marsh and salt pan. This is based on the footprint of the works. The construction of the facility would require greater disturbance to the marine environment that has not been identified in the EIS and Supplementary EIS.

The management of acid sulfate soils proposed for the dredge spoil disposal facility is not consistent with best practice or available guidelines. In particular, the proposed option of aboveground capping of 145,000m³ of excavated untreated acid sulfate soil material, with very high levels of acid generation potential, for the main embankment construction is not an acceptable management strategy. Capping untreated acid sulfate soils above the ground is a high risk activity and is not supported due to the associated level of environmental risk (*Queensland Acid Sulfate Soil Technical Manual Soil Management Guidelines 2002*). DERM would require that the acid sulfate soil material be treated. However, the Supplementary EIS indicates that treatment of the excavated acid sulfate soils would not be economically viable. Therefore, it is not clear that the proposed disposal of spoil at Laird Point could be approved with reasonable conditions (i.e. DERM imposing conditions to treat the material). Section 406 of the *Sustainable Planning Act 2009* requires that conditions be relevant and reasonable.

DERM has identified that an amended proposal and further information is required before DERM could support this proposal. The information includes:

- Information demonstrating the proposal is consistent with Port of Gladstone Western Basin Master Plan or the Port of Gladstone Western Basin Dredging Project;
- Owner's consent for the proposed development;
- An assessment of the alternative options for the disposal of dredge material including: ocean disposal and alternate land disposal options with a detailed assessment and determination of the selected disposal option. A clear discussion of the weighting of environmental criteria should be included;
- A detailed and site specific construction methodology for construction of the spoil disposal facility including an Acid Sulfate Soil Management Plan in accordance with the *Queensland Acid Sulfate Soil Technical Manual Soil Management Guidelines 2002* and other relevant guidelines.

Part B, section 1.5 in conjunction with the section 3 of the TOR required that this information be provided in the EIS.

Issue: Bridge and Road access to Curtis Island

The EIS identifies that the environmental impacts of the construction of bridge and road access to Curtis Island are far greater than the proposal to use barge and ferry for transport requirements. The barge and ferry option is Santos's preferred option.

Therefore, DERM does not support the bridge and road access to Curtis Island.

Recommended conditions for dredging and dredge spoil disposal:

The EIS and Supplementary EIS states that dredging of the channel, berth, and swing basin will be by cutter-suction dredge with direct pumping to a disposal area. The proposed dredging methodology and disposal is best practice in minimising adverse impacts. DERM has recommended conditions to apply to Material Change of Use for Environmentally Relevant Activities (16 Dredging) in Attachment 3.

It is recommended that the following conditions be imposed as Coordinator-General conditions for operational work assessed under the *Coastal Protection and Management Act 1995*:

Coastal Works

1. Prior to application for works within the Coastal Management District, detailed design drawings and a Construction Environmental Management Plan (CEMP) shall be provided to the DERM for review.
 - 1.1. The CEMP shall include the following information:
 - detailed design plans showing the exact extent of the works proposed;
 - details of the proposed construction methodology detailing significant construction stages, timeframes and proposed environmental controls;
 - water quality monitoring and a sampling program which details baseline turbidity and pollutant concentrations and provides the basis for ongoing monitoring of these levels for the period the works, including appropriate triggers for mitigation and cessation of works;
 - any potential impacts or effects of the proposed works upon the coastal environment including marine mammals and surrounding seagrass communities, and the means by which adverse impacts will be avoided or mitigated;
 - details of a response plan, with appropriate triggers, which will be initiated in response to any significant impacts on coastal management from the works.
2. Dredging shall be carried out in accordance with a Dredge Management Plan approved by the DERM using equipment and methodology which results in suspended sediment loading to waters no greater than the levels adopted for modelling in the Western Basin Dredging and Disposal Environmental Impact Statement.
 - 2.1. Dredging of the shipping channel, berths and swing basin shall be carried out using a cutter suction dredge with spoil pumped from the dredge to an approved disposal area.
3. All areas below 5 m AHD that are to be excavated, dredged or disturbed during construction shall be subject to an assessment in accordance with the *Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland 1998* (QASSIT).
4. Disturbance, dredging or excavation, and disposal of material containing acid sulfate soils shall only be carried out in accordance with a site specific, and construction methodology specific, Acid Sulfate Soil Management Plan (ASSMP) approved by the

DERM detailing management strategies in accordance with the *Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines 2002*.

- 4.1. The draft ASSMP must be provided to DERM prior to application for development approval under the *Sustainable Planning Act 2009*, or for approval of a Dredge Management Plan.
- 4.2. No material containing Actual Acid Sulfate Soils shall be placed in any disposal area, waters, or on land, without neutralisation.
- 4.3. Material containing Potential Acid Sulfate Soils may only be placed within a disposal area if located entirely below the level of Mean Low Water Springs and kept submerged at all times.
- 4.4. Above ground capping of untreated acid sulfate soil material, or filling land with untreated excavated or dredged acid sulfate soil material is not permitted.
5. Prior to an application for development approval under the *Sustainable Planning Act 2009*, or approval of a Dredge Management Plan, for dredging and disposal of dredge spoil, a monitoring program to assess the impacts of the dredging on ecological health and water quality must be developed in consultation with, and acceptable to, DERM.
 - 5.1. The monitoring program shall be implemented over the full period of dredging, and for a period prior to and after dredging as defined by the monitoring program.
 - 5.2. Information obtained from the monitoring program must be made available to the DERM within 28 days of survey or data acquisition.

Other activities issues and recommendations:

Issue: Insufficient information to condition permits outside of petroleum tenure

Preface, section 4 of the TOR requires that the EIS consider all development permits to allow the CG to state conditions in the Evaluation Report. There is insufficient information in the draft EIS and EIS Supplement to assess the activities that are proposed to occur outside of the petroleum tenure. Therefore, appropriate conditions cannot be recommended. Such activities include: environmentally relevant activities assessed under the *Environmental Protection Act 1994*; works assessed under the *Vegetation Management Act 1999*; and works assessed under the *Coastal Protection and Management Act 1995* for activities based on the mainland and possible on Curtis Island outside the petroleum lease designation.

DERM **requests** that the Coordinator-General's report state that the Evaluation Report does not apply to those activities to ensure that the processing of the applications for development approval can include the Information and Referral Stage of the IDAS and the Notification Stage if it would be applicable.

Department of Environment and Resource Management (DERM) recommended Coordinator-General – Environmental authority conditions for the Gladstone LNG Project

Gas transmission pipeline:

SCHEDULE A – GENERAL CONDITIONS

PREVENT AND/OR MINIMISE LIKELIHOOD OF ENVIRONMENTAL HARM

- (A1) This authority does not authorise environmental harm unless a condition contained within this authority explicitly authorises that harm. Where there is no condition or the authority is silent on a matter, the lack of a condition or silence shall not be construed as authorising harm.
- (A2) In carrying out petroleum activities the holder of this authority must prevent and / or minimise the likelihood of environmental harm being caused.

MAINTENANCE OF MEASURES, PLANT AND EQUIPMENT

- (A3) The holder of this authority must:
 - a) install all measures, plant and equipment necessary to ensure compliance with the conditions of this authority; and
 - b) maintain such measures, plant and equipment in a proper and efficient condition; and
 - c) operate such measures, plant and equipment in a proper and efficient manner.
- (A4) All instruments, equipment and measuring devices used for measuring or monitoring in accordance with any condition of this authority must be calibrated, appropriately operated and maintained.
- (A5) No change, replacement or alteration of any plant or equipment is permitted if the change, replacement or alteration increases the environmental harm caused by the petroleum activities.
- (A6) The holder of this authority must ensure that daily operation and maintenance of all plant and equipment relating to the authorised petroleum activities are carried out by suitability qualified, competent and experienced person(s).
- (A7) All analyses and tests required to be conducted under this authority must be carried out by a laboratory that has NATA certification for such analyses and tests, except as otherwise authorised by the administering authority.

COMPLIANCE WITH AUSTRALIAN PIPELINE INDUSTRY ASSOCIATION CODE OF ENVIRONMENTAL PRACTICE

- (A8) The holder of this authority must undertake petroleum activities in relation to the operation of petroleum pipelines in accordance with the Australian Pipeline Industry Association *Code of Environmental Practice – Onshore Pipelines*, October 2005 (the Code) or subsequent versions thereof. To the extent of any inconsistency between the conditions of this environmental authority and the Code, the conditions of this authority prevail.

FINANCIAL ASSURANCE

- (A9) The holder of this authority must provide a financial assurance in the amount and form required by the administering authority for the construction, operation and decommissioning of the relevant petroleum pipeline at the time of the submission of the original or any amended work program or development plan. The calculation of financial assurance must be calculated in accordance with the guideline *Financial assurance for petroleum activities*.
- (A10) The financial assurance is to remain in force until the administering authority is satisfied that no claim is likely to be made on the assurance.

DEFINITIONS

- (A11) Words and phrases used in this authority are defined in Appendix 1 – Definitions. Where a definition for a term used in this authority is sought and the term is not defined within this

authority, the definitions in the *Environmental Protection Act 1994*, its Regulation and Environmental Protection Policies must be used.

ENVIRONMENTAL MANAGEMENT PLAN

- (A12) An Environmental Management Plan (EM plan) must be implemented that provides for the effective management of the actual and potential impacts resulting from the carrying out of the petroleum activities. Documentation relating to the EM plan must be kept.
- (A13) The EM plan required by condition (A12) must address, at least, the following:
1. Describe each of the following:
 - (a) each relevant resource authority for the environmental authority;
 - (b) all relevant petroleum activities;
 - (c) the land on which the activities are to be carried out;
 - (d) the environmental values likely to be affected by the activities; and
 - (e) the potential adverse and beneficial impacts of the activities on the environmental values.
 2. State the environmental protection commitments the applicant proposes for the activities to protect or enhance the environmental values under best practice environmental management;
 3. Include a rehabilitation program for land proposed to be disturbed under each relevant resource authority for the application; and
 4. State a proposed amount of financial assurance for the environmental authority as part of the rehabilitation program.
 5. Training staff in the awareness of environmental issues related to carrying out the petroleum activities, which must include at least:
 - (a) The environmental policy of the authority holder, so that all persons that carry out the petroleum activities are aware of all relevant commitments to environmental management;
 - (b) Any relevant environmental objectives and targets, so that all staff are aware of the relevant performance objectives and can work towards these;
 - (c) Control procedures to be implemented for routine operations for day to day activities to minimise the likelihood of environmental harm, however occasioned or caused;
 - (d) Contingency plans and emergency procedures to be implemented for non-routine situations to deal with foreseeable risks and hazards, including corrective responses to prevent and mitigate environmental harm (including any necessary site rehabilitation);
 - (e) Organisational structure and responsibility to ensure that roles, responsibilities and authorities are appropriately defined to ensure effective management of environmental issues;
 - (f) Effective communication procedures to ensure two-way communication on environmental matters between operational staff and higher management;
 - (g) Obligations with respect to monitoring, notification and record keeping obligations under the EM plan and relevant approvals; and
 - (h) Monitoring of the release of contaminants into the environment including procedures, methods and record keeping.
 6. The conduct of periodic reviews of environmental performance and procedures adopted, not less frequently than annually; and
 7. A program for continuous improvement.

SCHEDULE B – ENVIRONMENTAL NUISANCE

- (B1) The release of odour, dust or any other airborne contaminant(s), or light from the petroleum activity must not cause an environmental nuisance at any sensitive place or commercial place.

NOISE

- (B2) Prior to undertaking petroleum activities that are likely to impact upon a sensitive or commercial place, the holder of this authority must investigate potential noise emissions from the proposed petroleum activities and determine if noise emissions are likely to exceed the limits set in Condition (B3).
- (B3) If noise emissions are likely to exceed the limits specified in Schedule B, Table 1, then the holder must take appropriate measures to either relocate the petroleum activity or incorporate noise abatement and / attenuation measures to mitigate those impacts. These measures must be in place prior to undertaking the proposed petroleum activity.
- (B4) Noise emitted from any aspect of the petroleum activities must not exceed the noise levels, specified in Schedule B, Table 1 at any sensitive or commercial place, other than those owned by the holder of this authority.
- (B5) In the event of a complaint regarding noise from the petroleum activities at a sensitive or commercial place, the holder of this authority must conduct an appropriate investigation and must implement remedial action, if the noise from the petroleum activities exceeds the noise limits in Schedule B, Table 1 at the sensitive or commercial place.
- (B6) The method of measurement and reporting of noise levels must comply with the latest edition of the Environmental Protection Agency's Noise Measurement Manual or the most recent version of AS1055 Acoustics – Description and measurement of environmental noise and the EPA guideline, Assessment of low frequency noise and the EcoAccess guideline, Planning for noise control.

ALTERNATIVE ARRANGEMENTS AVAILABLE WHEN NOISE EMISSIONS MAY CAUSE NUISANCE FOR LIMITED PERIODS

- (B7) Where the holder of this authority has, at their cost, made alternative arrangements to the satisfaction of and with the written agreement of each person affected by nuisance noise emissions at a sensitive or commercial place, then the requirements specified in Table F1- Noise Limits will not apply at that sensitive or commercial place for the period of the alternative arrangements.
- (B8) As a minimum each written agreement of an alternative arrangement must state:
1. the location of the sensitive or commercial place;
 2. the names of the affected persons;
 3. the nature of the alternative arrangement(s) (e.g. provision of alternative accommodation); and
 4. the period of the alternative arrangement(s).

SCHEDULE B, TABLE 1 – NOISE LIMITS

Sensitive place						
Noise level dB(A) measured as:	Monday to Saturday			Sundays and public holidays		
	7am to 6pm	6pm to 10pm	10pm to 7am	9am to 6pm	6pm to 10pm	10pm to 9am
adj, 15 mins	f bg+3	lesser of bg+0 or 40				
adj, 15 mins	f bg+5	f bg+5		f bg+5	f bg+5	
adj, 15 mins	f bg+10	f bg+10	f bg+5	f bg+10	f bg+10	f bg+5
Commercial place						
Noise level dB(A) measured as:	Monday to Saturday			Sundays and public holidays		
	7am to 6pm	6pm to 10pm	10pm to 7am	9am to 6pm	6pm to 10pm	10pm to 9am
adj, 15 mins	lesser of bg+5 or 50	bg+0	bg+0	lesser of bg+3 or 43	bg+0	bg+0
adj, 15 mins	lesser of bg+10 or 55	lesser of bg+10 or 50	lesser of bg+5 or 45	lesser of bg+10 or 50	lesser of bg+10 or 45	lesser of bg+5 or 40
adj, 15 mins	lesser of bg+15 or 60	lesser of bg+15 or 55	lesser of bg+10 or 50	lesser of bg+15 or 55	lesser of bg+15 or 50	lesser of bg+10 or 45

- bg = background noise level
- In the event that measured bg is less than 25 dB(A), then 25 dB(A) is to be substituted for the measured level
- If the background is higher than the number shown on the second line in any box, the limit is to be background plus 0.

BLASTING ACTIVITIES

- (B9) All blasting must be carried out in a proper manner by a competent person in accordance with best practice environmental management and Australian Standard 2187 to minimise the likelihood of any adverse effects being caused by airblast overpressure and/or ground borne vibrations at any sensitive or commercial place.
- (B10) Noise from blasting operations must not exceed an airblast overpressure level, when measured at or extrapolated to any noise sensitive or commercial place, of 115 dB (linear peak) for nine (9) out of any ten (10) consecutive blasts initiated nor 120 dB (linear peak) at any time.

- (B11) Ground-borne vibration peak particle velocity caused by blasting operations, when measured at or extrapolated to any noise sensitive or commercial place, must not exceed more than 5 mm per second for nine (9) out of any ten (10) consecutive blasts initiated, nor 10 mm per second at any time.

BLAST AND VIBRATION MONITORING

- (B12) Should complaints about blasting and/or vibration be received or when requested by the Administering Authority, monitoring and recording of air blast overpressure and ground borne vibration (as relevant to the complaint) must be undertaken to investigate any complaint of nuisance, and the results notified within 14 days to the administering authority. Monitoring must include:
1. maximum instantaneous charge;
 2. location of the blast within the site (including any bench level);
 3. airblast overpressure level (dB Linear Peak);
 4. peak particle velocity (mms-1);
 5. location, date and time of recording;
 6. measurement instrumentation and procedure;
 7. meteorological conditions for blast monitoring (including temperature, relative humidity, temperature gradient, cloud cover, wind speed and direction); and
 8. distance/s from blast site to potentially noise-affected building/s or structure/s.

SCHEDULE C – WATER MANAGEMENT

RELEASE TO WATERS

- (C1) There must be no release of contaminants to waters.

RELEASE TO LAND

- (C2) The holder of this authority may allow pipeline trench water to be released to land for disposal provided that the water does not have any properties nor contain any organisms or other contaminants in concentrations that are capable of causing environmental harm.
- (C3) Subject to Condition (C2), the holder of this authority must ensure that the release of trench water to land must be carried out in a manner that ensures that:
1. vegetation is not damaged;
 2. soil erosion and soil structure damage is avoided;
 3. the quality of groundwater is not adversely affected; and
 4. there are no releases of trench water to any surface waters.

MANAGEMENT OF HYDROSTATIC TEST WATER

- (C4) The holder of this authority must ensure that:
1. hydrostatic test water is not released to waters;
 2. hydrostatic test water containing chemical additives is not released to land without written consent from the administering authority; and
 3. hydrostatic test water released to land does not exceed the water quality limits specified in Schedule C – Table 1.

SCHEDULE C, TABLE 1 – LIMITS FOR THE DISPOSAL OF HYDROSTATIC TEST WATER TO LAND

Parameter	Maximum Value
pH	6.5-8.5 (Range)
Arsenic (mg/L)	2.0
Cadmium (mg/L)	0.05
Chromium (mg/L)	1
Copper (mg/L)	5
Iron (mg/L)	10
Lead (mg/L)	5
Manganese	10
Zinc (mg/L)	5
Nitrogen (mg/L)	35
Phosphorus (mg/L)	10
Electrical Conductivity (uS/cm)	2000

(C5) The release of hydrostatic test water authorised by Condition (C4 (3)) must be located at least 100m from the nearest watercourse and carried out in a manner that ensures that:

1. vegetation is not damaged;
2. soil erosion and soil structure damage is avoided;
3. the quality of groundwater is not adversely impacted; and
4. discharge of hydrotest water is controlled to prevent water runoff from the nominated discharge areas.

DETERMINING WATER QUALITY CONTAMINANTS

(C6) All determinations of the quality of contaminants released must be made in accordance with methods prescribed in the latest edition of the Department of Environment and Resource Management *Monitoring and Sampling Manual*, 2009, and carried out on samples that are representative of the discharge.

CONTAMINANT RELEASES TO GROUNDWATER

(C7) There must be no release of contaminants to groundwater.

SCHEDULE D – WASTE MANAGEMENT

- (D1) The holder of this authority must ensure that petroleum activities do not result in the release or likely release of contaminants to the environment from the storage, conditioning, treatment and disposal of regulated waste materials.
- (D2) The holder of this authority must ensure that petroleum activities do not result in the release or likely release of a hazardous contaminant to the environment.
- (D3) Any spillage of hazardous waste or other contaminants that may cause environmental harm, must be effectively contained and cleaned up as quickly as practicable. Such spillage must not be cleaned up by hosing, or otherwise thereby releasing such waste or contaminants to any land or waters.
- (D4) The holder of this authority must as soon as practicable remove and dispose of all regulated waste to a licensed waste disposal facility or recycling facility.
- (D5) All regulated waste removed from the site must be removed by a person who holds a current authority to transport such waste under the provisions of the *Environmental Protection Act 1994* and sent to a facility licensed to accept such waste.
- (D6) When regulated waste is removed from within the boundary of the petroleum tenure and transported by the holder of this authority, a record must be kept of the following:
1. date of waste transport;
 2. quantity of waste removed and transported;
 3. type of waste removed and transported;
 4. route selected for transport of waste;
 5. quantity of waste delivered; and
 6. any incidents (e.g. spillage) that may have occurred on route.
- (D7) If a person removes regulated waste associated with activities within the operational land and disposes of such waste in a manner which is not authorised or is improper or unlawful then, as soon as practicable, notify the administering authority of all relevant facts, matters and circumstances known concerning the disposal.
- (D8) The holder of this authority must implement a Waste Management Plan consistent with the Environmental Protection (Waste) Policy 2000.
- (D9) The Waste Management Plan must address at least the following matters:
1. The types and amounts of waste generated;
 2. How the waste will be dealt with, including a description of the types and amounts of waste that will be dealt with under each of the waste management practices mentioned in the waste management hierarchy (section 10 of the Environmental Protection (Waste Management) Policy 2000);
 3. Procedures for dealing with accidents, spills and other incidents that may impact on waste management; and
 4. How often the performance of the waste management practices will be assessed (i.e. at least annually); and
 5. The indicators or other criteria on which the performance of the waste management practices will be assessed.
- (D10) There must be no treatment and disposal of sewage conducted under this environmental authority.

SCHEDULE E – LAND MANAGEMENT**MINIMISING DISTURBANCE TO LAND AND SOIL MANAGEMENT**

- (E1) The holder of this authority must:
1. limit the right of way width to a maximum of 40 metres;
 2. minimise disturbance to land in order to prevent land degradation;
 3. ensure that for land that is to be significantly disturbed by petroleum activities (except in areas of highly erosive soils), the top layer of the soil profile is removed; and
 - (a) stockpiled in a manner that will preserve its biological and chemical properties, and
 - (b) used for rehabilitation purposes in accordance with condition (E30).
- (E2) The holder of this environmental authority must develop and implement soils management procedures for areas to be disturbed by petroleum activities prior to commencement of petroleum activities in these areas to prevent or minimise the impacts of soil disturbance. These procedures must include but not be limited to:
- (a) establish baseline soils information for areas to be disturbed including soil depth, pH, electrical conductivity (EC), chloride, cations (calcium, magnesium and sodium), exchangeable sodium percentage (ESP), particle size and soil fertility (including nitrogen, phosphorous, potassium, sulphur and micronutrients);
 - (b) a soils monitoring program outlining parameters to be monitored, frequency of monitoring and maximum limits for each parameter;
 - (c) identify soil units within areas to be disturbed by petroleum activities at a scale of 1:100000, in accordance with the *“Guidelines for Surveying Soil and Land Resources, 2nd Edition”* (McKenzie *et al.* 2008), *“Australian Soil and Land Survey Handbook, 3rd Edition”* (National Committee on Soil and Terrain 2009) and *“The Australian Soil Classification”* (Isbell 2002);
 - (d) develop soil descriptions that are relevant to assessment for agricultural suitability, topsoil assessment, erodibility and rehabilitation, for example:
 - i. shallow cracking clay soils;
 - ii. deep cracking clay soils;
 - iii. deep saline and/or sodic cracking clay soils with melonholes;
 - iv. thin surface, sodic duplex soils;
 - v. medium to thick surface (say >15 cm), sodic duplex soils; and
 - vi. non-sodic duplex soils;
 - (e) detailed mitigation measures and procedures to manage the risk of adverse soil disturbance in the carrying out of the petroleum activity; and
 - (f) for areas of good quality agricultural land, detailed methods to be undertaken to minimise potential impacts.
- (E3) A copy of the soils management procedures must be made available to the administering authority upon request.
- (E4) The holder of this authority must undertake an acid sulfate soils (ASS) investigation for the proposed linear disturbance (excavation, filling) on land areas that may potentially contain ASS (including all areas <5m AHD) according to the *Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils (ASS) in Queensland 1998*.
- (E5) The holder of this authority must provide detailed management measures in accordance with the *Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines 2002* to the administering authority at least 20 business days prior to commencement of excavation or filling activities within areas identified as potential for containing ASS in the investigation outlined in condition (E4).

- (E6) The holder of this authority must have due regard to any comments provided by the administering authority when implementing ASS management measures.

EROSION AND SEDIMENT CONTROL PLANS

- (E7) An Erosion and Sediment Control Plan must be developed and implemented for all stages of the petroleum activities and which has been certified by a Certified Professional in Sediment and Erosion Control, or a professional with appropriate experience and or qualifications accepted by the Administering Authority.
- (E8) Appropriate measures to achieve compliance with condition (E7) for the petroleum activity must be described in the EM plan and include:
1. diverting uncontaminated stormwater run-off around areas disturbed by petroleum activities or where contaminants or wastes are stored or handled that may contribute to stormwater;
 2. contaminated stormwater runoff and incident rainfall is collected; and treated, reused, or released in accordance with the conditions of this environmental authority;
 3. roofing or minimising the size of areas where contaminants or wastes are stored or handled;
 4. using alternate materials and or processes (such as dry absorbents) to clean up spills that will minimise the generation of contaminated waters;
 5. erosion and sediment control structures are placed to minimise erosion of disturbed areas and prevent the contamination of any waters;
 6. an inspection and maintenance program for the erosion and sediment control features; and
 7. provision for adequate access to maintain all erosion and sediment control measures especially during the wet season months from December to March.
 8. identification of remedial actions that would be required to ensure compliance with the conditions of this environmental authority.
- (E9) Erosion protection measures and sediment control measures must be implemented and maintained to minimise erosion and the release of sediment and contamination of stormwater.
- (E10) The maintenance and cleaning of any vehicles, plant or equipment must not be carried out in areas from which contaminants can be released into any waters, roadside gutter or a stormwater drainage system.
- (E11) Any spillage of wastes, contaminants or other materials must be cleaned up as quickly as practicable. Such spillages must be cleaned up using dry methods that minimise the release of wastes, contaminants or materials to any stormwater drainage system, roadside gutter or waters.

DISTURBANCE TO LAND

- (E12) Prior to conducting petroleum activities that involve significant disturbance to land, an assessment must be undertaken of the condition, type and ecological value of any vegetation in such areas where the activity is proposed to take place.
- (E13) The assessment required by Condition E12 must be undertaken by a suitably qualified person and include the carrying out of field validation surveys, observations and mapping of any category A, B or C Environmentally Sensitive Areas (ESA's) and the presence of species classed as endangered, vulnerable, rare or near threatened under the *Nature Conservation Act 1992*.
- (E14) The holder of this environmental authority, when carrying out petroleum activities must:
- (a) avoid, minimise or mitigate (in order of preference) any impacts on areas of vegetation or other areas of ecological value;
 - (b) minimise the risk of injury, harm, or entrapment to wildlife and stock;
 - (c) minimise disturbance to land that may otherwise result in land degradation;
 - (d) ensure that for land that is to be significantly disturbed by petroleum activities:
 - i. the top layer of the soil profile is removed;
 - ii. stockpiled in a manner that will preserve its biological and chemical properties; and

- iii. used for rehabilitation purposes (in accordance with Condition H6) and
- (e) prior to carrying out field based activities, make all relevant staff, contractors or agents carrying out those activities, aware of the location of any category A, B or C ESA's and the requirements of this environmental authority.

Note: This environmental authority does not authorise the taking of protected animals or the tampering with an animal breeding place as defined under the Nature Conservation Act 1992 and Regulations.

- (E15) In accordance with Condition E14 above, if significant disturbance to land is unavoidable, the holder of this environmental authority must not clear vegetation or place fill:
 - (a) in a way which significantly isolates, fragments or dissects tracts of vegetation resulting in a reduction in the current level of ecosystem functioning, ecological connectivity (i.e. stepping stone or contiguous bioregional/local corridor networks) and/or results in an increase in threatening processes (e.g. potential impacts associated with edge effects or introduced species); or
 - (b) in discharge areas.
- (E16) Clearing of remnant vegetation shall not exceed ten (10) metres in width for the purpose of establishing tracks and 20 metres in width for dual carriageway roads unless otherwise approved by the administering authority in writing.
- (E17) Cleared vegetation must be stockpiled in a manner that facilitates respreading or salvaging and does not impede vehicle, stock or wildlife movements.

DISTURBANCE TO LAND – ENVIRONMENTALLY SENSITIVE AREAS

- (E18) Notwithstanding Conditions E12 to E17 inclusive, the holder of this environmental authority must ensure that petroleum activities:
 - (a) are not conducted in or within 200 metres of any listed category A, B or C ESA's; and
 - (b) do not involve activities other than limited petroleum activities within 1km of a listed category A ESA, or within 500m of a listed category B or C ESA.
- (E19) Limited petroleum activities carried out in accordance with Condition E17 must be preferentially located in pre-existing areas of clearing or significant disturbance to the greatest practicable extent.

DISTURBANCE TO LAND – ENDANGERED AND OF CONCERN REGIONAL ECOSYSTEMS

- (E20) Despite Condition E18, where it can be demonstrated that no reasonable or feasible alternative exists, limited petroleum activities may be undertaken within an endangered/of concern regional ecosystem and its associated buffer zone, provided that the area is not part of another listed category A, B or C ESA (e.g. a National Park) or associated buffer zone, subject to the following:
 - (a) the limited petroleum activity is located and carried out in areas according to the following order of preference:
 - i. pre-existing cleared areas or significantly disturbed areas less than 200m from an Endangered/Of Concern RE;
 - ii. undisturbed areas less than 200m from an Endangered/Of Concern RE;
 - iii. pre-existing areas of significant disturbance within an endangered/of concern regional ecosystem (e.g. areas where significant clearing or thinning has been undertaken within a regional ecosystem, and/or areas containing high densities of weed or pest species which has inhibited re-colonisation of native regrowth);

areas where clearing of an endangered or of concern regional ecosystem is unavoidable;
 - (b) any vegetation clearing in an Endangered/Of Concern RE or associated buffer zone must not exceed any of the following areas:
 - i. 10% of the remnant unit of Endangered/Of Concern regional ecosystem as ground truthed and mapped before any activity commences as per condition D1 and D2 of this environmental authority for the life of the project; or

- ii. six (6) metres in width for tracks; or
 - iii. twelve (12) metres in width for pipeline construction purposes; and
 - (c) all reasonable and practical measures are taken to minimize the area cleared and to avoid the clearing of mature trees, which must include but not be limited to, for each well site, a risk assessment to determine the minimum amount of disturbance possible.
- (E21) Details of any significant disturbance to land in or within 200m of Endangered or Of Concern regional ecosystems, along with a record of the assessment required by Conditions D2 and D3 must be kept and submitted to the administering authority upon request.
- (E22) If the assessment required by Conditions E12 and E13 indicates that an ecosystem mapped as Endangered or Of Concern regional ecosystem by the Queensland Herbarium should be in a lower conservation value classification and the holder of this environmental authority wishes to undertake activities as if the ecosystem is of the lower conservation value they must notify the administering authority in writing before any significant disturbance to land takes place.
- (E23) If, within the 20 business days following the lodgement of the notification under Condition E21 the administering authority notifies the holder of this environmental authority, in writing, that the regional ecosystem mapping requires further validation, then significant disturbance to land in the mapped regional ecosystem are prohibited until the administering authority provides written advice that significant disturbance to land may proceed.
- (E24) When requested by the administering authority, the environmental authority holder must enter into an agreement with the administering authority to provide an environmental offset to counterbalance the impacts of the activity on Endangered or Of Concern regional ecosystem.
- (E25) The holder of this environmental authority must comply with any environmental offset agreement made in accordance with the conditions of this environmental authority.

DISTURBANCE TO LAND – STATE FORESTS AND TIMBER RESERVES

- (E26) Despite condition E18, activities may be undertaken within State Forests or Timber Reserves provided the holder of the environmental authority has written approval from the authority responsible for the administration of the *Forestry Act 1959*.
- (E27) Where activities are to be undertaken in a State Forest or Timber Reserve that are also Endangered or Of Concern Regional Ecosystems, such activities may be undertaken in accordance with condition D10 of this environmental authority, provided the holder of this environmental authority has written approval from the authority responsible for the administration of the *Forestry Act 1959*.

WATERCOURSES, WETLANDS AND SPRINGS

- (E28) In the carrying out of the petroleum activity the holder of this environmental authority must not clear vegetation or place fill, except for the construction of roads and pipelines, in or within:
- (a) 200 metres from any natural significant wetland;
 - (b) 100 metres from any natural wetland, lakes or springs; or
 - (c) 100 metres of the high bank of any other watercourse.
- (E29) The holder of this environmental authority must not excavate or place fill in a way that interferes with the flow of water in a watercourse, wetland, or spring, including works that divert the course of flow of the water or works that impound the water.
- (E30) Despite condition E29 pipeline and road construction works may be undertaken in watercourses, wetlands or springs where there is no practicable alternative such as the use of horizontal directional drilling methods, for a maximum period of ten (10) days, provided that the works are conducted in accordance with the following order of preference:
- (a) conducting work in times of no flow; and
 - (b) using all reasonable and practical measures to reduce impacts in times of flow.
- (E31) Activities or works resulting in significant disturbance to the bed or banks of a watercourse or wetland, or a spring must:

- (a) only be undertaken where necessary for the construction and/or maintenance of roads, tracks and pipelines that are essential for carrying out the authorised petroleum activities and no reasonable alternative location is feasible;
 - (b) be no greater than the minimum area necessary for the purpose of the significant disturbance;
 - (c) be designed and undertaken by a suitably qualified and experienced person taking into account the matters listed in Section 5. Planning Activities and Section 6 Impact Management During Activities of DERM's "*Guideline – Activities in a watercourse, lake or spring associated with mining operations*" dated April 2008, or more recent editions as such become available; and
 - (d) upon cessation of the activities or works, commence rehabilitation immediately such that the final rehabilitation is to a condition that will ensure the ongoing physical integrity and the natural ecosystem values of the site.
- (E32) Sediment control measures must be implemented to minimise any increase in water turbidity due to carrying out petroleum activities in the bed or banks of a watercourse or wetland, or a spring.
- (E33) Routine, regular and frequent visual monitoring must be undertaken while carrying out construction work and/or any maintenance of completed works in a watercourse, wetland or spring. If, due to the petroleum activities, water turbidity increases in the watercourse, wetland or spring outside contained areas, works must cease and the sediment control measures must be rectified to limit turbidity before activities recommence.
- (E34) Petroleum activities must not be carried out in River Improvement Trust Asset Areas without the approval of the relevant River Improvement Trust.

Note: Locations and details of River Improvement Trust Asset Areas can be obtained from the relevant River Improvement Trust. A list of the relevant River Improvement Trusts will be provided by DERM.

REHABILITATION REQUIREMENTS

- (E35) Progressive rehabilitation of disturbed areas must commence as soon as practicable following the completion of any construction or operational works associated with the authorised petroleum activities on the relevant petroleum authority.
- (E36) For areas of native vegetation, revegetation must use seed sourced from local provenance native species.
- (E37) As soon as practicable and within 3 months at the end of petroleum activities that cause any significant disturbance to land, the holder of this authority must investigate contaminated land status in accordance with *Environmental Protection Act 1994* requirements and the *National Environment Protection (Site Assessment) Measure 1999* where land has been subject to contamination caused by petroleum activities authorised under this authority.
- (E38) All land significantly disturbed by petroleum activities must be rehabilitated to:
1. a stable landform with a self-sustaining vegetation cover with same species and density of cover to that of the surrounding undisturbed areas, except over the area that must be maintained free of large flora species for pipeline integrity and access, and in cases where approval is sought in accordance with Condition (E35);
 2. ensure that all land is reinstated to the pre-disturbed land use and suitability class;
 3. ensure that the maintenance requirements for rehabilitated land is no greater than that required for the land prior to its disturbance by petroleum activities.
- (E39) Notwithstanding Condition (E38) any planned rehabilitation outcome that does not fulfil the rehabilitation requirements listed in Condition (E38) approval must be sought from the administering authority, prior to the rehabilitation being carried out.
- (E40) Maintenance of rehabilitated areas must take place to ensure and demonstrate:
1. stability of landforms;
 2. erosion control measures remain effective;

3. stormwater runoff and seepage from rehabilitated areas does not negatively affect the environmental values of any waters;
 4. plants show healthy growth and recruitment is occurring; and
 5. declared pest plants are controlled on rehabilitated areas to a level consistent with the surrounding property and prevented from spreading to unaffected areas through authorised petroleum activities.
- (E41) Rehabilitation can be considered successful when the site can be managed for its designated land-use (either similar to that of surrounding undisturbed areas or as otherwise agreed in a written document with the landowner/holder and administering authority) without any greater management input than for other land in the area being used for a similar purpose and there is evidence that the rehabilitation has been successful for at least 3 years.

PEST AND WEED MANAGEMENT

- (E42) The holder of this authority must develop and implement a pest and weed control program that includes but is not limited to the following:
1. identification of areas requiring pest and weed control;
 2. control measures to prevent the spread of pest and weed species; and
 3. measures to eliminate infestations of noxious pest and weed species that may occur.

STORAGE AND HANDLING OF CHEMICALS, FLAMMABLE AND COMBUSTIBLE LIQUIDS

- (E43) All explosives, hazardous chemicals, corrosive substances, toxic substances, gases and dangerous goods must be stored and handled in accordance with the relevant Australian Standard.
- (E44) Flammable and combustible liquids (including petroleum products and associated piping and infrastructure), must be stored, handled and maintained in accordance with the latest edition of Australian Standard 1940 – *The Storage and Handling of Flammable and Combustible Liquids*.
- (E45) Any liquids stored on site that have the potential to cause environmental harm must be stored in or serviced by an effective containment system that is impervious to the materials stored and managed to prevent the release of liquids to waters or land. Where no relevant Australian Standard is available, the following must be applied:
1. storage tanks must be banded so that the capacity and construction of the band is sufficient to contain at least 110% of a single storage tank or 100% of the largest storage tank plus 10% of the second largest storage tank in multiple storage areas; and
 2. drum storages must be banded so that the capacity and construction of the band is sufficient to contain at least 25% of the maximum design storage volume within the band.
- (E50) All containment systems must be designed to minimise rainfall collection within the system.

SCHEDULE F – FAUNA MANAGEMENT

- (F1) The holder of this authority must develop and implement fauna management procedures in such a manner that petroleum activities are undertaken to prevent and/or minimise environmental harm.
- (F2) The fauna management procedures must include but not be limited to:
1. training and awareness of staff and contractors;
 2. conduct of a preconstruction ecological survey to identify the presence of any endangered, vulnerable or rare fauna species and identify and mark hollow-bearing trees;
 3. the development of management strategies to minimise impact on any endangered, vulnerable or rare species;
 4. minimising the clearing of mature and hollow-bearing trees;
 5. minimising the length of time the trench is open through the staging of activities;
 6. temporary exclusion fencing where practicable to restrict fauna access to the trench;

7. the use of “night caps” over open pipe string ends to prevent the ingress of wildlife;
 8. pipes being strung with gaps to allow for fauna movement across the line of the pipe;
 9. a suitably qualified person for fauna handling must be present during clear and grade activities to relocate fauna or recover any injured fauna and must check the entire trench for captured fauna at least daily, preferably in the morning;
 10. installation of ramps and trench plugs with a slope less than 50% at least every 1000m to assist fauna to leave the trench; and
 11. installation of shelter material to provide wet weather protection and reduction of heat stress, such as by placing sawdust filled Hessian bags in pairs every 250m.
- (F3) A copy of the fauna management procedures must be made available to the administering authority on request

SCHEDULE G – DECLARED WILD RIVER AREAS

- (G1) If the petroleum authority is in or partly within a declared wild river area, or a moratorium is in place under the *Wild Rivers Act 2005*, the holder of this authority must ensure that petroleum activities within the (proposed) wild river area are conducted in accordance with the conditions in the wild river declaration for the area relevant to the petroleum activities.

SCHEDULE H – PROJECT INFRASTRUCTURE

- (H1) All petroleum infrastructure (including buildings, structures, plant and equipment erected and/or used for the petroleum activities) authorised under this authority must be located within the PPL <insert number> License Area.
- (H2) All petroleum infrastructure must be removed from the relevant petroleum authority prior to surrender of this authority, except where agreed in writing by the administering authority and the current landowner.
- (H3) Prior to the commencement of decommissioning or abandonment activities the scope of work for decommissioning or abandonment of project infrastructure shall be developed and agreed to with the administering authority.
- (H4) The holder of this authority must decommission the petroleum and gas pipeline to a situation where ongoing, or potential environmental harm is prevented or minimised. As a minimum, pipeline must be decommissioned such that:
1. it no longer contains hazardous contaminants;
 2. it is left in stable condition;
 3. all the above ground infrastructure is removed, and
 4. all areas disturbed by above ground infrastructure are rehabilitated in accordance with the requirements of this authority.

SCHEDULE I DAMS

- (I1) Conditions (I3) to (I10) apply to all dams installed as part of the petroleum activities, as defined in this authority.
- (I2) Dams in the significant or high hazard category as defined in Appendix 4 are not permitted under this authority.

GENERAL CONDITIONS

- (I3) The holder of this authority must ensure that all dams on the operational land are designed and constructed by a suitably qualified engineer and maintained in accordance with generally accepted engineering standards and practices.
- (I4) In operating or decommissioning any dam, the holder of this authority must not interfere with any groundwater or surface water resource or watercourse so as to cause environmental harm, except where that interference and consequent harm has been authorised in this authority.

- (I5) The holder of this authority must ensure that any activities conducted under this authority, or enabled by this authority, do not compromise the integrity of any dam, either on the operational land or adjacent to the operational land.
- (I6) The holder of this authority must take advice from suitably qualified and experienced persons and, based on that advice, monitor the condition of all dams located on the operational land, for early signs of loss of structural or hydraulic integrity.
- (I7) In the event of any early signs of loss of structural or hydraulic integrity, the holder of this authority must take action to prevent and/or to minimise any environmental harm, and report any findings and actions taken to the administering authority.
- (I8) The holder of the authority must assess the hazard category of each dam using Table 1 of Appendix 3 - prior to construction of any new dam, and thereafter on an annual basis. The holder of the authority must act on that monitoring and assessment in accordance with Condition (I9).
- (I9) Where the hazard category for any dam has been assessed as significant or high, the holder of this authority must:
 - 1. notify the administering authority in writing;
 - 2. implement measures to manage the potential for environmental harm; and
 - 3. apply to the administering authority to amend this environmental authority to allow for the operation of a significant or high hazard dam.
- (I10) The holder of this authority must not abandon any dam, but must decommission each dam to a situation where ongoing environmental harm will not occur, unless in accordance with condition (E30). Decommissioned dams must no longer be dams but become landforms on the operational land and must comply with any rehabilitation requirements of this authority.

SCHEDULE J – MONITORING PROGRAMS

- (J1) The holder of this authority must:
 - 1. develop and implement a monitoring program that will demonstrate compliance with the conditions in this authority; and
 - 2. document the monitoring and inspections carried out under the program and any actions taken.
- (J2) The holder of this authority must ensure that a suitably qualified, experienced and competent person(s) conduct all monitoring required by this authority.
- (J3) The holder of this authority must record, compile and keep for a minimum of five years all monitoring results required by this authority and make available for inspection all or any of these records upon request by the administering authority. Monitoring results relating to rehabilitation should be kept until the relevant petroleum tenure is surrendered.
- (J4) An annual monitoring report must be prepared each year and submitted to the administering authority when requested. This report shall include but not be limited to:
 - 1. a summary of the previous twelve (12) months monitoring results obtained under any monitoring programs required under this authority and, a comparison of the previous twelve (12) months monitoring results to both this authority limits and to relevant prior results; and
 - 2. an evaluation/explanation of the data from any monitoring programs; and
 - 3. a summary of any record of quantities of releases required to be kept under this authority; and
 - 4. a summary of the record of equipment failures or events recorded for any site under this approval; and
 - 5. an outline of actions taken or proposed to minimise the environmental risk from any deficiency identified by the monitoring or recording programs.

SCHEDULE K – COMMUNITY ISSUES

MANAGING COMPLAINTS

- (K1) When the administering authority advises the holder of a complaint alleging nuisance (e.g. caused by dust or noise), the holder must investigate the complaint and advise the administering authority of the action proposed or undertaken in relation to the complaint.
- (K2) If the administering authority is not satisfied with the proposed or completed action, the holder must undertake monitoring or other action requested by the administering authority.
- (K3) Maintain a record of complaints and incidents causing environmental harm, and actions taken in response to the complaint or incident.
- (K4) Retain the record of complaints required by this condition for 5 years.

COMPLAINT RESPONSE

- (K5) The holder of this authority must record the following details for all complaints received and provide this information to the administering authority on request:
 1. time, date, name and contact details of the complainant;
 2. reasons for the complaint;
 3. any investigations undertaken;
 4. conclusions formed; and
 5. any actions taken.

SCHEDULE L – NOTIFICATION PROCEDURES

NOTIFICATION OF EMERGENCIES AND INCIDENTS

- (L1) The holder of this authority must telephone the DERM's Pollution Hotline (1300 130 372) or local office as soon as practicable after becoming aware of any release of contaminants not in accordance with the conditions of this authority or any event where environmental harm has been caused or may be threatened.
- (L2) Subject to condition (L1), the holder of this authority is required to report in the case of uncontained spills (including hydrocarbon, associated water or a mixtures of both) of the following volumes or kind:
 - a) releases of any volume to water; and
 - b) releases of volume greater than 200L to land; and
 - c) releases of any volumes where potential serious or material environmental harm is considered to exist.
- (L3) The notification of emergencies or incidents as required by conditions number (L1 and L2) must include but not be limited to the following:
 - a) the holder of the authority;
 - b) the location of the emergency or incident;
 - c) the number of the authority;
 - d) the name and telephone number of the designated contact person;
 - e) the time of the release;
 - f) the time the holder of the authority became aware of the release;
 - g) the suspected cause of the release;
 - h) the environmental harm caused, threatened, or suspected to be caused by the release; and
 - i) actions taken to prevent any further release and mitigate any environmental harm caused by the release.
- (L4) Not more than fourteen (14) days following the initial notification of an emergency or incident, written advice must be provided of the information supplied in accordance with condition number (L3) in addition to:
 - a) proposed actions to prevent a recurrence of the emergency or incident; and

- b) outcomes of actions taken at the time to prevent or minimise environmental harm.
- (L5) As soon as practicable, but not more than six (6) weeks following the conduct of any environmental monitoring performed in relation to the 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 this authority, written advice must be provided of the results of any such monitoring performed to the administering authority.
- (L6) A record of incidents must be maintained to include a record of all incidents occurring in the previous 5 years.

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LNG Facility:**SCHEDULE A – GENERAL CONDITIONS****PREVENT AND/OR MINIMISE LIKELIHOOD OF ENVIRONMENTAL HARM**

- (A1) This authority does not authorise environmental harm unless a condition contained within this authority explicitly authorises that harm. Where there is no condition or the authority is silent on a matter, the lack of a condition or silence shall not be construed as authorising harm.
- (A2) In carrying out petroleum activities the holder of this authority must prevent and / or minimise the likelihood of environmental harm being caused.

MAINTENANCE OF MEASURES, PLANT AND EQUIPMENT

- (A3) The holder of this authority must:
 - a) install all measures, plant and equipment necessary to ensure compliance with the conditions of this authority; and
 - b) maintain such measures, plant and equipment in a proper and efficient condition; and
 - c) operate such measures, plant and equipment in a proper and efficient manner.
- (A4) All instruments, equipment and measuring devices used for measuring or monitoring in accordance with any condition of this authority must be calibrated, appropriately operated and maintained.
- (A5) The holder of this authority must ensure that daily operation and maintenance of all plant and equipment relating to the authorised petroleum activities are carried out by suitability qualified, competent and experienced person(s).
- (A6) No change, replacement or alteration of any plant or equipment is permitted if the change, replacement or alteration increases the risk of environmental harm from the petroleum activities.
- (A7) All analyses and tests required to be conducted under this authority must be carried out by a laboratory that has NATA certification for such analyses and tests, except as otherwise authorised by the administering authority.

ENVIRONMENTAL MANAGEMENT PLAN

- (A8) An Environmental Management Plan (EM plan) must be implemented that provides for the effective management of the actual and potential impacts resulting from the carrying out of the petroleum activities. Documentation relating to the EM plan must be kept.
- (A9) The EM plan required by condition (A8) must address, at least, the following:
 - 8. Describe each of the following:
 - (a) each relevant resource authority for the environmental authority;
 - (b) all relevant petroleum activities;
 - (c) the land on which the activities are to be carried out;
 - (d) the environmental values likely to be affected by the activities; and
 - (e) the potential adverse and beneficial impacts of the activities on the environmental values.
 - 9. State the environmental protection commitments the applicant proposes for the activities to protect or enhance the environmental values under best practice environmental management;
 - 10. Include a rehabilitation program for land proposed to be disturbed under each relevant resource authority for the application; and
 - 11. State a proposed amount of financial assurance for the environmental authority as part of the rehabilitation program.
 - 12. Training staff in the awareness of environmental issues related to carrying out the petroleum activities, which must include at least:

- (a) The environmental policy of the authority holder, so that all persons that carry out the petroleum activities are aware of all relevant commitments to environmental management;
 - (b) Any relevant environmental objectives and targets, so that all staff are aware of the relevant performance objectives and can work towards these;
 - (c) Control procedures to be implemented for routine operations for day to day activities to minimise the likelihood of environmental harm, however occasioned or caused;
 - (d) Contingency plans and emergency procedures to be implemented for non-routine situations to deal with foreseeable risks and hazards, including corrective responses to prevent and mitigate environmental harm (including any necessary site rehabilitation);
 - (e) Organisational structure and responsibility to ensure that roles, responsibilities and authorities are appropriately defined to ensure effective management of environmental issues;
 - (f) Effective communication procedures to ensure two-way communication on environmental matters between operational staff and higher management;
 - (g) Obligations with respect to monitoring, notification and record keeping obligations under the EM plan and relevant approvals; and
 - (h) Monitoring of the release of contaminants into the environment including procedures, methods and record keeping.
13. The conduct of periodic reviews of environmental performance and procedures adopted, not less frequently than annually; and
14. A program for continuous improvement.
- (A11) A Stormwater Management Plan must be prepared and implemented for the site prior to construction and operation. The Stormwater Management Plan must address at least the following:
- a) prevention of incident storm water and storm water run-off from contacting wastes or contaminants;
 - b) diversion of upstream run-off away from areas where it may be contaminated by bulk products being loaded or unloaded, wastes, contaminants or other materials; and
 - c) collection, treatment and disposal of all contaminated storm water run-off.
- (A12) A Waste Management Program (WMP) in accordance with Part 5 of the Environmental Protection (Waste Management) Policy 2000 must be developed, implemented within 3 (three) months from the date of this authority, and maintained for the authorised petroleum activities.
- (A13) The EM Plan must not be implemented or amended in a way that contravenes or is inconsistent with any condition of this approval.
- (A14) Contingency plans and emergency procedures must be developed and implemented for non-routine situations to deal with foreseeable risks and hazards including corrective responses to prevent and mitigate environmental harm (including a contingency plan when plant shuts down for maintenance or other reasons).

THIRD PARTY AUDITING

- (A15) Compliance with the conditions of this authority must be audited by an appropriately qualified third party auditor, nominated by the holder of this authority and accepted by the administering authority, within one year of the commencement of this authority, and annually thereafter.
- (A16) Upon receipt of the final third party audit report, the holder of this authority must submit a copy to the administering authority.
- (A17) The third party auditor must certify the findings of the audit in the report.
- (A18) The financial cost of the third party audit is borne by the holder of this authority.

- (A19) The holder of this authority must immediately act upon any recommendations arising from the audit report and:
- a) investigate any non-compliance issues identified; and
 - b) as soon as practicable, implement measures or take necessary action to ensure compliance with this authority.
- (A20) Subject to condition (A15), and not more than three (3) months following the submission of the audit report, the holder of this authority must provide written advice to the administering authority addressing the:
- a) actions taken by the holder to ensure compliance with this authority; and
 - b) actions taken to prevent a recurrence of any non-compliance issues identified.

FINANCIAL ASSURANCE

- (A21) The holder of this authority must provide a financial assurance in the amount and form required by the administering authority for the authorised petroleum activities.
- (A22) The financial assurance is to remain in force until the administering authority is satisfied that no claim is likely to be made on the assurance.

DEFINITIONS

- (A23) Words and phrases used in this authority are defined in Appendix 1 – Definitions. Where a definition for a term used in this authority is not defined within this authority, the definitions in the *Environmental Protection Act 1994*, its Regulation and Environmental Protection Policies must be used.

[Note: for the sake of brevity, the appendix of definitions has not been provided in this EIS assessment report but will be provided in the environmental authority.]

SCHEDULE B – AIR EMISSIONS**NUISANCE**

- (B1) The release of noxious or offensive odours or any other noxious or offensive airborne contaminants resulting from the activities must not cause an environmental nuisance at any nuisance sensitive or commercial place.
- (B2) The release of dust and/or particulate matter resulting from the activities must not cause an environmental nuisance at any nuisance sensitive or commercial place.
- (B3) Dust and particulate matter must not exceed any of the following levels when measured at any nuisance sensitive or commercial place:
 - a) Dust deposition of 120 milligrams per square metre per day over a 30-days averaging period, when monitored in accordance with Australian Standard AS 3580.10.1 of 2003 (or more recent editions); OR
 - b) A concentration of particulate matter with an aerodynamic diameter of less than 10 micrometre (μm) (PM10) suspended in the atmosphere of 50 micrograms per cubic metre (with five one day exceedances allowed in any one year period); and over a 24 hour averaging time, at a dust sensitive place downwind of the licensed place, when monitored in accordance with:
 - i. Australian Standard AS 3580.9.6 of 2003 (or more recent editions) 'Ambient air - Particulate matter - Determination of suspended particulate PM10 high-volume sampler with size-selective inlet -Gravimetric method'; or
 - ii. any alternative method of monitoring PM10 which may be permitted by the 'Air Quality Sampling Manual' as published from time to time by the administering authority.

Note: The above 5 days exceedances per year are based on the natural events such as bushfires and dust storm.

THE RELEASE OF CONTAMINANTS TO THE ATMOSPHERE

- (B4) The release of contaminants to the atmosphere from a point source must only occur from those release points identified in *Schedule B, Table 1 - Contaminant Release Points* and must be directed vertically upwards without any impedance or hindrance.
- (B5) Contaminants must be released to the atmosphere from a release point at a height and a flow rate not less than the corresponding height and velocity stated for that release point in *Schedule B, Table 1 -*
- (B6) Contaminants must not be released to the atmosphere from a release point at a mass emission rate/concentration, as measured at a monitoring point, in excess of that stated in *Schedule B, Table 1 - Contaminant Release Points*.
- (B7) Contaminants must be monitored not less frequently than specified in *Schedule B, Table 2 - Contaminant Release Limits to Air*.
- (B8) Monitoring of any releases to the atmosphere required by a condition of this approval must be carried out in accordance with the following requirements:
 - 1) Monitoring provisions for the release points listed in *Schedule B, Table 2 - Contaminant Release Limits to Air* must comply with the Australian Standard AS 4323.1 - 1995 'Stationary source emissions, Method 1: Selection of sampling positions' (or more recent editions).
 - 2) The following tests must be performed for each determination specified in *Schedule B, Table 1 - Contaminant Release Limits to Air*:
 - i) gas velocity and volume flow rate;
 - ii) temperature;
 - iii) water vapour concentration (moisture content).
 - 3) Where practicable, samples must be taken when emissions are expected to be at maximum rates.

4) During the sampling period the following additional information must be gathered:

- i) production rate at the time of sampling;
- ii) raw materials and fuel used;
- iii) number of equipments and operating units;
- iv) reference to the actual test methods and accuracy of the methods.

(B9) All release points referred to in *Schedule B, Table 1 - Contaminant Release Points* must be conspicuously marked with the corresponding release point number.

SCHEDULE B, TABLE 1 – CONTAMINANT RELEASE POINTS

Number of Stacks/units	Source Description	Minimum Release Height (m)	Minimum Velocity * (m/s)
6	Refrigeration compressor turbines (3 Mtpa)	28	31
18	Refrigeration compressor turbines (10 Mtpa)	28	31
5	Power generation (3 Mtpa)	36	38
11	Power generation (10 Mtpa)	36	38
1	Pilot flare (3 Mtpa)	87	20
1	Pilot flare (10 Mtpa)	87	20
1	Nitrogen vent (3 Mtpa)	32	37
3	Nitrogen vent (10 Mtpa)	32	37
2	Regeneration gas heater (3 Mtpa)	37	22
6	Regeneration gas heater (10 Mtpa)	37	22
2	Hot oil heater (3 Mtpa)	50	17
6	Hot oil heater (10 Mtpa)	50	17
1	CO ₂ vent (3 Mtpa)	16	13
3	CO ₂ vent (10 Mtpa)	16	13
8	Compressor engines at the compressor	9	17

	stations in the gas field		
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*This limit applies during normal operating conditions.

SCHEDULE B, TABLE 2 – CONTAMINANT RELEASE LIMITS TO AIR

Monitoring Location	Contaminant	Emission Limits per stack*	Frequency of Monitoring
Refrigeration compressor turbines	Oxides of Nitrogen (NO _x)	70 mg/Nm ³ @15% O ₂ (dry) and 3.23 grams/second	All stacks must be monitored during commissioning of the facility and at least one stack of each source type must be monitored annually thereafter **
	Volatile Organic Compounds (VOC)	0.9 grams/second (Total VOCs as CH ₄)	
Power generation	Oxides of Nitrogen (NO _x)	70 mg/Nm ³ @15% O ₂ (dry) and 0.7 grams/second	
	Volatile Organic Compounds (VOC)	0.25 grams/second (Total VOCs as CH ₄)	
Nitrogen vent	Volatile Organic Compounds (VOC)	84 grams/second (Total VOCs as CH ₄)	
Regeneration gas heater	Oxides of Nitrogen (NO _x)	350 mg/Nm ³ @3% O ₂ (dry) and 0.34 grams/second	
	Volatile Organic Compounds (VOC)	0.04 grams/second (Total VOCs as CH ₄)	
Hot oil heater	Oxides of Nitrogen (NO _x)	350 mg/Nm ³ @3% O ₂ (dry) and 1.18 grams/second	
	Volatile Organic Compounds (VOC)	0.13 grams/second (Total VOCs as CH ₄)	
CO ₂ vent	Volatile Organic Compounds (VOC)	14 grams/second (Total VOCs as CH ₄)	
Compressor engines at the compressor stations	Oxides of Nitrogen (NO _x)	0.461 grams/second	

in the gas field			
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* These limits are applicable during normal operating conditions.

- (B10) Within 3 months of commissioning the facility, the holder of this environmental authority must conduct air emission monitoring to demonstrate compliance with air emission limits listed in Table 2 and submit report to the administering authority.

Flare conditions

- (B10) The flare must be equipped with a flare tip design to provide good mixing with air, flame stability and achieve a minimum Volatile Organic Compound (VOC) removal efficiency of 98% under varied gas flow rate and meteorological conditions and meet the best practice design standards (e.g. NSW EPA: Protection of the Environment Operations (Clean Air) Amendment (Industrial and Commercial Activities) Regulation 2005, US EPA Code of Federal Regulations: 40 CFR 60.18 and 40 CFR 63.11).
- (B11) The flare must be equipped with a continuously burning pilot or other automatic ignition system that assures gas ignition and provides immediate notification to appropriate personnel when the ignition system ceases to function.
- (B12) The flare must be designed to handle large fluctuations in both the volume and the chemical content of gases.
- (B13) Visible smoke and particulate emissions must not be permitted for more than five minutes in any two hour period.
- (B14) Contingency plans and emergency procedures must be developed and implemented for non-routine situations to deal with foreseeable risks and hazards including corrective responses to prevent and mitigate environmental harm (including a contingency plan when plant shuts down for maintenance or other reasons).

Fugitive Emissions

- (B15) The holder of this environmental authority must ensure that all reasonable and practicable measures are taken in the design and operation of the plant to minimise fugitive VOC emissions. Reasonable and practicable measures include but are not limited to:
- (a) implementation of a monitoring program to regularly leak test all units/components including pumps, piping and controls, vessels and tanks; and
 - (b) operating, maintenance and management practices to be implemented to mitigate fugitive VOC sources.
- (B16) The ducting and extraction systems that transfer effluent gases from one location to another must be constructed, operated and maintained so as to minimise any leakage of VOCs and vapours to the atmosphere occurring from these sources.
- (B17) In the event of emissions of contaminants occurring from industrial plant or ducting systems that transfer effluent gases from one location to another, the fault or omission that resulted in that emission must be corrected as soon as practicable.

Fuel Burning

- (B18) This authority only permits the burning of natural gas, methane gas or diesel fuel in the fuel burning equipment under normal operating conditions at the rate of the design capacity of the equipment.
- (B19) The sulphur content of fuel burned in the power generators must not exceed 0.5 percent by weight

Greenhouse Gas Emissions

- (B20) The holder of this authority must develop and implement a greenhouse gas reduction strategy for the plant. The strategy must include items but not limited to the company's policy on greenhouse gas emissions, an energy efficiency program, a continuous improvement program, better control systems and the CO₂ recovery plan.

SCHEDULE C – WATER MANAGEMENT

RELEASE TO WATERS

The conditions for this section should be developed following the detailed information required by the CG's Evaluation Report.

RELEASE TO LAND

The conditions for this section should be developed following the detailed information required by the CG's Evaluation Report.

MAINTENANCE OF STORMWATER MANAGEMENT DEVICES

- (C3) Suitable banks and/or diversion drains must be installed and maintained to exclude stormwater runoff from entering the LNG facility footprint.
- (C4) All stormwater management devices must be installed and maintained to ensure they are working properly at all times, including the following:
 - a) oil and grit separator devices;
 - b) detention basin(s);
 - c) grass swales; and
 - d) trash racks and protected risers.

CONTAMINANT RELEASES TO GROUNDWATER

- (C5) There must be no release of contaminants to groundwater.

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SCHEDULE D – NOISE MANAGEMENT

- (D1) Noise from the LNG plant activities must not cause environmental nuisance at any sensitive place or commercial place.
- (D2) 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.
- (D3) If the authority holder can provide evidence through monitoring that the limits defined in Schedule D – Table 1 are not being exceeded then the holder is not in breach of Condition (D1). Monitoring and subsequent analysis must provide:
- (a) determination of $L_{Aeq,15\text{ mins}}$ for the LNG plant noise at the noise sensitive place or commercial place;
 - (b) narrow band analysis and the noise 'signature' of the LNG plant to determine the contribution from the LNG plant to the total noise level at the noise sensitive place or commercial place;
 - (c) the level and frequency of occurrence of impulsive or tonal noise;
 - (d) taking measurements of the low frequency noise below 200 Hz;
 - (e) atmospheric conditions including temperature, wind speed and direction; and
 - (f) location, date and time of recording.
- (D4) If monitoring indicates exceedence of the limits in Schedule D – Table 1 due to the contribution from the LNG plant activities, then the holder of this authority must:
- (a) resolve the complaint with the use of appropriate dispute resolution techniques to the satisfaction of the administering authority; or
 - (b) consider Best Practice Environmental Management in instigating noise abatement measures to comply with noise emission limits in Schedule D – Table 1.

SCHEDULE D, TABLE 1 – NOISE COMPONENT LIMITS FOR THE LNG PLANT

Noise component at the following locations:
<i>The conditions for this section should be developed following the detailed information required by the CG's Evaluation Report.</i>

Notes: A map showing the exact location of residential noise receptors in the vicinity of Curtis Island will be provided in the environmental authority.

The noise levels in Table 1 apply for the day, evening and night periods since the LNG plant operates continuously on a 24-hour basis.

- (D5) The method of measurement and reporting of noise levels must comply with the latest edition of the Department of Environment and Resource Management's Noise Measurement Manual.

NOISE CONTROL MEASURES

- (D6) The authorised activities must be carried out by such reasonable and practicable means necessary to minimise the noise generated. The measures adopted must be incorporated into the relevant procedure(s) implemented under the Environmental Management Plan required by condition (A8) and must include, but not necessarily be limited to, the following noise abatement measures:
- i) ensure that any equipment to be used on the site is assessed for potential noise nuisance impacts and appropriately attenuated;

- ii) low frequency components at the plant including the gas turbine are to be attenuated according to Australian standards and Best Practice Environmental Management;
- iii) ensure that engine cowlings and high efficiency silencers are fitted to all the engines of all plant and equipment identified as impacting on noise sensitive receivers; and
- iv) where operation of reversing beepers is likely to cause environmental nuisance, taking measures to ensure mitigation of the environmental nuisance, for example by de-tuning the reversing beepers, replacing the reversing beepers with other warning devices and/or replacing reversing beepers with alternative reversing beepers which adjust their noise level output in accordance with the prevailing background noise level.

LOW FREQUENCY NOISE

- (D7) Notwithstanding condition (D1) and the limits specified in Table 1 in condition D4, emission of any noise below 200 Hz must not cause an environmental nuisance.
- (D8) Low frequency noise from the LNG plant is NOT considered to be a nuisance under condition (D7) if monitoring shows that noise emissions do not exceed the following limits:
 - a) 50 dB(Z) measured inside the noise sensitive place or commercial place; and
 - b) the difference between the internal A-weighted and Z-weighted noise levels is no greater than 15 dB.

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SCHEDULE E – WASTE MANAGEMENT

- (E1) Waste generated in the carrying out the activities must be stored, handled and transferred in a proper and efficient manner. Waste must not be released to the environment, stored, transferred or disposed contrary to any condition of this authority.
- (E2) The holder of this authority must ensure that activities authorised under this environmental authority do not result in the release or likely release of a hazardous contaminant to land or waters.
- (E3) The holder of this authority must ensure that all general waste produced from the conducting of the activities under this environmental authority is removed and disposed of at a facility that is permitted to accept such waste.
- (E4) All regulated waste removed from the site must be removed by a person who holds a current authority to transport such waste under the provisions of the *Environmental Protection Act 1994* and sent to a facility that is permitted to accept such waste.
- (E5) When regulated waste is removed from within the boundary of the authorised facility and transported by the holder of this authority, a record must be kept of the following:
 - a) date of waste transport;
 - b) quantity of waste removed and transported;
 - c) type of waste removed and transported;
 - d) quantity of waste delivered; and
 - e) any incidents (e.g. spillage) that may have occurred en route.
- (E6) Regulated waste is not permitted to be disposed on site, including septic waste, sewage, and concentrate and back wash water from the reverse osmosis plant.

SCHEDULE F – LAND MANAGEMENT**EROSION AND SEDIMENT CONTROL PLANS**

- (F1) An Erosion and Sediment Control Plan must be developed and implemented for all stages of the petroleum activities and which has been certified by a Certified Professional in Sediment and Erosion Control, or a professional with appropriate experience and or qualifications accepted by the administering authority.
- (F2) Appropriate measures to achieve compliance with condition (F1) for the petroleum activity must be described in the EM plan and include:
9. diverting uncontaminated stormwater run-off around areas disturbed by petroleum activities or where contaminants or wastes are stored or handled that may contribute to stormwater;
 10. contaminated stormwater runoff and incident rainfall is collected; and treated, reused, or released in accordance with the conditions of this environmental authority;
 11. roofing or minimising the size of areas where contaminants or wastes are stored or handled;
 12. using alternate materials and or processes (such as dry absorbents) to clean up spills that will minimise the generation of contaminated waters;
 13. erosion and sediment control structures are placed to minimise erosion of disturbed areas and prevent the contamination of any waters;
 14. an inspection and maintenance program for the erosion and sediment control features;
 15. provision for adequate access to maintain all erosion and sediment control measures especially during the wet season months from December to March; and
 16. identification of remedial actions that would be required to ensure compliance with the conditions of this environmental authority.
- (F3) Erosion protection measures and sediment control measures must be implemented and maintained to minimise erosion and the release of sediment and contamination of stormwater.
- (F4) The maintenance and cleaning of any vehicles, plant or equipment must not be carried out in areas from which contaminants can be released into any waters, roadside gutter or a stormwater drainage system.
- (F5) Any spillage of wastes, contaminants or other materials must be cleaned up as quickly as practicable. Such spillages must be cleaned up using dry methods that minimise the release of wastes, contaminants or materials to any stormwater drainage system, roadside gutter or waters.

ACID SULFATE SOILS

- (F6) The holder of this authority must conduct an acid sulfate soils (ASS) investigation prior to construction and in accordance with the requirements of the State Planning Policy 2/02 *Development Involving Acid Sulfate Soils* and relevant guidelines such as the *Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland 1998*.
- (F7) Acid sulfate soils must be managed in accordance with the *Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines 2002* such that contaminants are not directly or indirectly released, as a result of the activity, to any waters or the bed and banks of any waters.

CONTAMINATED LAND

- (F8) Prior to construction, investigations to be carried out in accordance with the *Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland* (EPA, 1998), the *Environmental Protection Act 1994*, and the *National Environment Protection (Site Assessment) Measure 1999 (NEPM) for contaminated land*.
- (F9) As soon as practicable and within 3 (three) months of cessation of authorised activities that cause any significant disturbance to land, the holder of this authority must investigate contaminated land status in accordance with *Environmental Protection Act 1994* requirements and the NEPM where land has been subject to contamination caused by activities authorised under this authority;

PEST AND WEED SPECIES

- (F10) Pest and weed species must be managed to prevent their growth and proliferation.

MANAGEMENT OF FAUNA

- (F11) The holder of this authority must develop and implement, within three (3) months from the date of this approval, a Fauna Management Plan that details how the holder will ensure that authorised activities are undertaken to minimise the potential risk of causing harm to fauna.
- (F12) The holder of this authority must minimise lighting disturbance to marine turtles by:
- a) physically shielding lights and directing the lights onto work areas;
 - b) keeping light heights as low as practicable;
 - c) using long wave length lights instead of short wavelength lights where practicable;
 - d) minimising reflective surfaces; and
 - e) fitting motion detectors and light timers where practicable.

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SCHEDULE G – STORAGE AND HANDLING OF CHEMICALS, FLAMMABLE AND COMBUSTIBLE SUBSTANCES

- (G1) All explosives, hazardous chemicals, corrosive substances, toxic substances, gases, dangerous goods, flammable and combustible liquids (including petroleum products and associated piping and infrastructure) must be stored and handled in accordance with the relevant Australian Standard where such is available.
- (G2) Notwithstanding the requirements of any Australian Standard and any other relevant Australian or State legislation, any liquids stored on site that have the potential to cause environmental harm must be stored in or serviced by an effective containment system that is impervious to the materials stored and managed to prevent the release of liquids to waters or land. Where no relevant Australian Standard is available, the following must be applied:
- a) storage tanks must be bunded so that the capacity and construction of the bund is sufficient to contain at least 110% of a single storage tank or 100% of the largest storage tank plus 10% of the second largest storage tank in multiple storage areas; and
 - b) drum storages must be bunded so that the capacity and construction of the bund is sufficient to contain at least 25% of the maximum design storage volume within the bund.
- (G3) All containment systems must be roofed and designed to minimise rainfall collection within the system.

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SCHEDULE H - PETROLEUM INFRASTRUCTURE

- (H1) All infrastructure (including buildings, structures, petroleum equipment and plant erected and/or used for the authorised activities) authorised under this authority must be removed from the relevant environmental authority prior to surrender of this authority, except where agreed in writing by the administering authority and the current landowner.
- (H2) Prior to the commencement of decommissioning or abandonment activities, the scope of work for decommissioning or abandonment of project infrastructure shall be developed and agreed to with the administering authority.

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SCHEDULE I – MONITORING PROGRAMS

- (I1) The holder of this authority must:
- a) develop and implement a monitoring program, within three (3) months from the date of this approval, that will demonstrate compliance with the conditions in this authority; and
 - b) document the monitoring and inspections carried out under the program and any actions taken.
- (I2) The holder of this authority must ensure that a suitably qualified, experienced and competent person(s) conducts all monitoring required by this authority.
- (I3) The holder of this authority must record, compile and keep for a minimum of five (5) years all monitoring results required by this authority and make available for inspection all or any of these records upon request by the administering authority. Monitoring results relating to rehabilitation should be kept until the relevant petroleum tenure is surrendered.
- (I4) Any management or monitoring plans, systems or programs required to be developed and implemented by a condition of this authority must be reviewed for performance and amended if required on an annual basis.
- (I5) An annual monitoring report must be prepared each year and presented to the administering authority when requested. This report shall include but not be limited to:
- a) a summary of the previous twelve (12) months monitoring results obtained under any monitoring programs required under this authority and, a comparison of the previous twelve (12) months monitoring results to both this authority limits and to relevant prior results; and
 - b) an evaluation/explanation of the data from any monitoring programs; and
 - c) a summary of any record of quantities of releases required to be kept under this authority; and
 - d) a summary of the record of equipment failures or events recorded for any site under this approval; and
 - e) an outline of actions taken or proposed to minimise the environmental risk from any deficiency identified by the monitoring or recording programs.

SCHEDULE J – COMMUNITY ISSUES

- (J1) When the administering authority advises the holder of a complaint alleging environmental nuisance, the holder must investigate the complaint and advise the administering authority in writing of the action proposed or undertaken in relation to the complaint.
- (J2) When requested by the administering authority, the holder of this authority must undertake monitoring specified by the administering authority, within a reasonable and practicable timeframe nominated by the administering authority, to investigate any complaint of environmental harm at any sensitive or commercial place.
- (J3) The results of the investigation (including an analysis and interpretation of the monitoring results) and abatement measures implemented must be provided to the administering authority within fourteen (14) days of completion of the investigation, or receipt of monitoring results, whichever is the latter.
- (J4) If monitoring in accordance with Condition (J2), indicates that emissions exceed the limits set by this authority or are causing environmental nuisance, then the holder of this authority must:
- a) address the complaint including the use of appropriate dispute resolution if required; and/or
 - b) as soon as practicable implement abatement or attenuation measures so that noise, dust, particulate or odour emissions from the authorised activities do not result in further environmental nuisance.
- (J5) Maintain a record of complaints and incidents causing environmental harm, and actions taken in response to the complaint or incident; and
- (J6) The holder of this authority must record the following details for all complaints received and provide this information to the administering authority on request:
- a) name, address and contact number for complainant;
 - b) time and date of complaint;
 - c) reasons for the complaint;
 - d) investigations undertaken;
 - e) conclusions formed;
 - f) actions taken to resolve complaint;
 - g) any abatement measures implemented; and
 - h) person responsible for resolving the complaint.
- (J7) The holder of this authority must retain the record of complaints required by this condition for five (5) years.

SCHEDULE K – NOTIFICATION PROCEDURES

- (K1) The holder of this authority must telephone the Department of Environment and Resource Management's Pollution Hotline (1300 130 372) or local office as soon as practicable after becoming aware of any release of contaminants not in accordance with the conditions of this authority or any event where environmental harm has been caused or may be threatened.
- (K2) Subject to Condition (K1), the holder of this authority is required to report in the case of uncontained spills (including hydrocarbon, contaminated water or mixtures of both) of the following volumes or kind:
- a) releases of any volume to water;
 - b) releases of water contaminated with hydrocarbons of volume greater than 200L to land; and
 - c) releases of any volumes where potential serious or material environmental harm is considered to exist.
- (K3) The notification of emergencies or incidents as required by Conditions number (K1 and K2) must include but not be limited to the following:
- a) the authority number and name of holder;
 - b) the name and telephone number of the designated contact person;
 - c) the location of the emergency or incident;
 - d) the date and time of the release;
 - e) the time the holder of the authority became aware of the emergency or incident;
 - f) the estimated quantity and type of any substances involved in the incident;
 - g) the actual or potential suspected cause of the release;
 - h) a description of the effects of the incident including the environmental harm caused, threatened, or suspected to be caused by the release;
 - i) any sampling conducted or proposed, relevant to the emergency or incident; and
 - j) actions taken to prevent any further release and mitigate any environmental harm caused by the release.
- (K4) Within fourteen (14) days following the initial notification of an emergency or incident or receipt of monitoring results, whichever is the later, further written advice must be provided to the administering authority, including the following:
- a) results and interpretation of any samples taken and analysed;
 - b) outcomes of actions taken at the time to prevent or minimise environmental harm; and
 - c) proposed actions to prevent a recurrence of the emergency or incident.
- (K5) As soon as practicable, but not more than six (6) weeks following the conduct of any environmental monitoring performed in relation to the 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 this authority, written advice must be provided of the results of any such monitoring performed to the administering authority.

Department of Environment and Resource Management (DERM) – Model Conditions

SCHEDULE A – GENERAL CONDITIONS

Authorised Petroleum Activities

- (A1) In the carrying out of the petroleum activity(ies), the holder of this environmental authority must not exceed the number and maximum size for each of the specified petroleum activities listed in Schedule A - Table 1 for each petroleum tenure.

Schedule A, Table 1 – Authorised Petroleum Activities

Tenure No.	Petroleum Activity	Number	Maximum size (where applicable)
	Seismic (kms)		
	Core Well(s)		
	Exploration Wells		
	Production Well(s)		
	Compressor Station(s)		
	Regulated Dam(s) >401 megalitres		
	Regulated Dam(s) <400 megalitres		
	Reverse Osmosis Plants		
	Brine Encapsulation Facilities		

Prevent or Minimise Likelihood of Environmental Harm

- (A2) This environmental authority does not authorise environmental harm unless a condition contained in this environmental authority explicitly authorises that harm. Where there is no condition, the lack of a condition shall not be construed as authorising harm.

Maintenance of Measures, Plant and Equipment

- (A3) The holder of the environmental authority must:
- (a) install all measures, plant and equipment necessary to ensure compliance with the conditions of this environmental authority;
 - (b) maintain such measures, plant and equipment in their proper and effective condition; and
 - (c) operate such measures, plant and equipment in a proper and effective manner.
- (A4) No change, replacement or alteration of any plant or equipment is permitted if the change, replacement or alteration materially increases, or is likely to increase, the environmental harm caused by the petroleum activity.

Operational Plan

- (A5) The holder of this environmental authority must develop an Operational Plan (the Plan) that provides detailed information about the activities to be carried out under the environmental authority.
- (A6) The activities identified in the Plan must incorporate but not be limited to the petroleum activities set out in the approved Work Program and/or Development Plan for the relevant petroleum authority as required under the *Petroleum Act (1923)* or the *Petroleum and Gas (Production and Safety) Act 2004*.
- (A7) The Plan must be consistent with the requirements of the environmental authority and include, but not be limited to:
- (a) a stated period, not exceeding 3 years, to which the Plan applies;
 - (b) a description of the existing infrastructure for conducting the petroleum activities;
 - (c) a description of proposed infrastructure that will be developed during the term of the Plan
 - (d) a map or maps that:
 - i. record the location of the infrastructure in place for conducting the petroleum activities that exists at the commencement of the period of the Plan, including but not limited to:
 - regulated dams;
 - wells;
 - transmission flow lines;
 - gas processing facilities; and
 - water treatment facilities;
 - ii. records the location of approved additional infrastructure that will be developed for the conduct of the petroleum activities during the period of the Plan.
 - (e) for proposed disturbance or vegetation clearing in an Environmentally Sensitive Area (ESA) provide details on the scale and extent of the disturbance or clearing and if required a commitment to provide an environmental offset
 - (f) for each site to be disturbed, a description of the rehabilitation activities to be performed during the period of the Plan, including but not limited to:
 - i. location (eg tenure, coordinates) and disturbance type (eg well lease, flow line, access track);
 - ii. area to be rehabilitated;
 - iii. use of reference sites;
 - iv. species compositions; and
 - v. post-disturbance land use;
 - (g) a description of progressive rehabilitation carried out including performance in relation to the requirements set out in the environmental authority and the proposed rehabilitation activities set out in the previous Plan; and
 - (h) the calculation of the financial assurance for the proposed maximum disturbance expected during the period of the Plan.
- (A8) The Plan must be submitted to the administering authority not less than three months prior to the expiry of the Plan period.

Financial Assurance

- (A9) The holder of this environmental authority must:
- (a) provide to the administering authority financial assurance in the amount and form required from time to time by the administering authority for the authorised petroleum activities; and
 - (b) review and maintain the amount of financial assurance based on the activities and rehabilitation to be undertaken during the period of the Plan.
- (A10) The calculation of financial assurance must be in accordance with the most recent version of the Department of Environment and Resource Management's Guideline "Financial assurance for petroleum activities".

- (A11) The financial assurance is to remain in force until the administering authority is satisfied that no claim is likely to be made on the assurance.

Third Party Audit

- (A12) Compliance with the conditions of this environmental authority must be audited by an appropriately qualified third party auditor, nominated by the holder of this environmental authority and accepted by the administering authority, for each period of the Operational Plan required under Conditions A5 – A8.

- (A13) Notwithstanding condition A12, the holder of this environmental authority may, prior to undertaking the third party audit, negotiate with the administering authority the scope and content of the third party audit

Note: Where minimal activities have been undertaken on a tenure, the negotiation of the scope of the third party audit may also include the postponing of the third party audit to an agreeable time between the holder of this environmental authority and the administering authority

- (A14) The report of the third party auditor for the relevant prior period must be submitted to the administering authority by the holder of this environmental authority with each revised Operational Plan submitted in accordance with Condition A8.
- (A15) The third party auditor must certify (including a statutory declaration) the findings of the audit in the report.
- (A16) The financial cost of the third party audit is to be borne by the holder of this environmental authority.
- (A17) The holder of this environmental authority must immediately act upon any recommendations arising from the audit report by:
- (a) investigating any non-compliance issues identified; and
 - (b) as soon as practicable, implementing measures or taking necessary action to ensure compliance with the requirements of this environmental authority.
- (A18) Subject to condition A17, and not more than three (3) months following the submission of the audit report, the holder of this environmental authority must provide a written report to the administering authority addressing the:
- (a) actions taken by the holder to ensure compliance with this environmental authority; and
 - (b) actions taken to prevent a recurrence of any non-compliance issues identified.

Cultural Heritage

- (A19) In the carrying out of the petroleum activity the holder of this environmental authority must not adversely impact on the cultural heritage values of any place registered on the Queensland Heritage Register.

SCHEDULE B – WATER**Contaminant Release**

- (B1) Contaminants that will or may cause environmental harm must not be directly or indirectly released to any waters except as permitted under this environmental authority.

Erosion and Sediment Control

- (B2) Erosion protection measures and sediment control measures must be implemented and maintained to minimise erosion and the release of sediment and contaminated stormwater to waters.
- (B3) An Erosion and Sediment Control Plan must be developed and implemented for all stages of the petroleum activities and which has been certified by a Certified Professional in Sediment and Erosion Control, or a professional with appropriate experience and or qualifications accepted by the administering authority and must include but not be limited to:
- (a) diverting uncontaminated stormwater run-off around areas disturbed by petroleum activities or where contaminants or wastes are stored or handled that may contribute to stormwater;
 - (b) contaminated stormwater runoff and incident rainfall is collected; and treated, reused, or released in accordance with the conditions of this environmental authority;
 - (c) roofing or minimising the size of areas where contaminants or wastes are stored or handled;
 - (d) revegetating the disturbed area as soon as practicable after the completion of works;
 - (e) using alternate materials and or processes (such as dry absorbents) to clean up spills that will minimise the generation of contaminated waters;
 - (f) erosion and sediment control structures are placed to minimise erosion of disturbed areas and prevent the contamination of any waters;
 - (g) an inspection and maintenance program for the erosion and sediment control features;
 - (h) provision for adequate access to maintain all erosion and sediment control measures especially during the wet season months from December to March;
 - (i) erosion and sediment control measures for construction of wells and pipelines on slopes >10%; and
 - (j) identification of remedial actions that would be required to ensure compliance with the conditions of this environmental authority.
- (B4) A copy of the Erosion and Sediment Control Plan must be submitted to the administering authority upon request.

Maintenance and Cleaning

- (B5) The maintenance and cleaning of vehicles and any other equipment or plant must be carried out in areas from where the resultant contaminants cannot be released into any waters, roadside gutter or stormwater drainage system.

Watercourses, Wetlands and Springs

- (B6) In the carrying out of the petroleum activity the holder of this environmental authority must not clear vegetation or place fill, except for the construction of roads and pipelines, in or within:
- (a) 200 metres from any natural significant wetland;
 - (b) 100 metres from any natural wetland, lakes or springs; or
 - (c) 100 metres of the high bank of any other watercourse.
- (B7) The holder of this environmental authority must not excavate or place fill in a way that interferes with the flow of water in a watercourse, wetland, or spring, including works that divert the course of flow of the water or works that impound the water.

- (B8) Despite condition B7 pipeline and road construction works for may be undertaken in watercourses, wetlands or springs where there is no practicable alternative such as the use of horizontal directional drilling methods, for a maximum period of ten (10) days, provided that the works are conducted in accordance with the following order of preference:
- (a) conducting work in times of no flow; and
 - (b) using all reasonable and practical measures to reduce impacts in times of flow.
- (B9) Activities or works resulting in significant disturbance to the bed or banks of a watercourse or wetland, or a spring must:
- (a) only be undertaken where necessary for the construction and/or maintenance of roads, tracks and pipelines that are essential for carrying out the authorised petroleum activities and no reasonable alternative location is feasible;
 - (b) be no greater than the minimum area necessary for the purpose of the significant disturbance;
 - (c) be designed and undertaken by a suitably qualified and experienced person taking into account the matters listed in Section 5. Planning Activities and Section 6 Impact Management During Activities of DERM's "*Guideline – Activities in a watercourse, lake or spring associated with mining operations*" dated April 2008, or more recent editions as such become available; and
 - (d) upon cessation of the activities or works, commence rehabilitation immediately such that the final rehabilitation is to a condition that will ensure the ongoing physical integrity and the natural ecosystem values of the site.
- (B10) Sediment control measures must be implemented to minimise any increase in water turbidity due to carrying out petroleum activities in the bed or banks of a watercourse or wetland, or a spring.
- (B11) Routine, regular and frequent visual monitoring must be undertaken while carrying out construction work and/or any maintenance of completed works in a watercourse, wetland or spring. If, due to the petroleum activities, water turbidity increases in the watercourse, wetland or spring outside contained areas, works must cease and the sediment control measures must be rectified to limit turbidity before activities recommence.
- (B12) Petroleum activities must not be carried out in River Improvement Trust Asset Areas without the approval of the relevant River Improvement Trust.

Note: Locations and details of River Improvement Trust Asset Areas can be obtained from the relevant River Improvement Trust. A list of the relevant River Improvement Trusts will be provided by DERM.

Groundwater

- (B13) The extraction of groundwater as part of the petroleum activity from underground aquifers must not directly or indirectly cause environmental harm to any spring, wetland or other surface waters.

Wild Rivers

- (B14) In a declared Wild River Area, petroleum activities must be consistent with the conditions stated in the relevant Wild River declaration and in circumstances where there is any inconsistency or conflict the conditions of the Wild River declaration prevail.

Release to Waters of Treated or Good Quality CSG Water

Refer Appendix 1 for conditions

Sewage Treatment Works

Sewage Treatment Works (<21EP)

Refer Appendix 2 for conditions

Sewage Treatment Works (>21 – 450 EP)

Refer Appendix 3 for conditions.

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SCHEDULE C – REGULATED DAMS

Conditions to be inserted

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SCHEDULE D — Land**General**

(D1) Contaminants that will or may cause environmental harm must not be directly or indirectly released to land except as permitted under this environmental authority.

Disturbance to Land – General

- (D2) Prior to conducting petroleum activities that involve significant disturbance to land, an assessment must be undertaken of the condition, type and ecological value of any vegetation in such areas where the activity is proposed to take place.
- (D3) The assessment required by Condition D2 must be undertaken by a suitably qualified person and include the carrying out of field validation surveys, observations and mapping of any category A, B or C Environmentally Sensitive Areas (ESA's) and the presence of species classed as endangered, vulnerable, rare or near threatened under the *Nature Conservation Act 1992*.
- (D4) The holder of this environmental authority, when carrying out petroleum activities must:
- (a) avoid, minimise or mitigate (in order of preference) any impacts on areas of vegetation or other areas of ecological value;
 - (b) minimise the risk of injury, harm, or entrapment to wildlife and stock;
 - (c) minimise disturbance to land that may otherwise result in land degradation;
 - (d) ensure that for land that is to be significantly disturbed by petroleum activities:
 - i. the top layer of the soil profile is removed;
 - ii. stockpiled in a manner that will preserve its biological and chemical properties; and
 - iii. used for rehabilitation purposes (in accordance with Condition H6) and
 - (e) prior to carrying out field based activities, make all relevant staff, contractors or agents carrying out those activities, aware of the location of any category A, B or C ESA's and the requirements of this environmental authority.

Note: This environmental authority does not authorise the taking of protected animals or the tampering with an animal breeding place as defined under the Nature Conservation Act 1992 and Regulations.

- (D5) In accordance with Condition D4 above, if significant disturbance to land is unavoidable, the holder of this environmental authority must not clear vegetation or place fill:
- (a) in a way which significantly isolates, fragments or dissects tracts of vegetation resulting in a reduction in the current level of ecosystem functioning, ecological connectivity (i.e. stepping stone or contiguous bioregional/local corridor networks) and/or results in an increase in threatening processes (e.g. potential impacts associated with edge effects or introduced species);
 - (b) on slopes greater than 10% for activities other than pipelines and wells; or
 - (c) in discharge areas.

- (D6) Clearing of remnant vegetation shall not exceed ten (10) metres in width for the purpose of establishing tracks and 20 metres in width for dual carriageway roads unless otherwise approved by the administering authority in writing.
- (D7) Cleared vegetation must be stockpiled in a manner that facilitates respreading or salvaging and does not impede vehicle, stock or wildlife movements.

Disturbance to Land – Environmentally Sensitive Areas

- (D8) Notwithstanding Conditions D2 to D7 inclusive, the holder of this environmental authority must ensure that petroleum activities:
 - (a) are not conducted in or within 200 metres of any listed category A, B or C ESA's; and
 - (b) do not involve activities other than limited petroleum activities within 1km of a listed category A ESA, or within 500m of a listed category B or C ESA.
- (D9) Limited petroleum activities carried out in accordance with Condition D8(b) must be preferentially located in pre-existing areas of clearing or significant disturbance to the greatest practicable extent.

Disturbance to Land – Endangered and Of Concern Regional Ecosystems

- (D10) Despite Condition D8, where it can be demonstrated that no reasonable or feasible alternative exists, limited petroleum activities may be undertaken within an endangered/of concern regional ecosystem and its associated buffer zone, provided that the area is not part of another listed category A, B or C ESA (e.g. a National Park) or associated buffer zone, subject to the following:
 - (a) the limited petroleum activity is located and carried out in areas according to the following order of preference:
 - i. pre-existing cleared areas or significantly disturbed areas less than 200m from an Endangered/Of Concern RE;
 - ii. undisturbed areas less than 200m from an Endangered/Of Concern RE;
 - iii. pre-existing areas of significant disturbance within an endangered/of concern regional ecosystem (e.g. areas where significant clearing or thinning has been undertaken within a regional ecosystem, and/or areas containing high densities of weed or pest species which has inhibited re-colonisation of native regrowth);

areas where clearing of an endangered or of concern regional ecosystem is unavoidable;
 - (b) any vegetation clearing in an Endangered/Of Concern RE or associated buffer zone must not exceed any of the following areas:
 - i. 10% of the remnant unit of Endangered/Of Concern regional ecosystem as ground truthed and mapped before any activity commences as per condition D1 and D2 of this environmental authority for the life of the project; or
 - ii. more than 30m² for the construction of a sump; or
 - iii. six (6) metres in width for tracks; or
 - iv. twelve (12) metres in width for pipeline construction purposes; and
 - (c) all reasonable and practical measures are taken to minimize the area cleared and to avoid the clearing of mature trees, which must include but not be limited to, for each well site, a risk assessment to determine the minimum amount of disturbance possible.
- (D11) Details of any significant disturbance to land in or within 200m of Endangered or Of Concern regional ecosystems, along with a record of the assessment required by Conditions D2 and D3 must be kept and submitted to the administering authority upon request.
- (D12) If the assessment required by Conditions D2 and D3 indicates that an ecosystem mapped as Endangered or Of Concern regional ecosystem by the Queensland Herbarium should be in a

lower conservation value classification and the holder of this environmental authority wishes to undertake activities as if the ecosystem is of the lower conservation value they must notify the administering authority in writing before any significant disturbance to land takes place.

- (D13) If, within the 20 business days following the lodgement of the notification under Condition D12 the administering authority notifies the holder of this environmental authority, in writing, that the regional ecosystem mapping requires further validation, then significant disturbance to land in the mapped regional ecosystem are prohibited until the administering authority provides written advice that significant disturbance to land may proceed.
- (D14) When requested by the administering authority, the environmental authority holder must enter into an agreement with the administering authority to provide an environmental offset to counterbalance the impacts of the activity on Endangered or Of Concern regional ecosystem.
- (D15) The holder of this environmental authority must comply with any environmental offset agreement made in accordance with the conditions of this environmental authority.

Disturbance to Land – State Forests and Timber Reserves

- (D16) Despite condition D8, activities may be undertaken within State Forests or Timber Reserves provided the holder of the environmental authority has written approval from the authority responsible for the administration of the *Forestry Act 1959*.
- (D17) Where activities are to be undertaken in a State Forest or Timber Reserve that are also Endangered or Of Concern Regional Ecosystems, such activities may be undertaken in accordance with condition D10 of this environmental authority, provided the holder of this environmental authority has written approval from the authority responsible for the administration of the *Forestry Act 1959*.

Soil Management

- (D18) The holder of this environmental authority must develop and implement soils management procedures for areas to be disturbed by petroleum activities prior to commencement of petroleum activities in these areas to prevent or minimise the impacts of soil disturbance. These procedures must include but not be limited to:
 - (a) establish baseline soils information for areas to be disturbed including soil depth, pH, electrical conductivity (EC), chloride, cations (calcium, magnesium and sodium), exchangeable sodium percentage (ESP), particle size and soil fertility (including nitrogen, phosphorous, potassium, sulphur and micronutrients);
 - (b) a soils monitoring program outlining parameters to be monitored, frequency of monitoring and maximum limits for each parameter;
 - (c) identify soil units within areas to be disturbed by petroleum activities at a scale of 1:100000, in accordance with the “*Guidelines for Surveying Soil and Land Resources, 2nd Edition*” (McKenzie *et al.* 2008), “*Australian Soil and Land Survey Handbook, 3rd Edition*” (National Committee on Soil and Terrain 2009) and “*The Australian Soil Classification*” (Isbell 2002);
 - (d) develop soil descriptions that are relevant to assessment for agricultural suitability, topsoil assessment, erodibility and rehabilitation, for example:
 - i. shallow cracking clay soils;
 - ii. deep cracking clay soils;
 - iii. deep saline and/or sodic cracking clay soils with melonholes;
 - iv. thin surface, sodic duplex soils;
 - v. medium to thick surface (say >15 cm), sodic duplex soils; and
 - vi. non-sodic duplex soils;
 - (e) detailed mitigation measures and procedures to manage the risk of adverse soil disturbance in the carrying out of the petroleum activity; and
 - (f) for areas of good quality agricultural land, detailed methods to be undertaken to minimise potential impacts.

- (D19) A copy of the soils management procedures must be made available to the administering authority upon request.

Acid Sulfate Soils

- (D20) The holder of this environmental authority must, when clearing in areas with acid sulfate soils, develop and implement an acid sulfate soil environmental management plan prepared in accordance with the “*State Planning Policy 2/02 Guideline Planning and Managing Development Involving Acid Sulfate Soils*” and the Department of Environment and Resource Management’s “*Queensland Acid Sulphate Soil Technical Manual*” (Version 2.2 September 2004) or more recent editions or supplements to these documents as such become available.

Note: condition D20 is only applicable in areas of acid sulfate soils or potential acid sulfate soils. These areas should be identified in the Environmental Management Plan accompanying the application.

Fauna Management

- (D21) The holder of this environmental authority must develop and implement fauna management procedures for the carrying out of the petroleum activities, in particular pipeline construction, construction and use of dams, to prevent or minimise harm or the potential risk of causing harm to fauna.
- (D22) The fauna management procedures must include training and awareness of staff and contractors and ensure that any planned fauna handling is undertaken by a suitably qualified person.
- (D23) A copy of the fauna management procedures must be made available to the administering authority on request.

Note: The procedures required by conditions D21 and D22 should consider the “Australian Pipeline Industry Association Code of Environmental Practice – Onshore Pipelines” dated October 2005, or subsequent versions thereof.

Pest management

- (D24) In carrying out the petroleum activity(ies) the holder of this environmental authority must develop and implement an effective pest management program that includes but is not limited to the following:
- (a) identification of pest species and infestation areas;
 - (b) prevents and/or minimises the introduction and/or spread of pests; and
 - (c) control and management of pest outbreaks as a result of petroleum activities.
- (D25) A copy of the pest management program must be made available to the administering authority on request.

Note: The pest management program required by Condition D24 should consider the “Petroleum Industry (including coal seam methane gas) Minimising Pest Spread Guidelines” dated June 2008, or subsequent versions thereof. This document is available for download from:

[http://www.dpi.qld.gov.au/documents/Biosecurity EnvironmentalPests/IPA-Minimising-Pest-Spread-Advisory-Guidelines.pdf](http://www.dpi.qld.gov.au/documents/Biosecurity%20EnvironmentalPests/IPA-Minimising-Pest-Spread-Advisory-Guidelines.pdf)

Chemical and Fuel Storage

- (D26) All explosives, hazardous chemicals, corrosive substances, toxic substances, gases, dangerous goods, flammable and combustible liquids (including petroleum products and associated piping and infrastructure) must be stored and handled in accordance with the relevant Australian Standard where such is available.
- (D27) Notwithstanding the requirements of any Australian Standard, any liquids stored on site that have the potential to cause environmental harm must be stored in or serviced by an effective

containment system that is impervious to the materials stored and managed to prevent the release of liquids to waters or land. Where no relevant Australian Standard is available, the following must be applied:

- (a) storage tanks must be banded so that the capacity and construction of the band is sufficient to contain at least 110% of a single storage tank or 100% of the largest storage tank plus 10% of the second largest storage tank in multiple storage areas; and
- (b) drum storages must be banded so that the capacity and construction of the band is sufficient to contain at least 25% of the maximum design storage volume within the band.

(D28) All containment systems must be designed to minimise rainfall collection within the system.

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SCHEDULE – ENVIRONMENTAL NUISANCE**Odour, dust and other airborne contaminants**

- (E1) The release of odour, dust or any other airborne contaminant(s), or light from the petroleum activity must not cause an environmental nuisance at any sensitive place or commercial place.

Noise

- (E2) In the event of a complaint about noise from the carrying out of the petroleum activity being made to the administering authority and that the administering authority considers is not frivolous nor vexatious nor based on mistaken belief, then the emission of noise from the licensed place must not result in levels greater than those specified in Schedule E, Table 1 – Noise limits for fixed activities or Schedule E, Table 2 – Noise limits for itinerant activities as appropriate.
- (E3) In the event of a complaint about noise nuisance that the administering authority considers is not frivolous or vexatious then the holder of the environmental authority must prepare and submit a noise management plan to the administering authority within the reasonable and practicable timeframe specified in writing by the administering authority.
- (E4) The noise management plan must address, but not be limited to, the following matters:
- identification of component noise sources and activities at the place(s) which impact on noise sensitive areas;
 - the measured and/or predicted level of these noise sources and activities at noise sensitive places;
 - the reasonable and practicable control or abatement measures (including hours of operation) that can be undertaken to reduce identified intrusive noise sources;
 - the level of noise at noise sensitive places that would be achieved from implementing these measures.
 - the handling of future noise complaints;
 - community liaison and consultation; and
 - training of staff and contractors in noise management practices.
- (E5) The holder of this environmental authority must commence implementation of the noise abatement recommendations of the noise management plan not more than 30 days following its submission to the administering authority, accounting for any comments made by the administering authority within that time.

Schedule E, Table 1 – Noise limits for fixed activities

Sensitive place						
Noise level dB(A) measured as:	Monday to Saturday			Sundays and public holidays		
	7am to 6pm	6pm to 10pm	10pm to 7am	9am to 6pm	6pm to 10pm	10pm to 9am
Commercial place						
Noise level dB(A) measured as:	Monday to Saturday			Sundays and public holidays		
	7am to 6pm	6pm to 10pm	10pm to 7am	9am to 6pm	6pm to 10pm	10pm to 9am

- bg = background noise level
- In the event that measured bg is less than 25 dB(A), then 25 dB(A) is to be substituted for the measured level

- If the background is higher than the number shown on the second line in any box, the limit is to be background plus 0.

Schedule E, Table 2 – Noise Limits for itinerant activities

Sensitive place						
Noise level dB(A) measured as:	Monday to Saturday			Sundays and public holidays		
	7am to 6pm	6pm to 10pm	10pm to 7am	9am to 6pm	6pm to 10pm	10pm to 9am
Commercial place						
Noise level dB(A) measured as:	Monday to Saturday			Sundays and public holidays		
	7am to 6pm	6pm to 10pm	10pm to 7am	9am to 6pm	6pm to 10pm	10pm to 9am

- bg = background noise level
- In the event that measured bg is less than 25 dB(A), then 25 dB(A) is to be substituted for the measured level
- If the background is higher than the number shown on the second line in any box, the limit is to be background plus 0.

- (E6) The holder of this environmental authority, upon completion of the noise abatement recommendations contained in the noise management plan, must undertake verification noise measurement and not more than 30 days following such assessment of the noise submit to the administering authority noise report confirming compliance with noise limits in Schedule E Table 1 and/or Table 2.

SCHEDULE F – AIR**Fuel Burning or Combustion Equipment**

- (F1) Contaminants emitted from fuel burning or combustion equipment point sources must be directed vertically upwards.
- (F2) Air dispersion modelling must be used to calculate the ground level concentrations of emissions from fuel burning or combustion equipment (that is capable of burning at least 500kg of fuel in an hour) and identify any potential impacts to air quality within the study area. The results must be made available to the administering authority on request.
- (F3) The calculated ground level concentration of contaminants discharged to the atmosphere under maximum operating conditions must not exceed the criteria in Schedule F - Table 1 for each air contaminant.
- (F4) Prior to the installation of any new or additional fuel burning or combustion equipment following the issue of this environmental authority, the holder must ensure that proper and effective pollution control equipment is provided for in the design of the equipment to ensure that emissions as modelled in accordance with Condition (F2) demonstrate compliance with the criteria specified in Schedule F, Table 1 – Maximum Ground Level Concentration Criteria.

Schedule F, Table 1 – Maximum Ground Level Concentration Criteria

Contaminant	Concentration at 0°Celsius	Units	Averaging time
NOx as Nitrogen Dioxide	250	µg/m ³	1 hour
NOx as Nitrogen Dioxide	33	µg/m ³	1 year
Carbon monoxide	11	mg/m ³	8 hour

- (F5) The holder of this environmental authority must maintain a Register of Fuel Burning or Combustion Equipment that must include, as a minimum, the following information for each of the equipment:
- Fuel Burning or Combustion Equipment Name and Location
 - Stack emission height (metres)
 - Minimum efflux velocity (metres /sec)
 - Mass emission rates (g/s)
 - Contaminant concentrations (mg/Nm³ @ x %O₂ dry gas at 0°Celsius and 1 atmosphere)
- (F6) The holder of this environmental authority must ensure that the information contained in the Register of Fuel Burning or Combustion Equipment is complete and current on any given day.
- (F7) All entries in the Register of Fuel Burning or Combustion Equipment must be certified by the chief executive officer for the tenure holder, or their delegate, as being accurate and correct.
- (F8) The holder of this environmental authority must make the Register of Fuel Burning or Combustion Equipment or information contained in the Register available to the administering authority on request.

Fuel burning and/or combustion equipment conditions for hubs and/or places close to populated areas as well as other low risk sites where such equipment is to be located

Refer Appendix 4 for conditions for fuel burning in hubs or close to populated areas.

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SCHEDULE G – WASTE**General**

- (G1) All general waste must be removed from the site and sent to a recycling facility or disposal facility licensed to accept the waste.
- (G2) All regulated waste must be removed from the site by a person who holds a current authority to transport such waste under the provisions of the EP Act and sent to a recycling facility or disposal facility licensed to accept the waste.
- (G3) Waste must not be burned or allowed to be burned on the licensed site.
- (G4) All waste fluids and muds resulting from drilling and exploration activities must be contained in a dam or containment structure for disposal, remediation or reuse where applicable.
- (G5) Oil based drilling muds must not be used in the carrying out of the petroleum activity.
- (G6) Synthetic based drilling muds must not be used in the carrying out of the petroleum activity other than with the written approval of the administering authority.

Coal Seam Gas Water Management

- (G7) The holder of this environmental authority must develop and implement a coal seam gas water management plan (CWM Plan) for the authorised petroleum activities which must adequately identify and quantify all CSG water generated under this environmental authority and propose management options for treating and/or disposing of or beneficially reusing CSG water.
- (G8) The holder of this environmental authority must ensure that coal seam gas water is contained, is not released to land or waters and is only used for purposes specifically authorised:
 - (a) under this environmental authority; or
 - (b) under Section 186 of the *Petroleum and Gas (Production and Safety) Act 2004*; or
 - (c) under Section 86 of the *Petroleum Act 1923*; or
 - (d) under an approval of resource for beneficial use as provided for under the *Environmental Protection Act 1994*.
- (G9) The holder of this environmental authority must ensure that the coal seam gas water to be used for domestic or stock purposes meets the ANZECC 2000 Water Quality Guidelines, or subsequent versions thereof, for stock and domestic purposes.
- (G10) Coal seam gas water released to the environment in accordance with Condition (G8) must not have any properties that could cause, nor contain any contaminants in concentrations that are capable of causing environmental harm.
- (G11) Where any inconsistency exists between the conditions of this environmental authority and the CWM Plan, the conditions of this environmental authority prevail.

Note: CSG water that is beneficially used under an approval issued under the Environmental Protection (Waste Management) Regulation 2000 will be regulated under the conditions of that approval.

Associated Water Use for Dust Suppression

- (G12) CSG water produced from the authorised petroleum activities may be used for dust suppression within tenures covered by this environmental authority, provided the water quality meets the limits specified in Schedule G, Table 1 – Road dust suppression water contaminant release limits for each of the water quality characteristics.

Schedule G, Table 1 – Road dust suppression water contaminant release limits.

Water Quality Characteristics	Unit	Limit	Limit Type
pH	ph Units	6.0 to 9.0	range
Total Suspended Solids	mg/L	30	maximum
Total Dissolved Salts	mg/L	2000	maximum
Total Petroleum Hydrocarbons	mg/L	10	maximum

(G13) Use of CSG water for dust suppression activities must be carried out in a manner that:

- (a) vegetation is not damaged;
- (b) soil erosion and soil structure damage is avoided;
- (c) there is no surface damming of the CSG water;
- (d) minimises deep drainage below the root zone of any vegetation;
- (e) quality of shallow aquifers is not adversely affected; and
- (f) there are no releases of CSG waters to any surface waters.

Salt Management

Refer Appendix 5 for conditions for brine or salt reuse or disposal.

SCHEDULE H – REHABILITATION

- (H1) The holder of this environmental authority must not abandon any dam but must decommission each dam so as to prevent and/or minimise any environmental harm.
- (H2) As a minimum, decommissioning must be conducted such that each dam either:
- (a) becomes a stable landform similar to that of surrounding undisturbed areas, that no longer contains substances that will migrate into the environment, or
 - (b) is approved or authorised by the administering authority for use by the landholder following cessation of the petroleum activities.
- (H3) Progressive rehabilitation of disturbed areas must commence as soon as practicable following the completion of any construction or operational works associated with the petroleum activities.
- (H4) As soon as practicable but no later than 12 months (or longer period agreed in writing by the administering authority) after the end of petroleum activities causing significant disturbance to land, the holder of the authority must:
- (a) remediate contaminated land (e.g. dams containing salt);
 - (b) reshape all significantly disturbed land to a stable landform similar to that of surrounding undisturbed areas;
 - (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.
 - (d) undertake rehabilitation in a manner such that any actual and potential acid sulfate soils in or on the site are either not disturbed, or submerged, or treated so as to not be likely to cause environmental harm; and
 - (e) decommission all inactive buried pipelines in accordance with the requirements of AS 2885 and ensuring that there will not be any subsequent subsidence of land along the pipeline route.
- (H5) All significantly disturbed land caused by the carrying out of the petroleum activities must be rehabilitated to:
- (a) a stable landform and with a self-sustaining vegetation cover and species that are similar to adjoining undisturbed areas;
 - (b) ensure that all land is reinstated to the pre-disturbed land use and suitability class;
 - (c) ensure that the maintenance requirements for rehabilitated land is no greater than that required for the land prior to its disturbance by petroleum activities; and
 - (d) ensure that the water quality of any residual void or water bodies constructed by petroleum activities meets criteria for subsequent uses and does not have potential to cause environmental harm.
- (H6) Maintenance of rehabilitated areas must take place to ensure and demonstrate:
- (a) stability of landforms;
 - (b) erosion control measures remain effective;
 - (c) stormwater runoff and seepage from rehabilitated areas does not negatively affect the environmental values of any waters;
 - (d) plants show healthy growth and recruitment is occurring; and
 - (e) rehabilitated areas are free of any declared pest plants.
- (H7) Rehabilitation can be considered successful when:
- (a) the site can be managed for its designated land-use (e.g. similar to that of surrounding undisturbed areas);

- (b) no greater management input than for other land in the area being used for a similar purpose is required and there is evidence that the rehabilitation has been successful for at least three (3) years;
- (c) the rehabilitation is carried out in accordance with the goals, objectives indicators and completion criteria as specified in Schedule H, Table 1 – Planned rehabilitation specifications; or
- (d) written agreement is obtained from the landowner/holder and administering authority.

Schedule H, Table 1 – Planned rehabilitation specifications

Petroleum activity feature	Rehabilitation Goal	Rehabilitation objectives	Indicators	Completion criteria
	1. Safe	Site safe for humans and animals	(a) Landform re-established	(a) No subsidence or major erosion gullies
	2. Non-polluting	Sediment and erosion control structures in place Storm water runoff does not pollute nearby watercourses Encapsulated salt does not seep outside the monocell	(a) Sediment traps and design of erosion control measures (b) Surface water monitoring (c) Groundwater monitoring	(a) Certification from suitably qualified and experienced person and performance of control structures (b) Monitoring meeting release limits (c) Monitoring shows no adverse impacts on groundwater quality
	3. Stable	Minimise erosion	(a) Re-establish surface drainage lines (b) Vegetation cover	(a) no subsidence or areas of major erosion for at least x years (b) x% foliage cover recorded over a period of 3 years
	4. Self-sustaining	Describe post activity land use or land suitability or land capability	(a) Species diversity	(a) Certification that x% species diversity achieved and maintained for x years

			(b) Presence of key species	(b) Certification that key species present over a period of x years
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SCHEDULE I – MONITORING PROGRAMS**General**

- (I1) The holder of this environmental authority must develop and implement a monitoring program, the result of which will demonstrate compliance with the conditions of this environmental authority.
- (I2) All monitoring under this environmental authority must be conducted by a suitably qualified person.
- (I3) All instruments, equipment and measuring devices used for measuring or monitoring in accordance with any condition of this environmental authority must be calibrated, and operated and maintained effectively.
- (I4) The method of water sampling required by this environmental authority must comply with that set out in the most recent version of the *Monitoring and Sampling Manual – Environmental Protection (Water) Policy* published by the administering authority.
- (I5) All determinations of water quality must be:
 - a) performed by a person or body possessing appropriate experience and qualifications to perform the required measurements; and
 - b) made in accordance with methods prescribed in the latest edition of the Department of Environment and Resource Management - Water Quality Sampling Manual; and
 - c) collected from the monitoring locations identified within this environmental authority, within XX hours of each other where possible; and
 - d) carried out on representative samples.

Note: this condition requires the Monitoring and Sampling Manual – Environmental Protection (Water) Policy 2009 to be followed and where it is not followed because of exceptional circumstances this should be explained and reported with the results.

- (I6) All analyses and tests required to be conducted under this environmental authority must be carried out by a laboratory that has NATA certification for such analyses and tests, except as otherwise authorised by the administering authority.
- (I7) If monitoring conducted in accordance with this environmental authority indicated a condition or contaminant level that has caused, or has potential to cause, environmental harm, the environmental authority holder must:
 - (a) as soon as is practicable, take the necessary actions to rectify the condition or contaminant level so as to avoid or minimises environmental harm; and
 - (b) notify the administering authority of the condition or contaminant level and the actions taken to rectify it.
- (I8) Any management or monitoring plans, systems or programs required to be developed and implemented by a condition of this environmental authority must be reviewed for performance and amended if required on an annual basis.
- (I9) The holder of this environmental authority must record, compile and keep for a minimum of five years all monitoring results required by this environmental authority and make available for inspection all or any of these records upon request by the administering authority.
- (I10) An annual monitoring report must be prepared each year and presented to the administering authority when requested. This report shall include but not be limited to:

- (a) a summary of the previous twelve (12) months monitoring results obtained under any monitoring programs required under this environmental authority and, a comparison of the previous twelve (12) months monitoring results to both the limits set in this environmental authority and to relevant prior results; and
- (b) an evaluation/explanation of the data derived from any monitoring programs; and
- (c) a summary of any record of quantities of releases required to be kept under this environmental authority; and
- (d) an outline of actions taken or proposed to minimise the risk of environmental harm from any condition or elevated contaminant level identified by the monitoring or recording programs.

Groundwater Monitoring

- (I11) The holder of this environmental authority must prepare and implement a groundwater monitoring program within 40 business days of this environmental authority taking effect.
- (I12) The groundwater monitoring program must be developed and implemented by a person possessing appropriate qualifications and experience in the fields of hydrogeology and groundwater sampling design.
- (I13) The groundwater monitoring program must be able to detect any significant risks and changes to groundwater quality due to activities authorised under this environmental authority. As a minimum the program must include:
 - (a) a groundwater monitoring network designed and installed for the authorised petroleum activities; and
 - (b) a sufficient number of monitoring sites to provide information on the following:
 - (i) seepage to groundwater and surrounding soils from any regulated dam authorised under this environmental authority and its effect on groundwater and soils;
 - (ii) background monitoring sites (i.e. groundwater quality in representative bore(s) that have not been affected by the activities authorised under this environmental authority).
 - (c) the location of monitoring points, parameters to be measured, frequency of monitoring, monitoring methodology used, trigger values; and
 - (d) the development of procedures to establish background ground water quality.
- (I14) The Groundwater Monitoring Program must provide for monitoring of groundwater quality as often as necessary to detect impacts of the petroleum activities authorised under this environmental authority, but not less frequently than biannually (every six months) for the first year of carrying out the petroleum activities and annually thereafter.
- (I15) If groundwater contamination caused by the petroleum activities is encountered, the following must be considered to satisfy requirements under Condition (I17):
 - (a) the level of environmental harm caused as a result of such contamination to soils and groundwater;
 - (b) the conduct of a geodetic survey of all monitoring bores to determine the relative water surface elevations of each bore and reported in metres relative to the Australian Height Datum; and
 - (c) the determination of groundwater flow direction, groundwater flow rate and hydraulic conductivity.
- (I16) The holder of this environmental authority must ensure that the groundwater monitoring data gathered in accordance with this environmental authority is analysed and interpreted to assess the nature and extent of any environmental impact of the environmentally relevant activity. The data, analysis and assessment must be submitted to the administering authority with each Annual Return.

- (I17) If groundwater monitoring indicates that any significant changes in groundwater quality caused by petroleum activities are detected, then information must be submitted to the administering authority within 10 business days of receipt of the analysis indicating these changes, including any proposed actions to mitigate the changes in groundwater quality..

Air Monitoring (Point Source)

- (I18) The holder of this environmental authority must conduct a monitoring program of contaminants released to the atmosphere at each release point recorded in the Register of Fuel Burning or Combustion Equipment (Condition F5) for the contaminants listed in Schedule F – Table 1 (release of contaminants) and at the frequencies specified in Schedule I – Table 1.

Schedule I, Table 1 – Monitoring Frequency for contaminants

Contaminant	Monitoring frequency
NOx as Nitrogen Dioxide	To be inserted
NOx as Nitrogen Dioxide	To be inserted
Carbon monoxide	To be inserted

- (I19) The monitoring program must comply with the following:
- Monitoring provisions for the release points must comply with the most recent edition of AS4323.1 Stationary source emissions method 1: Selection of sampling provisions.
 - The following tests must be performed for each sample taken at each release point specified in the Register of Fuel Burning or Combustion Equipment (Condition F5):
 - Gas velocity, volume and mass flow rate.
 - Temperature.
 - Water vapour concentration (for non-continuous sampling).
 - Samples taken must be representative of the contaminants discharged when operating under maximum operating conditions.
 - During the sampling period the following additional information must be gathered:
 - Production rate.
 - Plant status.
 - Monitoring of contaminant release must be carried out in accordance with the latest edition of the administering authority's Air Quality Sampling Manual.

Noise Monitoring

- (I20) The holder of this environmental authority must undertake noise monitoring when requested by the administering authority to investigate a complaint of environmental nuisance at a sensitive or commercial place within the reasonable and practicable timeframe nominated by the administering authority, and report the results to the administering authority within 3 business days of completion of the monitoring.
- (I21) Noise monitoring and recording must include the following descriptor, characteristics and matters:
- $L_{AN,T}$ (where N equals the statistical levels of 1, 10 and 90 and T = 15 mins).
 - background noise $L_{A90,T}$.

- (c) the level and frequency of occurrence of impulsive or tonal noise and any adjustment and penalties to statistical levels.
 - (d) atmospheric conditions including temperature, relative humidity and wind speed and directions.
 - (e) effects due to any extraneous factors such as traffic noise.
 - (f) location, date and time of monitoring.
 - (g) if the complaint concerns low frequency noise, $\text{Max } L_{PZ,15 \text{ min}}$.
 - (h) If the complaint concerns low frequency noise, one third octave band measurements in dB(LIN) for centre frequencies in the 10 – 200 Hz range for both the noise source and the background noise in the absence of the noise source.
- (I22) The method of measurement and reporting of noise levels and background sound pressure levels must comply with the latest edition of the administering authority's *Noise Measurement Manual* or the most recent version of AS1055 Acoustics – description and measurement of environmental noise.

Nuisance Monitoring (other than Noise)

- (I23) When the administering authority advises the holder of this environmental authority of a complaint alleging nuisance other than noise, the holder must investigate the complaint and advise the administering authority in writing of the action proposed or undertaken to resolve the complaint.
- (I24) When requested by the administering authority, the holder of this environmental authority must undertake monitoring as specified by the administering authority, within a reasonable and practical timeframe nominated by the administering authority to investigate any complaint of environmental harm at any sensitive or commercial place.
- (I25) The results of the investigation (including an analysis and interpretation of the monitoring results) and abatement measures implemented must be provided to the administering authority within 10 business days of completion of the investigation, or receipt of the monitoring results, whichever is the latter.
- (I26) If monitoring in accordance with Condition I24 and I25, indicates that emissions exceed the limits set in this environmental authority or are causing environmental nuisance, then the holder of this environmental authority must:
- (a) address the complaint including the use of alternative dispute resolution services if required; and/or
 - (b) as soon as practicable implement abatement or attenuation measures so that light, dust, particulate or odour emissions from the authorised activities do not result in further environmental nuisance.

SCHEDULE J – COMMUNITY ISSUES

- (J1) The holder of this environmental authority must maintain a record of complaints and incidents causing environmental harm, and actions taken in response to the complaint or incident; and
- (J2) The holder of this environmental authority must record the following details for all complaints received and provide this information to the administering authority on request:
 - (a) name, address and contact number for complainant;
 - (b) time and date of complaint;
 - (c) reasons for the complaint as stated by the complainant;
 - (d) investigations undertaken in response to the complaint;
 - (e) conclusions formed;
 - (f) actions taken to resolve complaint;
 - (g) any abatement measures implemented to mitigate the cause of the complaint; and
 - (h) name and contact details of the person responsible for resolving the complaint.
- (J3) The holder of this environmental authority must retain the record of complaints required by this condition for five (5) years.

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SCHEDULE K NOTIFICATION PROCEDURES

- (K1) The holder of this environmental authority must telephone the administering authority's Pollution Hotline (1300 130 372) or local office as soon as practicable after becoming aware of any release of contaminants not in accordance with the conditions of this environmental authority or any event where environmental harm has been caused or may be caused.
- (K2) Subject to condition (K1), the holder of this environmental authority is required to report in the case of uncontained spills of contaminants (including but not limited to hydrocarbon, CSG water or mixtures of both) of the following volumes or kind:
- (a) releases of any volume of contaminants to water; and
 - (b) releases of volumes of contaminants greater than 200L of hydrocarbon, 2000 litres of brine or 10 000 litres of coal seam gas water to land; and
 - (c) releases of any volumes of contaminants where potential serious or material environmental harm has occurred or may occur.
- (K3) The notification of emergencies or incidents as required by conditions number (K1 and K2) must include but not be limited to the following information:
- (a) the environmental authority number and name of the holder;
 - (b) the name and telephone number of the designated contact person;
 - (c) the location of the emergency or incident;
 - (d) the date and time of the release;
 - (e) the time the holder of this environmental authority became aware of the emergency or incident;
 - (f) the estimated quantity and type of any substances involved in the incident;
 - (g) the actual or potential suspected cause of the release;
 - (h) a description of the effects of the incident including any environmental harm that has occurred or may occur as a result of the release;
 - (i) any sampling conducted or proposed, relevant to the emergency or incident; and
 - (j) actions taken to prevent any further release and mitigate any environmental harm caused by the release.
- (K4) Within 10 business days following the initial notification of an emergency or incident or receipt of monitoring results, whichever is the later, a written report must be provided to the administering authority, including the following:
- (a) results and interpretation of any samples taken at the time of the incident and analysed;
 - (b) the outcomes of actions taken at the time of the incident to prevent or minimise environmental harm; and
 - (c) proposed actions to prevent a recurrence of the emergency or incident.
- (K5) As soon as practicable, but not more than six (6) weeks following the conduct of any environmental monitoring performed in relation to the 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 this environmental authority, a written report on the results of any such monitoring must be provided to the administering authority.

SCHEDULE L DEFINITIONS

Note: Where a term is not defined in this environmental authority the definition in the Environmental Protection Act 1994, its regulations and Environmental Protection Policies or the Petroleum and Gas (Production and Safety) Act 2004 and its regulations must be used in that order.

"aggregation dam" means a dam that is used to aggregate and contain CSG water prior to use, treatment or disposal of that water (by means other than evaporation). The primary purpose of the dam must not be to evaporate the water even though this will naturally occur.

"associated works" in relation to a dam, means:

- operations of any kind and all things constructed, erected or installed for that dam; and
- any land used for those operations.

"background noise level" means the sound pressure level, measured in the absence of the noise under investigation, as the L A90,T being the A-weighted sound pressure level exceeded for 90 percent of the measurement time period T of not less than 15 minutes, using Fast response.

"bed and banks" for a watercourse or wetland means land over which the water of the watercourse or wetland normally flows or that is normally covered by the water, whether permanently or intermittently; but does not include land adjoining or adjacent to the bed or banks that is from time to time covered by floodwater.

"beneficial use" means

- with respect to dams, that the current or proposed owner of the land on which a dam stands, has found a use for that dam that is:
 - of benefit to that owner in that it adds real value to their business or to the general community,
 - in accordance with relevant provisions of the *Environmental Protection Act 1994*,
 - sustainable by virtue of written undertakings given by that owner to maintain that dam, and
 - the transfer and use have been approved or authorised under any relevant legislation.
 Or
- with respect to coal seam gas water, refer the DERM's Operational Policy *Management of water produced in association with petroleum activities (CSG water)* and *Notice of decision to approve a resource for beneficial use – CSG water* which can be accessed on DERM's website at www.derm.qld.gov.au.

"brine" means either saline water with a total dissolved solid concentration greater than 40 000mg/l or CSG water after it has been concentrated through water treatment processes and/or evaporation.

"bund or banded" in relation to spill containment systems for fabricated or manufactured tanks or containers designed to a recognised standard means an embankment or wall of brick, stone, concrete or other impervious material which may form part or all of the perimeter of a compound and provides a barrier to retain liquid. Since the bund is the main part of a spill containment system, the whole system (or banded area) is sometimes colloquially referred to within industry as the bund. The bund is designed to contain spillages and leaks from liquids used, stored or processed above ground and to facilitate clean-up operations. As well as being used to prevent pollution of the receiving environment, bunds are also used for fire protection, product recovery and process isolation.

"category A ESA" means any area listed in Section 25 of the *Environmental Protection Regulation 2008*.

"category B ESA" means any area listed in Section 26 of the *Environmental Protection Regulation 2008*.

"category C ESA" means any of the following areas:

- Nature Refuges as defined under the *Nature Conservation Act 1992*;
- Koala Habitat Areas as defined under the *Nature Conservation Act 1992*;
- State Forests or Timber Reserves as defined under the *Forestry Act 1959*;
- Declared catchment areas under the *Water Act 2000*;
- Resources reserves under the *Nature Conservation Act 1992*
- An area identified as "Essential Habitat" for a species of wildlife listed as endangered, vulnerable, rare or near threatened under the *Nature Conservation Act 1992*;
- Any wetland shown on the Map of Referable Wetlands available from DERM's website; or
- "Of concern" regional ecosystems identified in the database maintained by DERM called 'Regional ecosystem description database' containing regional ecosystem numbers and descriptions.

“certification or certified by a suitably qualified and experienced person” in relation to a design plan or an annual report regarding dams, means that a statutory declaration has been made by that person and, when taken together with any attached or appended documents referenced in that declaration, all of the following aspects are addressed and are sufficient to allow an independent audit at any time:

- exactly what is being certified and the precise nature of that certification.
- the relevant legislative, regulatory and technical criteria on which the certification has been based;
- the relevant data and facts on which the certification has been based, the source of that material, and the efforts made to obtain all relevant data and facts; and
- the reasoning on which the certification has been based using the relevant data and facts, and the relevant criteria.

“clearing” means:

- in relation to grass, scrub or bush—the removal of vegetation by disturbing root systems and exposing underlying soil (including burning), but does not include—
 - the flattening or compaction of vegetation by vehicles if the vegetation remains living; or
 - the slashing or mowing of vegetation to facilitate access tracks; or
 - the clearing of noxious or introduced plant species; and
- in relation to trees—cutting down, ringbarking, pushing over, poisoning or destroying in any way.

“commercial place” means a work place used as an office or for business or commercial purposes, which is not part of the petroleum activities and does not include employees accommodation or public roads.

“construction” in relation to a dam includes building a new dam and modifying or lifting an existing dam.

“CSG water” means groundwater that is necessarily or unavoidably brought to the surface in the process of coal seam gas exploration or production. CSG water typically contains significant concentrations of salts, has a high sodium adsorption ratio (SAR) and may contain other contaminants that have the potential to cause environmental harm if released to land or waters through inappropriate management. CSG water is a waste, as defined under s13 of the EP Act.

“CSG water dams” include any type of dam (storage or evaporation) used to contain groundwater that is necessarily or unavoidably brought to the surface in the process of coal seam gas exploration or production.

“dam” means a land-based structure or a void that is designed to contain, divert or control flowable substances, and includes any substances that are thereby contained, diverted or controlled by that land-based structure or void and associated works. A dam does *not* mean a fabricated or manufactured tank or container, designed and constructed to an Australian Standard that deals with strength and structural integrity of that tank or container.

“design plan” means the documentation required to describe the physical dimensions of the dam, the materials and standards to be used for construction of the dam, and the criteria to be used for operating the dam. The documents must include design and investigation reports, specifications and certifications, together with the planned decommissioning and rehabilitation works and outcomes. A design plan may include ‘as constructed’ drawings.

“discharge area” means:

- (a) that part of the land surface where groundwater discharge produces a net movement of water out of the groundwater; and
- (b) identified by an assessment process consistent with the document: Salinity Management Handbook, Queensland Department of Natural Resources, 1997; or
- (c) identified by an approved salinity hazard map held by the Department of Environment and Resource Management.

“ecosystem functioning” means the interactions between and within living and nonliving components of an ecosystem and generally correlates with the size, shape and location of an area of vegetation.

“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 petroleum activity, the time at which the petroleum authority ends or the time that the land in question ceases to be part of an authority.

“equivalent person or EP” means an equivalent person under volume 1, section 2 of the *Guidelines for Planning and Design of Sewerage Schemes*, October 1991, published by the Water Resources Commission, Department of Primary Industries, Fisheries and Forestry.

“evaporation dam” means a dam where CSG water or brine is contained until the water content has been removed by evaporation.

“fill” means any kind of material in solid form (whether or not naturally occurring) capable of being deposited at a place but does not include material that forms a part of, or is associated with, a structure constructed in a watercourse, wetland or spring including a bridge, road, causeway, pipeline, rock revetment, drain outlet works, erosion prevention structure or fence.

“flowable substance” means matter or a mixture of materials which can flow under any conditions potentially affecting that substance. Constituents of a flowable substance can include water, other liquids fluids or solids, or a mixture that includes water and any other liquids fluids or solids either in solution or suspension.

“foreseeable future” means the period used for assessing the total probability of an event occurring. Permanent structures and ecological sustainability should be expected to still exist at the end of a 150 year foreseeable future with an acceptably low probability of failure before that time.

“hazard” in relation to a dam as defined, means the potential for environmental harm resulting from the collapse or failure of the dam to perform its primary purpose of containing, diverting or controlling flowable substances.

“hazard category” means a category, either low significant or high, into which a dam is assessed as a result of the application of tables and other criteria in *DERM's Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (Version 1.0, 2008)* or any updated version of the Manual that becomes available from time to time

“heritage place” means any place that may be of cultural heritage significance, or any place with potential to contain archaeological artefacts that are an important source of information about Queensland's history.

“high bank” means the defining terrace or bank or, if no bank is present, the point on the active floodplain, which confines the average annual peak flows in a watercourse.

“highly erodible soils” means very unstable soils that are generally described as Sodosols with hard – setting, fine sandy loam to silty clay loam surfaces (solodics, solodised solonetz and solonetz) or soils with a dispersible layer located less than 25cm deep or soils less than 25cm deep.

“hydraulic performance” means the capacity of a regulated dam to contain or safely pass flowable substances based on a probability (AEP) of performance failure specified for the relevant hazard category in the *Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (Version 1.0, 2008)* published by the Environmental Protection Agency on its website.

“impulsive sound” means sound characterised by brief excursions of sound pressure (acoustic impulses) that significantly exceed the background sound pressure. The duration of a single impulsive sound is usually less than one second.

“infrastructure” means water storage dams, roads and tracks, equipment, buildings and other structures built for the purpose and duration of the conduct of the petroleum activities, but does not include other facilities required for the long term management of the impact of those activities or the protection of potential resources. Such other facilities include dams other than water storage dams (e.g. evaporation dams), pipelines and assets, that have been decommissioned, rehabilitated, and lawfully recognised as being subject to subsequent transfer with ownership of the land.

“itinerant activities” means [to be defined through the noise consultation process].

“lake” means:

- (a) a lagoon, swamp or other natural collection of water, whether permanent or intermittent; and
- (b) the bed and banks and any other element confining or containing the water.

“landfill monocell” means a specialised, isolated landfill facility where a single specific waste type is exclusively disposed (i.e. salt).

“leachate” means a liquid that has passed through or emerged from, or is likely to have passed through or emerged from, a material stored, processed or disposed of on site which contains soluble, suspended or miscible contaminants likely to have been derived from the said material.

“levee” means a dyke or bund that is designed only to provide for the containment and diversion of stormwater or flood flows from a contributing catchment, or containment and diversion of flowable materials resulting from unplanned releases from other works of infrastructure, during the progress of those stormwater or flood flows or those unplanned releases; and does not store any significant volume of water or flowable substances at any other times.

“limited petroleum activities” mean activities including geophysical surveys (including seismic activities), well sites, well pads, sumps, flare pits, flow lines and supporting access tracks. Limited petroleum activities do not include the construction of production infrastructure for processing or storing petroleum or

by-products, dams, compressor stations, campsites/workforce accommodation, power supplies, waste disposal or other supporting infrastructure for the project.

“max $L_{PZ,15 \text{ min}}$ min” means the maximum value of the Z-weighted sound pressure level measured over 15 minutes.

“mg/L” means milligrams per litre.

“overland flow water” means water, including floodwater, flowing over land, otherwise than in a watercourse or lake:

- after having fallen as rain or in any other way; or
- after rising to the surface naturally from underground.

“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.

“pest” means species:

- (a) declared under the *Land Protection (Pest and Stock route Management) Act 2002*;
- (b) declared under Local Government model local laws; and
- (c) which may become invasive in the future.

“regulated dam” means any dam in the significant or high hazard category as assessed using the *Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (Version 1.0, 2008)* or any updated version of the Manual that becomes available from time to time

“rehabilitation” means the process of reshaping and revegetating land to restore it to a stable landform and in accordance with the acceptance criteria set out in this environmental authority and, where relevant, includes remediation of contaminated land

“remnant unit” means a continuous area of remnant vegetation representative of a single Regional Ecosystem type or a single heterogeneous unit (multiple Regional Ecosystem types that cannot be distinguished individually due to the scale of mapping).

“River Improvement Trust Asset Area” means an area within a River Improvement Area declared under the *River Improvement Trust Act 1940* that is or has been subject to restoration or flood mitigation works. The locations and details of these areas can be obtained from the relevant River Improvement Trust.

“sensitive place” means

- a dwelling (including residential allotment, mobile home or caravan park, residential marina or other residential premises, motel, hotel or hostel; or
- a library, childcare centre, kindergarden, school, university or other educational institution;
- a medical centre, surgery or hospital; or
- a protected area; or
- a public park or garden that is open to the public (whether or not on payment of money) for use other than for sport or organised entertainment.

“significantly disturbed land or significant disturbance to land” means disturbance to land as defined in section 26 of the *Environmental Protection Regulation 2008*.

“site” means the petroleum authority(ies) to which the environmental authority relates.

“spring” means the land to which water rises naturally from below the ground and the land over which the water then flows.

“stable” in relation to land, means landform dimensions are or will be stable within tolerable limits now and in the foreseeable future. Stability includes consideration of geotechnical stability, settlement and consolidation allowances, bearing capacity (trafficability), erosion resistance and geochemical stability with respect to seepage, leachate and related contaminant generation.

“state heritage place” means a place entered in the Queensland heritage register under Part 4 of the *Queensland Heritage Act 1992*.

“suitably qualified person” means a person who has professional qualifications, training, skills or experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis to performance relative to the subject matter using the relevant protocols, standards, methods or literature.

“suitably qualified and experienced person” in relation to a hazard assessment of a dam, means that a statutory declaration has been made by that person and, when taken together with any attached or appended documents referenced in that declaration, all of the following aspects are addressed and are sufficient to allow an independent audit at any time:

- exactly what has been assessed and the precise nature of that assessment;

- the relevant legislative, regulatory and technical criteria on which the assessment has been based;
- the relevant data and facts on which the assessment has been based, the source of that material, and the efforts made to obtain all relevant data and facts; and
- the reasoning on which the assessment has been based using the relevant data and facts, and the relevant criteria.

“suitably qualified and experienced person” in relation to dams means one who is a Registered Professional Engineer of Queensland (RPEQ) under the provisions of the Professional Engineers Act 1988, OR registered as a National Professional Engineer (NPER) with the Institution of Engineers Australia, OR holds equivalent professional qualifications to the satisfaction of the administering authority for the Act; AND the administering authority for the Act is satisfied that person has knowledge, suitable experience and demonstrated expertise in relevant fields, as set out below:

- knowledge of engineering principles related to the structures, geomechanics, hydrology, hydraulics, chemistry and environmental impact of dams; and
- a total of five years of suitable experience and demonstrated expertise in the geomechanics of dams with particular emphasis on stability, geology and geochemistry, and
- a total of five years of suitable experience and demonstrated expertise each, in three of the following categories:
 - investigation and design of dams.
 - Construction, operation and maintenance of dams.
 - hydrology with particular reference to flooding, estimation of extreme storms, water management or meteorology.
 - hydraulics with particular reference to sediment transport and deposition, erosion control, beach processes.
 - hydrogeology with particular reference to seepage, groundwater.
 - solute transport processes and monitoring thereof.
 - dam safety.

“third party auditor” means a suitably qualified person who is either a certified third party auditor or an internal auditor employed by the holder of the environmental authority and the person is independent of the day to day management and operation of activities covered by this environmental authority

“threatening processes” means processes, features and actions that can have a detrimental effect upon the health and viability of an area of vegetation. For example altered hydrology, land use practices, invasion by pest and weed species, land degradation, edge effects and fragmentation.

“tolerable limits” means a range of parameters regarded as being sufficient to meet the objective of protecting relevant environmental values. For example, a range of settlement for a tailings capping, rather than a single value, could still meet the objective of draining the cap quickly, preventing damage and limiting infiltration and percolation.

“topsoil” means the surface (top) layer of a soil profile, which is more fertile, darker in colour, better structured and supports greater biological activity than underlying layers. The surface layer may vary in depth depending on soil forming factors, including parent material, location and slope, but generally is not greater than about 300mm in depth from the natural surface.

“void” means any man-made, open excavation in the ground (includes borrow pits, drill sumps, frac pits, flare pits, cavitation pits and trenches).

“waters” includes all or any part of a creek, river, stream, lake, lagoon, dam, swamp, wetland, spring, unconfined surface water, unconfined water in natural or artificial watercourses, 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 underground water.

“watercourse” means a river, creek or stream in which water flows permanently or intermittently:

- (a) in a natural channel, whether artificially improved or not; or
- (b) in an artificial channel that has changed the course of the watercourse; but, in any case, only:
 - (c) unless a regulation under paragraph (d), (e) or (f) declares otherwise-at every place upstream of the point (point A) to which the high spring tide ordinarily flows and reflows, whether due to a natural cause or to an artificial barrier; or
 - (d) if a regulation has declared an upstream limit for the watercourse-the part of the river, creek or stream between the upstream limit and point A; or

- (e) if a regulation has declared a downstream limit for the watercourse-the part of the river, creek or stream upstream of the limit; or
- (f) if a regulation has declared an upstream and a downstream limit for the watercourse-the part of the river, creek or stream between the upstream and the downstream limits.

Watercourse includes the bed and banks and any other element of a river, creek or stream confining or containing water.

“wetland” means an area shown as a wetland on a ‘Map of referable wetlands’, a document approved by the chief executive (environment). A map of referable wetlands can be viewed at www.derm.qld.gov.au.

“wild river declaration” means a statutory instrument under the *Wild Rivers Act 2005*. A declaration lists the relevant natural values to be preserved and delineates certain parts of the wild river area and the different constraints that may apply in these areas. With reference to environmental authorities for petroleum, each declaration also specifies conditions to be included in a new authority if the activity is to be located within the wild river area.

“80th percentile release limits” means that not more than one (1) of the measured values is to exceed the stated release limit for any five (5) consecutive samples where:

- (1) the consecutive samples are taken over a 5 month period; and
- (2) the consecutive samples are taken at approximately equal periods.

End of Conditions

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Appendices of Conditions for Different Scenarios

Appendix 1 Release to Waters of Treated or Good Quality Coal Seam Gas Water Conditions

Contaminant Release

(BA1) The release of contaminants to waters must only occur from the release points specified in Schedule BA, Table 1 – Contaminant Release Points, Sources and Receiving Waters and depicted in Figure 1 **<this would be a plan locating all monitoring and release points>** attached to this environmental authority.

Schedule BA, Table 1: Contaminant Release Points, Sources and Receiving Waters

Release Point (RP)	Latitude or northing (GDA94)	Longitude or easting (GDA94)	Contaminant Source and Location	Monitoring Point	Receiving waters description
RP 1	XXXX	XXXX	Treated CSG water from the RO plant	Outlet of Discharge Pipe to Wet Creek	Wet Creek
RP 2	XXXX	XXXX			

EXPLANATORY NOTES

Table 2 needs to be populated based on the discharge proposal, the spatial location and available background water quality information. Typically, a lesser number of indicators and limits will be required for event based releases. Similarly, more stringent limits will generally be required for a release to dry bed and banks, where this is shown to be a requirement of the approval. The values should be developed to ensure that downstream values are protected. For aquatic ecosystem protection, the limits will typically be based on achieving instream WQO's e.g. 20th and 80th percentiles of reference data (except in the case of conductivity which is based on 25th and 75th percentiles). This data may be sourced from the Queensland Water Quality guidelines or local reference data where available. Generic reference-based values for cations and anions will be made available by DERM based on historical monitoring results.

(BA2) The release of contaminants to waters must not exceed the release limits stated in Schedule BA, Table 2 when measured at the monitoring points specified in Schedule BA, Table 1 for each quality characteristic.

Schedule BA Table 2 – Contaminant Release Limits for release point X

Physicochemical Parameters	Release Limits	Limit Type	Monitoring frequency
Electrical conductivity (µS/cm)	To achieve an instream value between the 25 th to 75 th percentile of relevant reference data	range	daily
pH (pH Unit)	6.5-9	range	daily
Dissolved oxygen (mg/L)	2	minimum	daily
Temperature (°C)	To achieve an instream value between the 20 th to 80 th percentile of relevant reference data	range	daily
Turbidity (NTU)	To achieve an instream value between the 20 th to 80 th percentile of relevant reference data	range	daily
Suspended Solids (mg/L)	To achieve an instream value between the 80 th percentile of relevant reference data	maximum	weekly
Cations and anions (mg/L), these could include: calcium; fluoride; and sulphate.	To achieve an instream value between the 20 th to 80 th percentile of relevant reference data	range	weekly
Other	Depending on source of CSG water, the level of treatment and the management regime		

(BA3) The release of contaminants to waters from the release points must be monitored at the locations specified in Table 1 for each quality characteristics and at the frequency specified in Table 2.

Note: The following conditions are applicable when there needs to be monitoring of stream flow and the potential for the release to dominate downstream flow regimes (such as with release to ephemeral streams). Where flow monitoring occurs and the timing of the release is linked to measurements of instream flow, a receiving water flow trigger must be specified. The trigger will be used to signal a commencement and cessation of release. The flow trigger would usually be representative of the commencement of event flow rather than base flow and could be determined from historical flow monitoring or hydrological modelling. In other situations, a maximum release volume may be specified independent of stream flow rates.

Contaminant Release

(BA4) The holder must install, operate and maintain a stream flow gauging station(s) as specified in Table 3 to determine and record stream flows at the locations

upstream of each Release Point(s) as shown in Table 1, for any receiving water into which a release occurs.

- (BA5) Notwithstanding any other condition of this environmental authority, the release of contaminants to waters must only take place during periods of natural flow events specified as minimum flow in Table 3 for the contaminant release point(s) specified in Table 1.

Schedule BA, Table 3 – Contaminant Release during Flow Events

Receiving water description	Release Point	Gauging station description	Latitude or northing (GDA94)	Longitude or easting (GDA94)	Minimum Flow in Receiving Water Required for a Release Event	Flow recording Frequency
Wet Creek		Gauging station 1	XXXX	XXXX	The actual flow must be a quantifiable measure. Example: > or = 5 m ³ /sec	Continuous (minimum daily)

- (BA6) The volume released through the release point(s) must not exceed XX% of the measured upstream receiving water flow. <This will depend on hydrological assessment, historical flow events and the water quality release limits.>

OR

- (BA7) The volume release through the release point(s) must not exceed XX m³/s and YY ML/day.

Note: only one of condition BA6 and BA7 will apply.

- (BA8) The quantity of contaminants released from each release point must be measured and recorded at the monitoring point(s) in Table 1 and at the frequency specified in Table 2.

- (BA9) Releases to waters must be undertaken so as not to cause erosion of the bed and banks of the receiving waters, or cause a material build up of sediment in such waters.

- (BA10) The release of contaminants to waters must have ceased by XX <insert date as determined in the required risk assessment>.

Note: Condition B10 applies only to Hierarchy 5.

Characterisation of Other Contaminants

- (BA11) The environmental authority holder must undertake an <insert frequency> assessment of the contaminants of CSG water to determine the risk of environmental harm from release of CSG water to surface waters. This should consider the contaminants mentioned in the ANZECC & ARMCANZ 2000 guidelines.
- (BA12) If quality characteristics of the CSG water assessment, required by condition BA11, exceed any of the levels specified in Table 4 the environmental authority holder must:
- (a) notify the administering authority within 5 business days; and
 - (b) complete an investigation in accordance with the ANZECC & ARMCANZ 2000 methodology, into the potential for environmental harm and provide a written report to the administering authority in the next annual return, outlining:
 - i. details of the investigations carried out; and
 - ii. actions taken to prevent and/or minimise environmental harm.

Notification of Release Event Exceedance

- (BA13) If the release limits defined in Schedule BA, Table 2 are exceeded, the holder of the environmental authority must notify the administering authority within twenty-four (24) hours of receiving the results.
- (BA14) The environmental authority holder must, within twenty-eight (28) days of a release that exceeds the conditions of this environmental authority, provide a report to the administering authority detailing:
- (a) the reason for the release;
 - (b) the location of the release;
 - (c) all water quality monitoring results;
 - (d) any general observations;
 - (e) all calculations;
 - (f) measures taken to prevent a repeat of the exceedance taking place; and
 - (g) any other matters pertinent to the water release event.

Receiving Environment Monitoring Program (REMP)

- (BA15) A REMP must be developed and implemented to monitor and record the effects of the release of contaminants on the receiving environment whilst contaminants are being discharged, with the aims of identifying and describing the extent of any adverse impacts to local environmental values, and monitoring any changes in the receiving water. For the purposes of the REMP the receiving environment is defined as the waters of the XX and connected waterways within XX (e.g. Xkm) downstream of the release.
- (BA16) The REMP must be maintained by a person possessing appropriate qualifications and experience in the field of hydrology and surface water monitoring program design.

(BA17) The REMP must address but not be limited to the following points:

- (a) description of potentially affected receiving waters including key communities and background water quality characteristics based on accurate and reliable monitoring data that takes into consideration any temporal variation (e.g. seasonality);
- (b) description of applicable environmental values, including but not limited to:
 - i. hydrology (flow, duration, periodicity, connectivity with groundwater systems);
 - ii. physiochemical properties;
 - iii. aquatic ecosystem parameters including flow and fauna habitat; and
 - iv. geomorphological features;
- (c) description of water quality objectives to be achieved (i.e. as scheduled pursuant to the *Environmental Protection (Water) Policy 2009*);
- (d) any relevant reports prepared by other governmental or professional research organisations that relate to the receiving environment within which the REMP is proposed;
- (e) water quality targets within the receiving environment to be achieved, and clarification of contaminant concentrations or levels indicating adverse environmental impacts during the REMP.
- (f) monitoring for any potential adverse environmental impacts caused by the release;
- (g) monitoring of stream flow and hydrology;
- (h) consideration of sodic soils and potential for water course bank slumping;
- (i) monitoring of contaminants should consider the limits specified in Schedule BA – Table 2 to assess the extent of the compliance of concentrations with water quality objectives and/or the ANZECC & ARMCANZ 2000 guidelines for slightly to moderately disturbed ecosystems;
- (j) monitoring of physical chemical parameters as a minimum those specified in Table 2 (in addition to dissolved oxygen saturation);
- (k) monitoring biological indicators (for macroinvertebrates in accordance with the AusRiVAS methodology) and metals/metalloids in sediments (in accordance with ANZECC & ARMCANZ 2000, *A Guide To The Application Of The ANZECC & ARMCANZ Water Quality Guidelines In The Minerals Industry* (BATLEY et al) and/or the most recent version of AS5667.1 *Guidance on Sampling of Bottom Sediments*) for permanent, semi-permanent water holes and water storages;
- (l) the methods for analysis and interpretation all monitoring results;
- (m) the locations of monitoring points (including the locations of proposed background and downstream impacted sites for each release point);
- (n) the frequency or scheduling of sampling and analysis sufficient to determine water quality objectives and to derive site specific reference values within two (2) years (depending on wet season flows) in accordance with the *Queensland Water Quality Guidelines 2009*. For ephemeral streams, this should include periods of flow irrespective of mine or other discharges;
- (o) specify sampling and analysis methods and quality assurance and control;
- (p) any historical data sets to be relied upon;
- (q) description of the statistical basis on which conclusions are drawn,
- (r) any control or reference sites; and

- (s) recording of planned and unplanned releases to watercourses, procedures for event monitoring, monitoring methodology used and procedure to establish background surface water quality.

(BA18) The REMP must be prepared and submitted in writing to the administering authority by XX.

Water Release Reduction Strategy

(BA19) As part of the CWMP the holder of the environmental authority must develop and implement an on-going Release Reduction Strategy to maximise CSG water use and minimise any release to waters from the XX and the storage of CSG water in holding dams. The strategy must address the following matters:

- (a) implementation of schemes to achieve maximum use of the water;
- (b) specific targets for achieving increased use of CSG water both treated and untreated;
- (c) a market analysis at least every three (3) years to identify existing and future opportunities for water use;
- (d) on-going review of emerging technologies and/or re-use options that could achieve significant reductions in mass loads of contaminants released to the environment;
- (e) investigation of the feasibility of alternative options, practices and procedures to further minimise the volume and concentration of contaminants released to waters; and
- (f) programs to implement feasible options to achieve increased water use and reduction in contaminant loads, including actions and timeframes for completion.

(BA20) A progress report on the Release Reduction Strategy must be submitted to the administering authority with each annual return. The report(s) must address at least the following matters:

- (a) details of the specific options, practices and procedures investigated;
- (b) details of new practices, procedures and programs implemented since the last reporting period and targets met;
- (c) where alternative options, practices and procedures are not considered feasible, the provision of justification to support that determination; and
- (d) details of the option(s) yet to be implemented, including the timeframes for implementation, and justification for the chosen option(s).

Water General

(BA21) The release of contaminants directly or indirectly to waters:

- (a) must not produce any visible discolouration of receiving waters; nor
- (b) must not produce any slick or other visible or odorous evidence of oil, grease or petrochemicals nor contain visible floating oil, grease, scum, litter or other objectionable matter.

Annual Water Monitoring Reporting

(BA22) The following information must be recorded in relation to all water monitoring required under the conditions of this environmental authority and submitted to the administering authority in the specified format with each annual return:

- (a) the date on which the sample was taken;
- (b) the time at which the sample was taken;
- (c) the monitoring point at which the sample was taken;

- (d) the measured or estimated daily quantity of the contaminants released from all release points;
- (e) the release flow rate at the time of sampling for each release point;
- (f) the results of all monitoring and details of any exceedences with the conditions of this environmental authority; and
- (g) water quality monitoring data must be provided to the administering authority in the specified electronic format upon request.

Note: Condition BA22 will be incorporated into Schedule I when this appendix is incorporated into the environmental authority.

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Appendix 2 Sewage Treatment Plant <21 EP Conditions

- (BB1) The construction and operation of a sewage treatment works greater than 21 EP is prohibited under this environmental authority.
- (BB2) The disposal of sewage effluent must not cause environmental nuisance or material or serious environmental harm.

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Appendix 3 Sewage Treatment Works >21 - 450 EP Conditions

Instruction: low risk

Comment: Sewage treatment works that have a total daily peak design capacity of at least 21 EP constitute an environmentally relevant activity under the Environmental Protection Act 1994. The following model conditions have been developed for those works with a peak design capacity of 21 to 450 EP and where:

- *the plant is designed to produce secondary treated effluent with disinfection;*
- *the effluent is irrigated on a dedicated area of land on the petroleum tenure;*
- *there is a buffer distance of at least 100 metres to any residential area, watercourse, wetland or protected area.*

Release of Treated Sewage Effluent Contaminants to Land

- (BC1) Sewage pump stations must be fitted with a stand-by pump and a visible or audible high level alarm.
- (BC2) Treated effluent may only be released to land at the designated, fenced and delineated contaminant release area/s.
- (BC3) The contaminant release area/s must be maintained in a proper and efficient condition so as to provide adequate assimilation, percolation, evaporation and transpiration of the released contaminants.
- (BC4) Treated effluent must not be applied by spray irrigation and must be applied in a manner that does not cause damming or runoff of effluent beyond the contaminant release area/s.
- (BC5) When weather conditions or soil conditions preclude the release of contaminants, the contaminants must be directed to on-site storage or lawfully disposed of off-site.

Quality of Contaminants Released from the Sewage Treatment Works

- (BC6) Treated effluent must comply, at the sampling and in-situ measurement point(s), with each of the release limits specified in *Schedule BC – Table 1 Treated Sewage Effluent Standards* for each quality characteristic.
- (BC7) The release of contaminants to land must be monitored at the frequency and at the sampling and in-situ measurement point specified in *Schedule BC-Table 1 Treated Sewage Effluent Standards* and records of the monitoring results kept for at least five years and made available to the administering authority on request.

Schedule BC – Table 1 Treated Sewage Effluent Standards

Quality Characteristic	Sampling and in-situ measurement Point Location	Limit Type	Release Limit	1.1.1.1.1 Frequency
5 day	E.g. Release	maximum	20	Monthly

Quality Characteristic	Sampling and in-situ measurement Point Location	Limit Type	Release Limit	1.1.1.1.1 Frequency
Biochemical Oxygen Demand (inhibited)	pipe from sewage treatment plant		mg/L	
Suspended Solids		maximum	30 mg/L	
pH		range	6.0 to 9.0	
E-Coli		80 percentile	1000 cfu per 100 mL	
		maximum	10000 cfu per 100 ml	

Appendix 4 Fuel burning and/or combustion equipment conditions for hubs and/or places close to populated areas as well as other lower risk sites where such equipment is to be located

Fuel Burning or Combustion Equipment in Hubs and/or Places Close to Populated Areas

- (F1) Fuel burning or combustion equipment must only release contaminants to the atmosphere as provided for in Schedule F – Table 1.
- (F2) Contaminants must be directed vertically upwards.

Schedule F – Table 1 (release of contaminants)

Equipment	Minimum Release Height (m)	Minimum Velocity(m/sec)	Contaminant Released	Maximum Release Limit	Monitoring Frequency
Gas Compressors					
Diesel Compressors					
Power Generator					

Note: this will vary depending on the use, fuel and type of equipment employed.

Fuel Burning or Combustion Equipment in Other Areas

- (F3) The calculated ground level concentration of contaminants discharged to the atmosphere under maximum operating conditions must not exceed the criteria in Schedule F Table 2 for each air contaminant.
- (F4) Prior to the installation of any new or additional fuel burning or combustion equipment following the issue of this environmental authority, the holder must ensure that proper and effective pollution control equipment is provided for in the design of the equipment to ensure that modelling performed in accordance with Condition F5 demonstrates compliance with the criteria specified in Schedule F Table 2.
- (F5) The ground level concentrations resulting from all emissions from all fuel burning or combustion equipment expected to have a measurable impact on air quality within the study area must be calculated using an appropriate air dispersion model and the results must be made available to the administering authority on request.
- (F6) Contaminants must be directed vertically upwards.
- (F7) The holder of this environmental authority must maintain a Register of Fuel Burning or Combustion Equipment that must include, as a minimum, the following information for each item of equipment:
- fuel burning or combustion equipment name and location;
 - stack emission height (metres);
 - minimum efflux velocity (metres /sec); and
 - mass emission rates (g/s) / contaminant concentrations (mg/Nm³ @ x % O₂).
- (F8) The holder of this environmental authority must ensure that the information contained in the Register of Fuel Burning or Combustion Equipment is complete and current on any given day.

- (F9) All entries in the Register of Fuel Burning or Combustion Equipment must be certified by the chief executive officer or their delegate of the nominated principal holder for the tenure as being accurate and correct.
- (F10) The holder of this environmental authority must make the Register of Fuel Burning or Combustion Equipment or information contained in the Register available to the administering authority on request.

Schedule F Table 2 Maximum Ground Level Concentration Criteria

Contaminant	Concentration	Units	Averaging time	Monitoring frequency
NO _x as Nitrogen Dioxide	250	µg/m ³	1 hour	To be inserted
NO _x as Nitrogen Dioxide	33	µg/m ³	1 year	To be inserted
Carbon monoxide	11	mg/m ³	8 hour	To be inserted

Appendix 5 Salt Management

Brine Salt Reuse, Recycle or Off Site Disposal

- (GA1) Following cessation of petroleum activities, any residual brine or solid salt present in a CSG water dam must be removed and transported to a facility that can lawfully reuse, recycle or dispose of such waste.

Encapsulation of Solid Salt in a Landfill

- (GA2) Prior to encapsulation brine must be dried to a solid state.
- (GA3) Solid salt may be disposed in a purpose built landfill monocell, designed and constructed by suitably qualified persons, and in accordance with the following:
- (a) the landfill is located on land under the freehold ownership of the holder of this environmental authority;
 - (b) the landfill is not located within 100m of the boundary of the freehold land;
 - (c) details of the landfill have been included on the contaminated land register;
 - (d) only one landfill is permitted per petroleum project;
 - (e) the facility should not occur above the natural surface level of the surrounding land;
 - (f) the facility should be located such that there are no obvious below ground structures that are likely to bring water into contact with the exterior of the containment and have systems to prevent such contact;
 - (g) the facility should not be flat and shallow, but compact to minimise the surface area of the containing structure;
 - (h) the facility should be located with a sufficient buffer distance from the boundary of the relevant petroleum tenure/freehold tenure to minimise the risk of any adverse impact on sensitive environments, land with high ecological value, agricultural lands and useful surface water and groundwater; and
 - (i) the facility should be designed and located so that it is protected from any potential adverse consequences of regional or local flooding to the probable maximum flood level.
- (GA4) The only regulated waste that is authorised to be disposed of in the landfill monocell is solid salt resulting from the treatment of CSG water produced during the conduct of the authorised petroleum activities
- (GA5) The authorised landfill for disposal of solid salt waste is located at:
- Petroleum Tenure xxxx Latitude xxx Longitude xxxxxx
- (GA6) Material used in the construction of the solid salt disposal landfill monocell, above ground embankments, leachate collection dams and final cover must achieve the *in situ*, permeabilities for various landfill features complying with the corresponding limits specified in Schedule GA – Table 1.
- (GA7) Any solid salt disposal landfill monocell, above ground embankments, leachate collection dams and final cover must be constructed, operated and maintained in accordance with the requirements specified in Schedule GA – Table 1.

Schedule GA – Table 1 Permeabilities and Special Requirements for Landfill Features

Landfill Feature	Minimum Permeability (m sec ⁻¹)	Minimum Thickness (mm)	Special Requirements
Base and walls of landfill cells and subcells	1×10^{-9}	900	Constructed in at least 2 layers; and lined with a flexible membrane liner
Base and walls of seepage collection dam and leachate drains	1×10^{-9}	900	Constructed in at least 2 layers; and lined with a flexible membrane liner
Interim landfill cover	Not relevant	500	Interim cover to be applied between salt waste placement events
Final landfill cover	1×10^{-8}	700	Additional minimum cover of top soil of 150 mm

- (GA8) Suitable banks and/or diversion drains must be installed and maintained to exclude stormwater runoff from entering any dams or other structures used for the storage or treatment of contaminants or wastes.
- (GA9) The solid salt disposal landfill must be designed, installed and operated with an under liner leak detection and seepage management system that will allow the rapid detection of any passage of contaminants through the liner and also allow for the collection, monitoring and proper disposal of all such seepage.

Groundwater Monitoring

- (GA10) The solid salt disposal landfill must have a groundwater monitoring network installed and operated which:
- (a) is installed and maintained by a person possessing appropriate qualifications and experience in the fields of hydrogeology and groundwater monitoring program design to be able to competently make recommendations about these matters; and
 - (b) includes a sufficient number of “bore(s) of compliance”, constructed in accordance with the “Minimum Construction Requirements for Water Bores in Australia” (Agricultural and Resource Management Council of Australia and New Zealand 1997), that are located not more than 150 metres from the landfill unit or the boundary of the landfill facility whichever is the closer, and provides the following:
 - i. allows the taking of representative groundwater samples from the uppermost aquifer and from the lower (confined) aquifer;
 - ii. allows the determination of background groundwater quality in hydraulically up-gradient or background bore(s) that have not been affected by any release of contaminants to groundwaters; and
 - iii. allows the determination of the quality of groundwater down gradient of any release of contaminants to groundwater including groundwater passing the relevant bore(s) of compliance.

(GA11) The holder of this environmental authority must conduct monitoring from the solid salt disposal landfill groundwater monitoring network and keep records of the determinations of the groundwater quality. All determinations of groundwater quality must be:

- (a) made in accordance with methods prescribed in the Water Quality Sampling Manual and, where appropriate, in accordance with standards ISO 5667-11 1993 or AS/NZ 5667.11: 1998 Water Quality – Sampling – Guidance on sampling at Groundwaters and ISO 5667-18: 2001 Water Quality Sampling – Part 18 – Guidance on Sampling of Groundwater at Contaminated Sites;
- (b) conducted for the water quality characteristics and at the frequency in Schedule GA - Table 2;
- (c) taken from sufficient monitoring points and/or wells to obtain representative samples of groundwater both up-gradient and down-gradient of the potential influence;
- (d) carried out with sufficient regularity and spatial and temporal replication to make statistically valid conclusions about the presence or absence of a release;
- (e) carried out with sufficient number of sampling events to determine ambient water quality and natural variability prior to any development of the site occurring;
- (f) followed by an assessment of whether or not there has been any statistically significant adverse change compared to background values at locations hydraulically down gradient of the landfill unit for each quality characteristic in Schedule GA - Table 2 Landfill Monitoring Requirements.

Schedule GA – Table 2 Landfill Monitoring Requirements

Quality Characteristic	Frequency	
	During Landfilling	Pre-Landfilling Baseline Monitoring
pH	Monthly	Quarterly over a 12 month period prior to the commencement of any landfilling activity
Electrical Conductivity	Monthly	
CO ₃	Quarterly	
Cations (Na ⁺ , K ⁺ , Ca ²⁺ , Mg ²⁺)	Quarterly	
Anions (Cl ⁻ , HCO ₃ ⁻ , SO ₄ ²⁻)	Quarterly	
Dissolved Oxygen	Monthly	
Redox Parameters (Eh, ORP)	Monthly	
Heavy Metals (Ag, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sn, Sb, Se, Ti, Zn)	Quarterly	
Organics (VOC, SVOC, TPH)	Quarterly	

(GA12) On any occasion that samples are obtained in accordance with condition (GA11) the holder of this environmental authority must measure and record standing groundwater levels in metres accurate to 0.01 metres. The elevation of the reference point, relative to Australian Height Datum, for use in any groundwater level measurement must be determined to an accuracy of 0.01 metres.

Appendix 6 CSG water, treated water or brine injection

Note: the conditions regarding injection of CSG water, treated water and brine are separated into two sections. The first section relates to trials (<12 months) designed to determine the feasibility of injection as a disposal option for CSG water, treated water or brine. Upon completion of the trial, the proponent may apply to the administering authority for an amendment to the environmental authority to use injection as a permanent disposal option. This amendment application must be supported by the results of the injection trial.

Conditions to be inserted.

RTI DL RELEASE - EHP

South West Regional Response –Gladstone Liquified Natural Gas Project (Santos) Supplementary EIS –January 2010

Department of Environment and Resource Management (DERM)

General Comments/Recommended Conditions

There are significant deficiencies in the EIS and Supplementary Report provided by the Proponent. Additional information and data are required to enable adequate assessment of the current proposal. Further, the current Environment Management Plan is limited and failure to implement robust monitoring and assessment of potential impacts to the environment throughout the life of the proposed development represents an unacceptable risk.

Due the spatial scale of the proposed development it must be recognised that the magnitude of the potential impacts is considerably greater than may result from a more intensive development with a localised footprint. It is also noted that the cumulative impact assessment has not included potential impacts of the proposed APLNG Project which represents a significant limitation of the Cumulative Impact Assessment provided to the Department.

Overall, it is viewed that the EIS and Supplement have underweighted the potential impacts associated with the proposed development and the mitigation measures are not consistent with the potential impacts. The proponent has not committed to undertaking sections of the development in a manner consistent with industry standards nor to implement monitoring of potential impacts in accordance with State and National guidelines.

Recommended conditions:

- *Standard environmental compliance conditions for petroleum activities are to be imposed against the current proposal with additional conditions imposed as contained in this review.*
- *Environmental authorities are to be conditioned so that they are easily amended as required additional information and assessments are provided.*

General Comments/Recommended conditions

Issue: Management Plans

A significant number of management plans have been proposed or outlined but have not yet been completed and included in the Supplementary EIS. The following Management Plans have been proposed in the Supplementary EIS, but have not been developed yet:

- Significant Species Management Plan
- Weed Management Plan
- Biodiversity Offset Management Plan
- Site specific Management Plan
- GLNG Offset Management Plan
- CSG Environmental Management Plan
- Heritage Management Plan, and
- Project Specific Conservation Management Plan.

Management Plans not referred to in the Supplementary report include:

- Fauna and Flora Management Plans
- Biodiversity Management Plan

Recommended Condition:

The following Management Plans are to be developed and submitted to DERM for assessment and endorsement by DERM prior to the approval of the project:

- *Significant Species Management Plan*
- *Weed Management Plan*
- *Biodiversity Offset Management Plan*
- *Site specific Management Plan*
- *GLNG Offset Management Plan*
- *CSG Environmental Management Plan*
- *Heritage Management Plan,*
- *Project Specific Conservation Management Plan*
- *Fauna and Flora Management Plans*
- *Biodiversity Management Plan*

If they are not produced as stand alone documents these plans should be incorporated in the project environmental management plan as stand-alone sections of the EMP.

Specific comments/Recommended conditions**Issue: Assessment of Wetland and Aquatic Values**

The overall approach to the identification and assessment of wetlands and other aquatic values in proximity to the pipeline is inadequate and has not utilised all existing mapping and assessment information including Queensland Wetland Mapping. Whilst the supplementary EIS (SEIS) prescribes a process by which wetlands/aquatic ecosystems would be allocated to Sensitive Area Criteria there is no evidence that an appropriate level of assessment of the pipeline route has been undertaken to adequately inform that process. This has significant implications in relation to proposed mitigation and monitoring protocols for actions including construction, rehabilitation and maintenance of water course crossings, monitoring and maintenance of water quality and construction and maintenance of road networks.

Recommended Condition:

A detailed appraisal of the wetlands and other aquatic values along the pipeline route is provided in support of any categorisation of sites against the Sensitive Area Criteria. This appraisal should include site specific data that accurately and comprehensively describes the environmental values and ecological condition at each wetland site and should be provided to the Department prior to the granting of an Environmental Authority for the construction of the pipeline.

Issue: Waterway Crossings

Additional information regarding the aquatic environmental values of the project area was requested by the Department following review of the EIS. The specific recommendations were to:

- Undertake a detailed assessment of the aquatic values associated with watercourses and wetland areas on the gas field site and along the pipeline route, which identifies specific values that are potentially impacted by the project.
- Develop specific mitigation measures in relation to these potential impacts

It was further recommended that mitigation measures for permanent creek crossing and other aspects of pipeline construction should be consistent with AS2885 and the *Australian Pipeline Industry Association Code of Environmental Practice*, which document the approach to be taken when determining the optimal route selection as well as engineering standards that must be applied to the construction.

The Proponent has failed to address these recommendations and the lack of information, as it relates to the aquatic environmental values at locations where the proposed pipeline will cross waterways, significantly impedes the assessment of potential impact and/or suitability of proposed mitigations of potential impacts.

It must therefore be considered that information provided in the EIS and Supplementary Report **does not** support that trenching, for all but two pipeline crossings, represents a minimisation of potential environmental impact and is not consistent with the objectives of the Australian Pipeline Industry Association Code of Environmental Practice including:

- minimisation of adverse impacts on fauna and significant habitat areas;
- minimisation of impacts on riparian, aquatic and water dependent flora and fauna;
- minimise erosion and sediment impacts;
- maintain water quality and water flow requirements; and
- Maximise rehabilitation success of achieving long term site stability.

The potential environmental impact(s) of trenching across waterways are likely to be greater than use of Horizontal Directional Drilling, particularly where the pipeline route alignment is not within an existing cleared pipeline easement or road crossing. HDD can significantly reduce the need to clear riparian vegetation and minimises disturbance to in stream habitat thus limiting both direct and indirect potential impacts to aquatic ecosystems. The appropriate selection of drilling lubricants, fluid waste containment and disposal options implemented for HDD will further reduce the associated potential impacts of HDD on the environmental values of aquatic habitats in the Project area.

Recommended condition:

Further detail, including site specific data that accurately and comprehensively describes the aquatic environmental values and ecological condition at each stream pipeline crossing must be provided to the Department prior to the granting of an Environmental Authority for the current proposal.

To minimise potential impact to the aquatic environment and riparian vegetation within the development area, the current development proposal should at a minimum be conditioned to:

- a) Prevent or minimise disturbance to riparian vegetation by pipeline activities;*
- b) Manage the effects of vegetation clearing to prevent loss of biodiversity, reduction of ecological processes and degradation of waterways;*
- c) Avoid the removal of vegetation where viable alternatives exist, and must not clear vegetation:*

- i. In or within 50m of the high bank of a watercourse;
 - ii. In or within 50m of the static high watermark of wetlands, lakes or springs;
 - iii. In a way to dissect riparian corridors;
 - iv. On slopes greater than 5%;
 - v. On dispersible soils; and
 - vi. In existing or potential ground water discharge areas.
- d) Horizontal directional drilling (HDD) with the maximum practicable setback width should be used at **all** mapped waterway crossings.

Where the Proponent can demonstrate that trenching will result in an equal or lesser immediate **and** long-term impact to the aquatic ecology (including short and long-term impact to the riparian community and bank stability) a detailed assessment of each crossing location must be prepared in conjunction with a site specific environmental management plan provided to the Department for review.

It is further recommended that, consistent with the APIA Code of Environmental Practice, the construction of new access and maintenance tracks across waterways must only be undertaken where an existing alternative crossing is not available within a practicable distance. The construction of all vehicular crossings must be undertaken in a manner consistent with standard conditioning of the Code of Environmental Compliance for Petroleum Activities.

Details of all waterways crossings, including water quality and aquatic ecological monitoring, must be developed by the Proponent on a site specific basis, contained in the relevant EMP, and presented to the Department for review.

Issue: Construction of vehicle creek crossings

Construction of vehicle creek crossings may represent a barrier to the movement of aquatic fauna. The mitigation of potential impacts has not been sufficiently addressed in either the EIS or Supplementary Report.

Recommendation:

The design of all creek crossings and waterway barrier works shall be undertaken in accordance with the Fish Habitat Management Operational Policy FHMOP 008 (July 2009). DEEDI and DERM departmental staff should be engaged in the preliminary planning and design of all creek crossing and waterway barrier works.

Issue: Hydrostatic Testing

The potential impact of using local sources of water for the purpose of hydrostatic testing has not been adequately considered.

Recommended condition:

Treated CSG water will be used for the purpose of hydrostatic testing of pipelines.

Issue: Assessment of Hydrostatic test water impacts (Section 6.3 Appendix O2)

The Proponent has failed to provide sufficient information to adequately assess the potential impacts of hydrostatic testing of pipelines. The proposed post-hoc assessment of impacts and development of recommended mitigation measures is a significant limitation of both the EIS and Supplementary Report and is not consistent with the APIA Code of Environmental Practice or the guiding document commissioned by the APIA - *Analysis of Hydrostatic Test Water: Final Report for APIA* (2005).

Recommended Condition:

The selection of water quality parameters, trigger values and reporting, must be consistent with the principles of the relevant guidelines and APIA documents for the treatment and testing of hydrostatic test waters.

When carrying out hydrostatic testing as part of the current proposal, the Proponent must take all reasonable and practicable steps to prevent or minimise the likelihood of environmental harm including the following:

- 1. Hydrostatic test water must be discharged in a manner that prevents runoff to any waters or the bed or banks of any waters or to drainage lines.*
- 2. Hydrostatic testing water discharged to land must be discharged in such a way as to prevent flooding or erosion, damage to soil or vegetation, and adverse effects to surface or groundwater quality.*
- 3. Pipe sections crossing over or under water bodies must be hydrostatically tested prior to installation.*
- 4. Biocides used in hydrostatic testing water, where required, must be biodegradable. Where biocides are required, discharge water must be aerated.*
- 5. Except where the hydrostatic testing water source and water quality is known and documented, and no chemicals have been added, water quality testing must be carried out on the water to ensure acceptability for discharge. Applicable criteria are for irrigation and general use; Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC and ARMCANZ) Volume 1: Chapter 4.3 and Volume 3: Chapter 9.3.*

Issue: Removal of Drilling Fluid Waste

The Proponent has agreed to the containment and removal of all fluid waste from drilling and exploration activity for disposal at a facility licensed to accept such wastes.

Recommended condition:

All fluid waste from drilling and exploration activities are removed including all wastes contained in dams and containment structures as agreed by the Proponent in Section 6.3.1.5 of the SEIS. The removal of fluid waste should be detailed to include fluid waste from hydrostatic pressure testing of all pipe work. No authority will be provided to release waste generated from related activities to wetlands or constructed storages that may discharge to natural waterways.

Issue: Impact of Roads and Access Tracks

The construction of approximately 6500km of roads and access tracks represents a significant potential impact to water quality and aquatic health in the project area. The magnitude of this potential impact is not reflected in the EIS or Supplementary Report nor do the proposed mitigations reflect the extent of the potential impact. In the absence of a detailed water quality and aquatic biological monitoring and reporting program, caution must be expressed.

Recommended Condition:

A detailed integrated water quality and aquatic biological monitoring program must be developed by the Proponent for all aspects of the proposed development and provided to the Department for review prior to granting the Environmental Authority. The integrated water quality and biological monitoring and reporting must be based on the framework of the ANZECC, QWQG, and Monitoring and Sampling Manual 2009 (EPP (Water) 2009) and include the development of locally relevant trigger values.

Issue: Rehabilitation of Waterways

Recommendations for mitigation measures associated with the construction and rehabilitation of permanent creek crossings for pipeline construction make no reference to either AS2885 or the Australian Pipeline Industry Association Code of Environmental Practice.

Recommended Condition:

Mitigation measures for permanent creek crossing and other aspects of pipeline construction should be consistent with AS2885 and the Australian Pipeline Industry Association Code of Environmental Practice, which documents the approach that should be taken when determining the optimal route selection as well as engineering standards that must be applied to the construction.

Issue: Use of existing seed stock for rehabilitation

Reliance on seed stock contained in the replaced topsoil does not represent a rapid and reliable option for rehabilitation of riparian habitat.

Recommended Condition:

The diversity of species, density of plantings, soil and fertilizer preparation should be consistent with an accepted guideline and be based upon expert local knowledge. Advanced plants representing trees, shrubs and ground covers should be planted in all disturbed riparian areas to expedite the rehabilitation of these habitats. The restored riparian habitat shall at a minimum be as wide as that present prior to disturbance.

Issue: Well Point Dewatering

The EIS and Supplementary Report do not identify the need to undertake well point dewatering to stabilise areas of saturated soils within the pipeline alignment and as such have not identified the potential impacts associated with such activities.

Recommended Condition:

If well point dewatering is required as part of the proposed development, site specific environmental management plans must be developed and contained with the relevant EMP and presented to the Department for review and consultation.

Issue: Water Quality Monitoring

The collection of baseline water quality data during times of flow is required to align with the framework of the ANZECC/QWQG for the monitoring of ephemeral waterways.

DERM understands that the Proponent has undertaken baseline sampling during times when water flow was low or negligible. The Water Monitoring Program should however be developed for water quality sampling to occur at various stages of flow. Refer to the Department of Environment and Resource Management "Monitoring and Sampling Manual 2009 – Environmental Protection (Water) Policy 2009; Version 1 September 2009" for more information.

It is also noted that collection of baseline data at reference sites is imperative in order to detect potential impacts of the development. The measured parameters should reflect the potential impacts of the development activity (i.e. monitoring of turbidity near to areas of soil disturbance).

The EMP for the monitoring of surface water and aquatic ecological impacts must include a thorough representation of sites upstream and downstream of the CSG field areas plus sites upstream and downstream of the proposed pipeline route within the same catchment area. It is advised that monitoring of water quality and aquatic biology at control/reference sites commence as soon as practicable and in advance of the construction phase of the GLNG project to determine localised base-line data. Reference/control sites should be selected so as to represent "close or completely natural state" aquatic habitats as required by the QWQG 2009.

Recommended Conditions:

The proponents should collect water quality data from selected reference and control sites in advance of the construction phase during all phases of the hydrological cycle (including under variable flow conditions) in order to make meaningful comparisons with data collected during times of flow at construction and operational phases of the proposed development.

The Proponent should advise the DERM of dates when the Water Monitoring Plan, Operation Monitoring Program, Water Crossing Plan, Water Quality and River Health Monitoring Program will be completed and they must be submitted for review and approval by the relevant agencies.

The plans should:

- *Detail what issues will be specifically at each monitoring site, the parameters that will be sampled and the reasoning behind all site selections including reference sites. The WMP should include details of proposed monitoring for shallow groundwater systems adjacent to water containment ponds, brine ponds, brine encapsulation areas,*
- *Ensure that flow is factored in pre – during – and post construction phases.*
- *Provide details of when the ground survey will be completed and submitted for review by the relevant agencies.*

Detailed Environmental Management plans for the monitoring of all potential water quality related impacts must be provided to the Department for review. Such plans must be consistent with State and National guidelines.

Issue: *R. leukops* and *E. albagula* Nesting Habitat

Mitigation of potential impacts resulting from the construction of pipeline crossings in areas of potential habitat for *R. leukops* and *E. albagula* are not adequately addressed.

Recommended Condition:

*All pipeline construction works and site preparations in catchment areas that may support *R. leukops* and *E. albagula* should be undertaken outside of breeding and nesting periods. Horizontal directional drilling (HDD) should be undertaken at all wetland crossings within the known distribution of *R. leukops* and *E. albagula* with a minimum buffer width exceeding the maximum recorded lateral distance of nesting from the waterway.*

Issue: Aquatic Weeds

Section 13.16.6 of the EMP does not contain reference to aquatic weeds or the need to undertake inspections of vessels and aquatic survey equipment (e.g. fish nets, traps).

Recommendations:

Section 13.16.6 of the EMP should be amended to include Implementation Strategies, Monitoring and Reporting, and Reporting and Corrective Actions to prevent the movement of aquatic weeds.

The Weed Management EMP should be revised by the proponent to incorporate this recommendation and provided to the Department for review.

Issue: Monitoring rehabilitation (Part 3, D5, Nature Conservation, Mitigation, pg 1-3, 3rd paragraph; Section 6, p6-28)

At Section 6-28 Santos committed to development of a rehabilitation monitoring plan incorporating monitoring sites and benchmark reference sites but not enough detail is included on the establishment of reference sites for monitoring rehabilitation. The above mentioned paragraph states: 'Santos will develop a comprehensive rehabilitation plan that incorporates monitoring and benchmark reference sites to guide on-going environmental management and rehabilitation activities'.

Recommended condition:

The following details need to be added in this section:

- *'At least two reference sites will be developed from which to develop benchmarks, and to provide on-going reference for environmental management and rehabilitation activities. The sites will be selected to represent the major natural ecosystems being significantly impacted by the project, and should be sufficiently removed from the project to be unaffected by the project's activities. The sites should be monitored at the same intervals and with the same methodology as that used for on-site monitoring'.*

Issue: Treatment of topsoil: Part 3, D5, Nature Conservation, Mitigation, pg 1-3, 3rd paragraph, 2nd bullet point, 2nd point; also Section 6.4.5.2, p6-27

The Supplementary report states: 'Reinstate the top layer of the soil profile'....More detail concerning the treatment of top soil needs to be included here. An important consideration is that the disturbance of soils is minimised by the project's activities.

Recommended conditions:

Details on top soil treatment need to include:

- *Procedures for stripping and separating topsoils from subsoils*
- *Disturbance and Storage of topsoil should be minimised. This is important in reducing fertility degradation, as well as in maintaining the viability of the seed bank.*

Issue: Revegetation: Part 3, E3, Nature Conservation, pages 12, 23, 27 and 29.

More detail on revegetation should be included in the SEIS.

Recommended condition:

Revegetation methods and procedures should be detailed in the Fauna and Flora Management Plan.

Elements to be included are as follows:

- Revegetation of exposed soils should be carried out as soon as practical after works have been completed.
- The Plan should provide an indication of what species will be used as screening and amenity plantings. Where plantings and screening or landscaping are proposed, details should be provided of the species that will be used, and their likely provenance. Preference should be given to species native to the area. Revegetation should promote locally indigenous species, sourced from a local seed bank where possible.

Issue: Pipeline alignment details (Part 3, E3, Nature Conservation, page 18, 5.1.2 Vegetation Disturbance – CPIC, 1st paragraph)

The alignment of the pipeline needs to be determined, in order to determine the full impact the pipeline will have on various environmental values. Once the exact route is decided, attention needs to be given in the EMP and related management plans on how that particular route was chosen, so as to avoid or minimise impacts on the environment including remnant vegetation, habitat for native fauna or watercourses.

Recommended condition:

The exact pipeline route should be finalised and a detailed account of the process used to derive the preferred alignment for the gas pipeline should be provided including specific details of measures and decisions taken to avoid and/or minimise impacts on the environment with particular emphasis on remnant vegetation, wildlife habitat and watercourses and wetlands.

Issue: Weed management: Part 3, E3, Nature Conservation

Whilst the Supplementary report deals with many of the aspects of weed management, more detail needs to be included on on-going monitoring of weeds post-construction and post-rehabilitation.

Recommended condition:

Include the following in appropriate section/s and relevant management plans:

Special emphasis should be given to management of weeds during construction and during post-construction and post-rehabilitation. During a minimum period of 12 months following completion of all restoration work on the alignment, the proponent will carry out weed control along the length of the pipeline.

Issue: Erosion susceptibility (Part 3, D5, Nature Conservation, pg 1-3, Mitigation, 3rd paragraph, 4th bullet point, 2nd point)

There is no special mention made of the fact that all areas under rehabilitation will be susceptible to erosion.

Recommended condition:

Areas under rehabilitation should be specifically addressed as being susceptible to erosion in the EMP and site specific management plans.

Issue: Koala Habitat, Section 7.4.5.1:

Once the pipeline route has been decided, more and specific details need to be included in relation to the pipeline traversing Koala Habitat, under the Nature Conservation (Koala) Conservation Plan 2006.

Recommended condition:

Detailed information will be provided in relation to actual or potential disturbances of Koala Habitat Areas associated with the pipeline development. More relevant and specific mitigation measures should be provided and consideration of habitat offsets need to be discussed for areas where impacts cannot be sufficiently mitigated.

Issue: Cumulative impact assessment for associated water (1.7 Relationship to other Projects, p1-2)

The cumulative impact assessment for associated water only includes gas fields that are part of a LNG project; it does not include gas fields which have existing approvals or future activities that are not associated with LNG projects. In addition no information is provided on the amount of associated water that will be generated by the Australian Pacific LNG Gas Fields which are adjacent to the eastern boundary of the Roma fields. Therefore, it is difficult to determine whether the total amount of associated water produced for a given area can be beneficially used or disposed to minimise environmental harm.

Recommended condition

Prior to final approval of the LNG projects, cumulative impacts of the production, storage and use of associated water that will be produced by all CSG activities within each field (including adjacent tenements) should be assessed to ensure the associated water can be managed in an environmentally sustainable manner.

Issue: Requirements under the Water Supply (Safety and Reliability) Act 2008 (1.9.1 State Legislation, p1-6)

The proposed uses of associated water include provision of treated water for municipal use in Roma, industrial use in Roma and irrigation. The proponent should ensure it complies with the requirements of the *Water Supply (Safety and Reliability) Act 2008*. This may involve registering as a water service provider if there is a charge for the water.

Recommended condition

*Proposed uses for the associated water other than those authorised under the *Petroleum and Gas (production and Safety) Act 2004* shall comply with the *Water Supply (Safety and Reliability) Act 2008*.*

Issue: Lack of soil surveys (6.3.1 Topography, Geomorphology, Geology and Soils, p6-6)

The TOR for the project specified that "A soil survey of the sites affected by the Project should be conducted at a suitable scale..." Also the TOR stated that "Landform descriptions and soil profiles should be mapped at a suitable scale and described according to the Australian Soil and Land Survey Field Handbook". This was not provided in the EIS and therefore DERM responded by requesting that detailed soil survey information be provided in the Supplementary EIS.

No further soils information has been provided in the Supplementary EIS. The following comment is included: "To ensure problem soils are avoided, where practicable Santos will:

- o Conduct pre-construction soil surveys...."

It should not be a matter of if it is practicable to do the survey, the survey should be done to ensure problem soils are identified and avoided if possible.

Recommended Condition

Prior to the construction of facilities, access tracks and pipelines, pre-construction surveys will be conducted to identify problem soils areas which, where practicable, will be avoided.

Issue: No definitive option for Brine management (6.7 Associated Water Management, p6-54)

The Supplementary EIS states that no definitive final containment option has been selected for brine management. Therefore approval from DERM will be required when a decision has been made. If encapsulation is the preferred option, details will have to be provided to show how the integrity of the storage site will be managed to prevent leakage. Monitoring of the surrounding groundwater and soils will be a requirement of any approval.

Recommended Condition

Approval from DERM will be required when a final containment option is chosen for the brine. In the interim brine ponds will be constructed and lined to prevent leakage and located at least one kilometre from mapped water courses.

Issue: Proposed release of treated water to streams (6.7 Associated Water Management, p6-55)

The Supplementary EIS identifies a number of proposals to discharge treated associated water to streams. Approval will be required from DERM prior to any release of water to stream. The application to DERM should detail the existing environment, proposed release water (including water quality, frequency, flow pattern and duration), impacts on the environment and proposed mitigation measures. The assessment of any proposal will be in accordance with DERM's hierarchy for discharge to water bodies.

Recommended Condition

Approval from DERM will be required prior to the release of any water to streams.

Issue: Proposed irrigation using amended water (6.7 Associated Water Management, p6-56)**Recommended Condition**

Further expansion of irrigated areas using treated CSG water will require a Beneficial Use Approval and detailed site management plans.

Issue: Proposed release of desalinated water into Lake Nuga Nuga (6.7.4.6 Arcadia Water Strategy Overview, p6-62)

The SEIS indicates that up to 5% of the associated water generated in the Arcadia field may be discharged into Lake Nuga Nuga as a measure of last resort. This proposal is not acceptable due to the significant environmental values of the Lake. It is listed as a Wetland of National Significance, and therefore should be protected.

Recommended conditions

Release of desalination water into Lake Nuga Nuga will not be authorised. Santos should explore other options including release of treated CSG water downstream of Lake Nuga Nuga.

Issue: Key performance indicator for soils re: brine containment ponds (6.7.5 Potential Impacts and Mitigation Measures, p6-63)

SEIS states that with respect to soils and land use the key performance indicator is that:

“The projected depth of increase in soil salinity during operation of the pond must not be greater than 1m.”

Due to the highly saline nature of the brine, it is unacceptable to allow any seepage from these ponds. The ponds should be constructed to ensure no leakage occurs.

Recommended Condition

No leakage from the Brine containment ponds is permitted. Brine ponds will be lined to prevent leakage.

Issue: Monitoring Requirements for Water Storage Ponds (Section 6.7.5, p6-63, Section 9.1.2 Attachment D2, p102 & Section 9.3 Water Monitoring Plan, p107)

The monitoring commitments for regulated dams detailed in Table 23 of Attachment D2 (p107) don't include requirements for monitoring shallow groundwater in the vicinity of the water storage facilities the water's edge is the only site mentioned.

Recommendation

The monitoring commitment stated in the SEIS should be included in the monitoring commitments and the Associated Water Management section of the EMP. These include:

- o *Section 6.7.5 (p6-63) “All water management ponds shall have water table and soil moisture monitoring installed at locations suitable to enable characterisation of the water table and soil water quality both prior to and post pond remediation” and*
- o *Section 9.1.2 of Attachment D2 (p102) “shallow groundwater monitoring wells will be installed up and down hydraulic gradient from any water storage features...”*

Issue: Notification to DERM prior to clearing of millable timber (6.11 Land Use and Infrastructure p6-69, 6-73)

In DERM's response to the EIS, it advised it should be given adequate notice to enable survey and removal of millable timber prior to clearing or compensation may be required. Although Santos noted this comment it is not mentioned in the EMP. Also it stated that “no accurate assessment of the clearing requirements for millable timber can be made.”

Recommended condition

Santos will provide adequate prior notification to DERM of any proposed clearing of millable timber so that arrangements can be made for its salvage.

Issue: Commitment to pad drilling (Appendix D5, p1-8)

The SEIS states that it is expected that pad drilling will be technically feasible for the majority of wells and not available in a small minority of circumstances due to localised geological features. As this proposed practice will greatly reduce the impact on vegetation clearing the commitment should be detailed in the EMP.

Recommended condition

The Planning and Approval section of the EMP is amended to include pad drilling as the preferred drilling practice.

Issue: Construction of Water Storage Ponds (Appendix L1 Land – CSG field, pL1)

The SEIS states that Santos has incorporated a number of safety features into the dam design which includes:

- o A dual liner system comprising high-density polyethylene (HDPE) over a 300mm compacted clay liner.

Due to the potential for environmental harm if the dams containing high saline water leak, this safety feature should be included in the EMP as a minimum requirement for regulated dams.

Recommended condition

The Associated water section of the EMP is amended to include the following:

- o *For regulated dams, a dual liner system comprising high-density polyethylene (HDPE) over a 300mm compacted clay liner will be the minimum requirement.*

Issue: Associated water management plan (Attachment D3)

The AWMP suggests of portion of treated CSG water will discharged into Bungil Creek, Lake Nuga Nuga and the Dawson River. DERM's policy is that stream discharge is a least preferred option and that each proposal would need to be assessed on the basis on short term need.

Recommended condition

Further detail is required on each of Santos's proposals for treatment, use and disposal of CSG water. Discharge to streams is DERM's lowest priority for use of treated CSG water

Issue: Aboriginal Cultural Heritage (EMP Section 11.16.25, p11.39)

The EMP identifies that the development of the relevant Cultural Heritage Management Plans are to be finalised. It should also be noted that the finalised plans have to be submitted to DERM for approval.

Recommended Condition

A Cultural Heritage Management Plan must be submitted to DERM for approval prior to undertaking any construction activities.

AUSTRALIA-PACIFIC LNG Project (APLNG)

**Department of Environment and Resource Management
(DERM), October 2010.**

Advice and Recommended Conditions for the Coordinator-General's Evaluation Report

This report provides advice to the Coordinator-General on the draft EIS, taking into consideration the supplementary information provided by the proponent and subsequent documents and discussions. Where sufficient information has been provided, specific conditions have been prepared that should be attached to statutory approvals. Where additional information is required, suitable conditions have been framed in the form of a request for further strategies and reports. The majority of these must be provided at the time of application for statutory approval.

RTI DL RELEASE - EHP

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1.0. PROJECT DESCRIPTION INCLUDING BASIC DESIGN AND CONSTRUCTION METHODOLOGY.

The EM Plans developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for environmental authorisations must include a detailed and illustrated description of the design and construction methodologies to be used, accompanied by an assessment of the potential impacts and mitigation measures for all aspects of the project. The areas which require further site specific information include:

- the construction method and design of the dock and materials off-load facility and related structures on Curtis Island and the mainland;
- product export jetty construction methodology, particularly where the jetty will cross inter-tidal areas;
- LNG facility construction details, including the design of power plants, LNG tanks, the reverse osmosis water treatment plant, sewage treatment plant, and associated intake and outfall diffuser, and the management of contaminants removed from the CSG prior to liquefaction;
- upstream infrastructure design, location and construction methodology including compression stations and water treatment facilities.

Sufficient information must be provided to enable assessment of all components of the project. The construction methodologies must form part of this information. Plans and maps must be provided showing waste streams and discharge points accompanied by detailed descriptions of the quantity, quality, toxicity and other characteristics of the various waste components. Information must be presented describing the mitigation measures to be implemented during all stages of construction of the project. The basis for selecting these measures must also be described.

Further guidance on the additional information required is contained in the recommended conditions for the gas fields, the gas transmission pipeline and the LNG Facility.

2.0. FINANCIAL ASSURANCE FOR ENVIRONMENTAL AUTHORITIES

Financial assurance is required for environmental authorities (petroleum activities) in accordance with section 312O of the *Environmental Protection Act 1994*.

Schedules of disturbance with sufficient information regarding the scale of impacts to calculate the financial assurance are required. The proponent must prepare schedules of disturbance for all aspects of the project in accordance with the DERM guideline – *Financial assurance for petroleum activities*. Sufficient information must be provided for DERM to be satisfied that the financial assurance estimates will be adequate for worst-case scenarios (including maximum possible areas of disturbance, maximum proportion of problem soil areas and maximum proportion of environmentally sensitive areas).

3.0. THIRD PARTY AUDITING

It has become common practice to require holders of environmental authorities and development approvals to be required to undertake third party audits, at the holder's expense, of the holder's compliance with operating conditions. The following requirements are proposed concerning third party auditing of the project.

Condition 3.1. – Third Party Auditing
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It is recommended that the Coordinator-General (CG) impose the following conditions:

1. Compliance with the conditions of this CG's report and all environmental authorities and development approvals must be audited by an appropriately qualified third party auditor, nominated by the holder of environmental authority(s) and accepted by the CG and administering authority, within one year of the commencement of petroleum activities, and at three yearly intervals thereafter.
2. Upon receipt of the third party audit report, the holder of the environmental authorities must submit a copy of the report to the CG and to the administering authority.
3. The third party auditor must certify the findings of the audit in the report as being an accurate and independent assessment of compliance with the conditions of this CG's report, environmental authority(s) and development approvals.
4. The financial cost of the third party audit borne by the holder of the environmental authority(s) and development must be approved.
5. The holder of the environmental authority(s) must, within a reasonable timeframe, agreed to in writing by the administering authorities, act upon any recommendations arising from the audit report.
6. Not more than three (3) months following the submission of the report, the holder of the environmental authorities and development approvals must provide written report to the CG and administering authority on the:
 - (a) actions taken by the holder to ensure compliance with conditions of the CG's report and environmental authority(s) and development approvals; and
 - (b) actions taken to prevent a recurrence of any non-compliance issues identified by the report of the third party auditor.

4.0. GROUNDWATER IMPACTS ON THE GREAT ARTESIAN BASIN (GAB).

4.1 Background

The APLNG EIS recognises the importance of the possible impact on the Great Artesian Basin (GAB) of groundwater extraction due to coal seam gas production and acknowledges that the highest risk in the upstream component of its project is associated with the drawdown of groundwater levels. However, APLNG has expressed confidence that its proposed groundwater monitoring, together with the application of adaptive management arrangements, can effectively manage these risks and enable it to meet acceptable performance criteria.

In mid-2010, the Department of Environment and Resource Management (DERM) issued advice on the Environmental Impact Statements for the QGC and Santos projects. Since the time of that advice, considerable progress has been made in the understanding of scope of the potential impacts on aquifers of the GAB due to CSG activities. The groundwater modelling undertaken for the APLNG EIS and supplementary information provided by the company has contributed greatly in clarifying the potential impacts of CSG extraction.

4.2. Current Legislative Reform

Significant reforms are currently proposed to the *Water Act 2000* in regard to CSG-related groundwater management and to the *Water Supply (Safety and Reliability) Act 2008* in regard to the protection of public health through water quality standards

4.3. Groundwater Monitoring

The Government has improved public access to groundwater information by establishing an on-line information portal. The portal will provide the latest information on groundwater monitoring bores located in the Surat and Bowen basins.

The development of a comprehensive regional groundwater model is required to allow the ongoing interpretation of changes that may occur in the aquifers of the GAB. Groundwater modelling will be dependent on calibration by an extensive and thorough groundwater level monitoring program in all aquifers. To be effective the monitoring must commence well in advance of gas production and continue as gas production proceeds and then declines in order to determine drawdown changes in the aquifers of the GAB and then recovery in these aquifers. Monitoring must also continue beyond extraction to monitor the recovery of the groundwater system.

APLNG has proposed a groundwater monitoring program, focussing on high risk areas identified by its modelling. The monitoring will be for water levels and for water quality parameters and will help to better understand the water dynamics in the GAB. The program is designed to determine baseline conditions prior to CSG production, and will use existing bores and establish new monitoring bores.

APLNG advises it has adopted a two-tiered approach to monitoring viz.: to engage proactively with landholders if changes are detected and could occur to their bores; and to respond if landholders raise concerns about impacts to their bores. The

program is designed to complement DERM's monitoring network, particularly in the Cainozoic (Condamine alluvium) formations.

APLNG advises that its network will include a large number of pressure monitoring bores within the Walloon Coal Measures (WCM) from which the CSG is sourced. The monitoring will be set up as an 'early warning' system so that if unexpected changes in water levels outside natural fluctuations are detected, it will enable investigation and, if necessary, corrective action to occur.

Condition 4.1. - Groundwater Monitoring
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It is recommended that the CG impose the following conditions:

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for each EA for a gas field development area, must provide to the administering authority an extensive groundwater monitoring strategy for all aquifers potentially affected by the petroleum activities.
2. The strategy must include:
 - a. appropriate parameters, on location and frequency of monitoring, and a timetable for implementation
 - b. parameters that will identify potential contamination of the aquifers of the GAB from CSG activities, including possible impacts from chemical additives used in drilling and hydraulic fracturing
 - c. baseline data collection, including a comprehensive inventory of bores and of existing water levels
 - d. baseline data on monitoring of specific parameters at selected locations and frequency in accordance with the monitoring strategy across the project.
3. The monitoring strategy must include appropriate parameters, on location and frequency of monitoring, and a timetable for implementation.
4. The monitoring strategy must be capable of detecting changes in ground water level or pressure as well as any contamination that may occur due to the petroleum activities undertaken by APLNG or its contractors.
5. The strategy must include water quality monitoring parameters that may be necessary to assesses potential contamination from CSG activities, including possible impacts from hydraulic fracturing.

Note: The proponent must note that the monitoring requirement will need to be adaptive as knowledge of aquifer system responses become clearer. The intention is that changes to the APLNG monitoring program will be defined in underground water impact reporting. The administering authority may require the proponent to vary the monitoring program

from time to time during the life of the project in response to each underground water impact report.

Until the Queensland Water Commission's role in ground water modelling is operational, the Coordinator-General will receive ground water monitoring reports relevant to gas field development proposals.

4.4. Groundwater Modelling

APLNG has adopted a sophisticated finite element numerical groundwater model (FEFLOW), to deal with complex hydrogeology, including variable bed thickness and hydraulic properties both laterally and vertically. The model incorporates the proposed timing for various developments.

To identify the possible cumulative impacts of groundwater drawdown due to its own and other major CSG operations, APLNG has also undertaken groundwater modelling based on the relevant publicly available data and based certain assumptions about the implementation of the other CSG projects.

Notwithstanding this modelling approach, APLNG acknowledges there is inherent uncertainty about the modelled responses of groundwater systems and the potential impacts of CSG extraction on such systems.

It is proposed that the Queensland Water Commission will be empowered to develop a regional groundwater model framework incorporating all work to-date and with a focus on modelling cumulative impacts within a declared cumulative management area. It is anticipated that the regional groundwater model will incorporate all the gas fields located within the Surat Basin. The regional groundwater model will be used to predict collective impacts of CSG water extraction on water levels and help the design of the future water level monitoring network and management responses. The model will integrate the work already carried out by individual companies.

Condition 4.2. – Groundwater Modelling

It is recommended that the CG impose the following conditions:

1. The proponent must provide to the Coordinator-General all relevant information to assist in the development of an industry cumulative groundwater model in accordance with the *Water Act 2000*.
2. The proponent must reach agreement with Coordinator-General about transitioning the implementation of groundwater modelling, groundwater monitoring and the management of the 'make good' provisions from its individual project management approach to the proposed cumulative management approach.

4.5. Springs and associated groundwater dependent ecosystems

APLNG has presented a summary of an assessment of potential impacts to springs and associated groundwater-dependent ecosystems. These are geohydrological ecosystems of particular interest because of their inclusion as 'matters of national

environmental significance' under the *Environmental Protection and Biodiversity Conservation Act (Cwth) 1999*. However, APLNG has advised that there is only one recognised spring within its gas field tenements.

APLNG has undertaken a preliminary, conservative, assessment of river reaches where potential groundwater baseflow to the river could occur within the gas fields' its tenements. This assessment is being refined using field studies and remote sensing.

There are several springs on the register located in the Surat North and Surat Management Areas. The register maintains a list of springs is maintained for the purpose of implementing the Water Resource (Great Artesian Basin) Plan 2006. These springs are described in the publication *Great Artesian Basin Water Resource Plan: Ecological Assessment of GAB springs in Queensland* (Fensham & Fairfax 2005) and *The AGE Report* (2005) on potential river base flow and springs from aquifers of the Great Artesian Basin.

APLNG has advised that it is very unlikely any discharge springs occur within the area of potential drawdown from its CSG activities. It advises that the closest registered discharge springs are at the Eulo springs complex, which is located approximately 500km southwest of the its gas fields near Eulo. APLNG has reported that a basin ridge separates the Surat Basin from the Eromanga Basin, which, it argues, further protects the springs from any impact due to drawdown or changes in water quality. DERM accepts that there is a separation between the two basins but does not rule out the transfer of impacts from the Surat to the Eromanga Basins.

In the proposed regulatory framework under the *Water Act 2000* for managing groundwater impacts, proponents will have an obligation to undertake an assessment of all springs within areas likely to have a 0.2m drawdown, and accordingly propose and implement a strategy to minimise or mitigate impacts on these springs. The new regulatory framework provides for a risk-based adaptive management approach to spring impact managing potential impacts on springs.

It is considered that the proposed regulatory framework will be adequate for managing impacts on springs.

Condition 4.3. Groundwater and Springs Assessment
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It is recommended that the CG impose the following condition:

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for each EA for a gas field development area, must provide to the administering authority a report on the assessment of risks to groundwater dependant ecosystems (including springs and river reaches dependent on base flow) that could be affected by its CSG activities; and a strategy to minimise or mitigate these risks.

4.6. Injection into aquifers

Injection of CSG water to aquifers could be viewed in two contexts. Firstly it may be effective in mitigating any significant water level drawdowns associated with CSG production. Secondly, it may prove to be the best approach to disposing of unwanted CSG water in terms of environmental impact and resource management outcomes.

Clearly there are several advantages in pursuing injection as the primary means of managing CSG water. APLNG has identified that these advantages include: mitigating adverse impacts on aquifers and reducing potential 'make good' requirements for production bores and springs by re-establishing groundwater levels; reducing storage pond requirements and the associated surface impact; and contributing to a sustainable approach though storing water for future use.

APLNG has outlined its aquifer injection trials (approved by DERM), which are currently based on injection of treated CSG water from reverse osmosis plants (permeate). APLNG has stated that the trials are still at an early stage.

APLNG also noted that in regard to available water quality, injection is not a straightforward concept as it is necessary to match injected water with in-situ water quality to avoid potential chemical precipitates forming, which could reduce permeability of the aquifer.

All water will be treated before injection. However, depending on the quality of the receiving water, APLNG has advised that it may propose mixing some of the raw water supply or the brine stream into the injected water – provided this can be done without risk to public health. Injection back into the coal measures could impose limitations on the extent of injection to areas, but this was subject to further studies.

APLNG has noted that is aware that legislative changes to water quality management are proposed in Queensland to meet public health standards. Where higher water quality standard requirements for the protection of human health than the ANZECC National Water Quality Guidelines are required by Queensland Health this could limit injection in places where the water could directly or indirectly be used for urban drinking water supply.

Notwithstanding these potential difficulties, APLNG has advised that injection is likely to be an important part of the CSG water management mix of options deployed.

DERM's preference is that injection of treated CSG water should be the first priority in the disposal/management of this water. The selection of aquifers selected for this injection should give priority to those currently under stress from over-extraction. The quality of the water to be injected must comply with water quality standards required for the protection of human health where the selected aquifers are used for urban drinking water supplies.

Condition 4.4. - Injection to Aquifers

It is recommended that the CG impose the following condition:

1. The proponent must provide to the administering authority a report each year on progress with its injection trials.

4.7. Impacts on the Groundwater Resource

In its supplementary information APLNG provided a series of projected drawdown plots for the Taroom Coal Seam (near the base of the target Walloon Coal Measures) because this is where the greatest magnitude of drawdown will be experienced. APLNG indicates there could be a 20-year lag from maximum ground water extraction before the maximum drawdown occurs and this will not be uniform between different aquifers. Peak water production is expected to occur in 2020 and the drawdown projections were for the year 2049 (the year the maximum effect of groundwater extraction is likely to occur).

At the supplementary workshop on groundwater issues APLNG indicated that the magnitude of the depressurisation due to groundwater extraction could be several hundred metres within the Walloon Coal Measures - albeit this is understood to be localised to where the coal seams dip to 800 metres. APLNG has reported that it expects that all existing water production bores in the Walloon Coal Measures will be lost (or significantly impacted) and will have to be 'made good'.

The APLNG modelling indicates that the groundwater level drawdown in aquifers adjacent to the Walloon Coal Measures is projected to be on average approximately 15m across the project area. However, localised areas of greater drawdown are projected by the modelling, being generally concentrated in areas where both the coal seam elevations are comparatively deep and the Upper Walloons unit aquitard (separating the Springbok Sandstone and target coal seams) is inferred to be thin. The QGC modelling estimated maximum drawdown in the Springbok formation above the Walloon Coal Measures to be of the order of 80m.

In the higher aquifers, small amounts of drawdown are expected to occur, for instance in the shallower Gubberamunda Sandstone/BMO Grouping and near-surface Cainozoic Units. Upon completion of CSG development, water levels in the various aquifer intervals will recover towards baseline conditions - though this is predicted to take many years.

APLNG reports the Hutton Sandstone, which is situated beneath the Walloon Coal Measures and separated from it by a lower permeability unit, is expected to experience comparatively less drawdown.

Current information available suggests that while there is a potential for interconnectivity between parts of the Condamine River Alluvium and the underlying Walloon Coal Measures, the actual degree of interconnectivity needs to be further studied through on-going monitoring.

APLNG has noted that most of the existing water bores within the Walloon Coal Measures are located in the shallower parts of the aquifer outside its gas field tenements. APLNG believes that due to the proposed phased development of its gas fields, it will have time to enhance its groundwater model and incorporate monitoring results and 'make good' options. APLNG has committed that all potentially affected water users will be consulted and those affected will be compensated through 'make good' provisions.

DERM is particularly concerned about the environmental and resource management implications of the significant depressurisation (of several hundred metres) predicted by APLNG's modelling for the Walloon Coal Measures (WCM) and adjacent aquifers. The consequence of this depressurisation is that a significant drawdown area outside the WCM may be created in an area where aquitards may be relatively thin. If not well managed through ongoing monitoring, modelling and adaptive management, the APLNG modelling suggests that broad scale CSG extraction could have wide-ranging impacts on water levels in various aquifers of the GAB in the area, potentially leave a significant, ongoing, adverse legacy.

DERM is not aware of head differences of several hundred metres between aquifers in any aquifer sequence elsewhere in the world. These levels are far greater than DERM has experienced to date – for instance, it is much greater than the drawdowns that occurred through water extraction from the GAB which resulted in the need to create the GAB Sustainability Initiative (GABSI). DERM does not believe an acceptable contingency trigger (i.e. a 'rate of drawdown' trigger) should be set until the QWC's cumulative groundwater modelling has been developed and applied to this issue.

The path forward has to involve monitoring and modelled predictions of change and implementation of responses. It must also involve a strategy for responding to significant unforeseen impacts.

The proponent's management responses to any emerging significant impacts must include far-reaching solutions. This may involve: significant reduction or even the possible shut down of certain areas of CSG extraction operations; the modified scheduling of gas fields to be developed; offsets; and reinjection. The commitment by the proponent to implement these management responses should not just be for over the life of the project but also for many years beyond.

In short, final approval of the project by the CG should not result in the State carrying these risks. DERM considers that if there is uncertainty for proponents, then that is the nature of the enterprise they are proposing, and they should bear that risk. The final CG approval should provide for ongoing adaptive management. It should do so by providing that approvals and legislative requirements include conditions about adaptive management in relation to the impact of groundwater extraction – as has been proposed in this submission.

Condition 4.5. - Groundwater Resources Impacts Strategy

It is recommended that the CG impose the following condition:

1. Within six months of the approval by DERM of the Queensland Water Commission's Underground Water Impacts Report the proponent must submit to the CG a Groundwater Resource Impacts Mitigation Strategy that addresses the risk of possible adverse impacts on aquifer integrity, and on the water resources of aquifers other than the Walloon Coal Measures, and interconnectivity between aquifers as raised in the Underground water Impacts Report. The mitigation plan must set out the proponent's specific commitment to preventative and corrective management responses throughout the life of the project and beyond.

5.0. HYDRAULIC FRACTURING OF THE COAL SEAMS

As part of its supplementary information, APLNG gave further detailed information on the purpose and methodology of hydraulic fracturing, including how hydraulic fracturing fluids are prepared from commonly available materials. This included notes explaining the hydraulic fracturing process and a list of chemical constituents. However, this information was incomplete and further investigation is necessary.

APLNG advises that it is confident it has a good understanding of the associated effects from hydraulic fracturing of the Walloon Coal Measures (WCM), as well as the potential to effect springs and groundwater dependent ecosystems. APLNG has advised that it will only undertake hydraulic fracturing within the 'tighter' or less permeable coal seams. Based on planning for the first 5 years of development virtually no holes are expected to be fraced. However, under current projections up to 50% of the total wells to be developed for the Project may require hydraulic fracturing.

There is concern about the possibility that hydraulic fracturing fluids may include some prohibited or hazardous substances and what risks these might pose to water users and the environment. The concerns relate to overseas experience with hydraulic fracturing. For example, diesel was originally used to fracture wells in the oil industry but is now subject to a moratorium in the USA due to research finding that constituents, such as BTEX (benzene, toluene, ethylbenzene and xylenes) could be carcinogenic. Diesel as a hydraulic fracturing fluid is not used in Australia.

In light of these concerns DERM will require that a toxicology study and risk assessment be undertaken on proposed and possible chemicals used in hydraulic fracturing, based on a qualitative toxicology assessment using receptors and exposure pathways from US EPA studies. A quantitative mass balance assessment plan should also form part of a risk assessment for a fracture simulation development plan to be prepared by APLNG.

The Government has recently announced new laws to ban the use of petroleum mixtures containing benzene, toluene, ethylbenzene and xylenes (commonly referred to as BTEX) from use in coal seam gas (CSG) operations, including 'hydraulic fracturing' activities. The Government will use the existing head of power in the

Environmental Protection Act 1994 to require the Department of Environment and Resource Management to refuse any application for new coal seam gas activities that involve the use of B-TEX chemicals to fracture the coal seam.

The Government will also move to amend the *Environmental Protection Act 1994* to include a provision that 'deems' a new condition on all existing coal seam gas environmental authorities.

Condition 5.1. - Hydraulic Fracturing and Synthetic Drilling Muds/Chemicals
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It is recommended that the CG impose the following conditions:

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for each EA for a gas field development area, must provide to the administering authority, where hydraulic fracturing is proposed, an independent scientific assessment of the possible impacts from hydraulic fracturing.
2. The assessment must address, but not be limited to:
 - a. A complete inventory of biocides, corrosion inhibitors and all other chemicals used in drilling, completions and stimulation operations (hydraulic fracturing).
 - b. Toxicity data for each chemical and any mixture of chemicals.
 - c. Details of where, when and how often drilling, completions and stimulation operations are to be undertaken.
 - d. A risk assessment of the potential for drilling, completions and stimulation operations to cause environmental harm to the receiving environment.
 - e. The risk assessment must include but not be limited to: a mass balance determining the concentrations and absolute masses of chemicals that will be left *in situ* subsequent to drilling, completions and stimulation operations, and the results of any fluid monitoring undertaken in the course of previous drilling, completions and stimulation operations.
 - f. The long term monitoring program of drilling, completions and stimulation operations fluid chemical concentrations in water produced from wells to be implemented by the proponent.
 - g. Management measures that will be taken to avoid and mitigate any potential adverse impact on environmental values.
 - h. Risk avoidance and preventative measures for avoiding interconnectivity with overlying and underlying aquifers, and likelihood of such occurrences.
 - i. Monitoring, detection and response measures to address potential interconnectivity with other aquifers.

6.0. RELEASE TO SURFACE WATERS

As part of its supplementary information APLNG has provided an outline of its case for allowing continuous discharge to the Condamine River of treated associated water. The proposition is based on using the flow statistics of the hydrologic model, developed as part of the Condamine and Balonne Water Resources Plan 2004 (WRP). In particular the proposition has focused on compliance with the specified Environmental Flow Objectives (EFOs) at Node I in the Integrated Quality and Quantity Model (IQQM) adopted by the WRP. Node I is downstream of the Chinchilla Weir and the proposed APLNG Talinga discharge point but just upstream of the proposed APLNG Condabri discharge point.

APLNG has used these EFOs to argue the case that the release of treated water can be considered a 'beneficial use' rather than simply water disposal. They submit that this water discharge can return aquatic habitat towards predevelopment conditions and provide increased security to licensed water users.

In response DERM has advised APLNG that disposal of any CSG water directly to watercourses is not a preferred water management option under the government's Coal Seam Gas Water Management Policy, released in June 2010. If it is deemed necessary to dispose of the coal seam gas water directly to a surface water system, the discharges will be conditioned (through the environmental authority) to ensure that the flow regime remained as close as possible to natural regimes. These conditions would include limiting the discharge of water to a dry river system as this would be an environmental negative in ephemeral catchments. Continuous discharge of treated CSG water to a watercourse would not be compatible with the typically ephemeral nature of watercourse flows in the Condamine and Balonne River basin.

The key points of consideration that DERM uses to assess a proposal to discharge to a watercourse are outlined below. DERM will aim to give effect to the implementation of these requirements by imposing conditions on the environmental authorisation for each CSG project.

A CSG Water Management Plan incorporating CSG water discharge to surface waters must address the key points of consideration detailed below:

- demonstration that all preferred options for managing CSG water (as identified in the 'Coal Seam Gas Water Management Policy') have been considered and if a non preferred option is selected, detailed justification why the preferred options were not suitable;
- the relevant Water Resource Plan objectives, outcomes and requirements;
- protection and /or improvement of flow regime towards 'naturalness' including variability of flows (i.e. low flow and no flow periods);
- protection of aquatic ecosystem health through the protection of environmental values and their water quality objectives as specified in the Environmental Protection (Water) Policy;
- third party impacts or impacts on the environment;
- MDB salinity management strategy requirements;
- water quality standards for the protection of public health and approvals if the discharge is upstream of a drinking water supply source; and

- cumulative impacts of discharges and their management through an ongoing adaptive management process.

DERM concurs with the suggestion put forward by APLNG that DERM's assessment of the acceptability of each of the Surat Basin's CSG producer's water management strategies should be based on a *cumulative* spatial and temporal impact assessment of the management of this water across the basin.

DERM recognises that no single CSG company would be able to undertake the robust cumulative assessment of discharges to a watercourse unless information on all existing and proposed discharges is available. DERM is currently initiating development of an integrated framework for assessing treated CSG water discharge proposals with regard to cumulative impacts. This work will leverage the CSG Feasibility Study of the Healthy Headwaters Project titled, "Stream ecosystem health response to CSG water release". It is expected this will provide an assessment framework to support decisions about if, where, when and how CSG water can be discharged to surface waters. The Department will be consulting with the CSG industry on this matter.

It is noted that APLNG has committed in its EIS that it would comply with the EFOs of the Condamine and Balonne Water Resource Plan and also to aim to return river flow patterns to no greater than pre-development levels. However, it is reiterated that those EFOs were designed as a reference check when allocating water for *extraction* (which is a 'drying' action). They were not designed as a reference check when approving a *discharge* (which is a 'wetting' action). In short, simply relying on compliance with the stated EFOs of the Water Resource Plan is not an adequate basis for regulating the discharge of CSG water to surface waters.

Both DERM and APLNG officers have agreed that the key sections of the flow exceedence curve for each node in the Condamine-Balonne WRP, in so far as discharges are concerned, are at the lower to nil-flow end of the curve (no flow periods and 0 ML/d to 100 ML/d flows). There will have to be periods of nil discharge and so a certain volume of off-stream storage will need to be constructed. Further hydrologic modelling is needed to determine how big this needs to be.

During natural low river flow periods (0 – 100 ML/d) some discharge would be acceptable but this would have to be in accordance with a formula that mimics the natural flow. DERM has recently developed a sample release strategy based on certain assumptions for augmenting flows to pre-development flow conditions at one of the model nodes in the area. However, further detailed project specific hydrologic modelling will be necessary to further develop these CSG water release rules. APLNG has recently commissioned further hydrologic modelling in consultation with DERM.

APLNG has advised that its CSG Water Management Plan will be submitted in mid-October 2010.

Condition 6.1. - Release to Surface Waters.
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It is recommended that the CG impose the following conditions:

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for each EA for a gas field development area, must provide to the administering authority a CSG water release strategy in each CSG water management plan.
2. The CSG water release strategy must, at a minimum:
 - a. include rules for CSG water releases to the watercourse based on observed flows;
 - b. include trigger thresholds for the commencement and cessation of releases;
 - c. ensure protection and/ or improvement of flow regime towards 'naturalness' including protection of pre-development 'no flow periods' and protection and/or restoration of natural variability of flows;
 - d. demonstrate consistency of the CSG release proposal with respect to the relevant Water Resource Plan (WRP) objectives and outcomes;
 - e. identify and minimise the possible adverse bio-physical impacts of releasing treated CSG water into natural watercourse environments (e.g. risk of soil minerals being absorbed, increased light penetration, etc) and considers bank stability, bank slumping, sedimentation, and impacts on soil chemistry; and
 - f. include a monitoring and reporting schedule including potential establishment of any new gauging station/s.
3. The release strategy must be developed taking into account:
 - a. Hydrologic modelling of the 'pre' and 'post' development river flow regime for reaches downstream of the CSG water release point. (Any wetting of the flow regime beyond pre-development levels will not be acceptable as this is an environmental negative in ephemeral environments);
 - b. cumulative impacts of CSG releases on the flow regime and water quality for ecosystem health and public health requirements; and
 - c. risks associated with identified potential outcomes due to altered hydrology and water quality.
4. The proponent may consider the need for systems and structures (eg: off-stream storages to store and release) to ensure the release rules can be met.
5. In systems where detailed pre-development model/s are not available, a precautionary approach to release rules must be adopted.

7.0. THE CSG (ASSOCIATED) WATER MANAGEMENT PLAN

APLNG has advised that it will submit its updated CSG Water Management Plan with its application for an EA in October 2010. DERM has advised APLNG that this plan should comply with the requirements of the recent amendment (section 310 D) of the

Environmental Protection Act 1994 which specifically focuses on this issue. In particular the plan should address the measurable criteria (the management criteria) against which the applicant will monitor and assess the effectiveness of the management of the water.

APLNG has advised that it has found that the scope for using water derived from CSG activities to supplement other water uses and/or improve groundwater pressure and drawdown is limited, because the largest water use is for domestic and stock water purposes and these demands are currently catered for. The large volume water users, such as feedlots, power stations and urban water require both large volumes and reliable supply – and it is difficult for CSG producers to assure this reliability at the same location over the long term.

DERM considers that the proponent should make every effort to find beneficial uses for as much of the CSG water as possible – consistent with the Government's CSG water management policy. DERM will review the proponent's CSG water management plan in this regard. DERM has noted its preference is to retain the CSG water 'in the system', hence injection of appropriately treated CSG water to aquifers is the favoured option.

DERM advised that it has recently undertaken a draft water demand study, which presents the 'big picture' about demands across the Surat Basin. APLNG agrees that a whole-of-system approach is appropriate, but submits that this requires a coordinated effort by CSG producers and government authorities.

It is expected the CSG Water Management Plan to be submitted by APLNG will examine:

- (i) all preferred options for managing CSG water (as identified in the 'Coal Seam Gas Water Management Policy') and if a non preferred option is selected, detail evidence why the preferred options were not suitable;
- (ii) how CSG water is to be treated for various uses;
- (iii) injection to aquifers;
- (iv) management of the waste products from water treatment (brine, salt);
- (v) the possible supply of water to large scale users, e.g. irrigators, feedlots, power stations;
- (vi) the possible supply of water to urban users;
- (vii) the possible cumulative regional beneficial use; and finally
- (viii) discharge to watercourses.

Condition 7.1. - CSG Water Management Plan

It is recommended that the CG impose the following condition:

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for each EA for a gas field development area, must provide to the administering authority a CSG Water Management Plan. The CSG Water Management Plan must address, but not be limited to:

- a. the Queensland Government's policy on Coal Seam Gas Water Management;
- b. the DERM Guideline: *Preparing an environmental management plan (EM Plan) for Coal Seam Gas (CSG) activities*;
- c. the DERM Guideline: *Approval of coal seam gas water for beneficial use*;
- d. the Environmental Protection (Waste Management) Regulation 2000;
- e. the DERM Healthy Headwaters study: *Characterisation of salinity limits related to the use of CSG water for irrigation* (DERM, January 2010);
- f. comply with the requirements of (s310 D) to the *Environmental Protection Act 1994*, including the requirement to 'state measurable criteria'; and other statutory requirements, including but not limited to: the requirements of the *Water Act 2000*, *Water Supply (Reliability and Safety) Act 2008* and the *Public Health Regulation 2005*; and
- g. the cumulative impacts to environmental values from multiple discharges to all relevant surface and ground water systems in the region to the best extent known to the proponent.

8.0. BRINE AND SALTS MANAGEMENT

The APLNG EIS reported that the groundwater chemistry within the recharge zones of aquifer sequences in the Surat Basin (and the Great Artesian Basin as a whole) to be largely homogeneous. Following the infiltration of rainfall, the evolutionary path of groundwater begins through low salinity, slightly acidic groundwater, and moves through various chemical forms to finally produce water dominated by calcium and magnesium bicarbonates and chlorides.

In general terms the proposed reverse osmosis (RO) treatment is designed to remove over 90% of the salts in the CSG groundwater. Hence at a Total Dissolved Salts (TDS) concentration of typically 3000 mg/L, each megalitre of treated water will produce 2.7 tonnes of salt. APLNG advises that the project is expected to produce (at Talinga-Condabri-Reedy Creek) CSG water of the order of 100 ML/d. This would translate into a total salts load of about 270 tonnes per day, or 100, 000 tonnes per annum.

APLNG has advised that recent technical advances in design has meant that the size of brine ponds has been significantly reduced from that presented in the EIS, and that brine ponds will be developed in 20ha modules to meet demand up to a total size of 80ha. APLNG noted that 'salt drift' was an issue when enhanced evaporation ponds were used, but this is no longer the case, although it is still considered important to monitor for salt drift.

APLNG also advised that the liners for the brine ponds have a design life of up to 60 years and are capable of being re-cycled. Ultimately, if the clay beneath the liners does not become contaminated, APLNG would fill the pond as part of rehabilitating the land for an approved land-use.

APLNG advises that it proposes to produce solid salt for transport to a regulated waste facility off-site. APLNG is investigating future options to manage brine, including:

- reducing the quantity of brine through concentration using innovative technologies;
- re-use of salt by producing saleable salt products, such as soda ash and halite (limited progress to date); and
- recycling brine through injection into coal seams (not likely for at least 10 years).

Landfills or encapsulation are not DERM's preferred final disposal option for salt. The following hierarchy must be used to determine the management strategies for brine and residual solid salts from water treatment processes and evaporation, in order of preference:

- Waste reuse/recycling through chemically processing / treating brine or salt residues to create useable/ saleable products, such as soda ash; or
- Injection of brine if the target formation is:
 - a single geological unit that is not regionally consistent and extensive;
 - isolated above and below by an aquitard or aquicludes within the hydraulic impact zone; and
 - not an aquifer that does or could supply water for potable or agricultural purposes; then
- Waste disposal through:
 - disposal of brine to an ocean/estuarine environment; then
 - disposal of salt into a suitable existing licensed regulated waste disposal facility; then
 - disposal of salt into a purpose built regulated waste disposal facility (landfill mono cell) on freehold land owned by the petroleum tenure holder.

Encapsulation is only suitable for solid salt residues, not brine. Any encapsulation strategy proposed for disposal of solid salt residue must ensure, primarily, that a landfill mono-cell facility is used for the disposal and containment of this specific waste and that the facility is designed and constructed by a suitably qualified and experienced person to provide the performance required to mitigate all credible hazards associated with this solid salt residue and so that the salt content is contained within the facility for the foreseeable future.

Where the encapsulation of salt in a landfill mono-cell is proposed DERM will consider the following:

- the facility should not occur above the natural surface level of the surrounding land;
- the facility should be located such that there are no obvious below ground structures that are likely to bring water into contact with the exterior of the containment and should have systems to prevent such contact;
- the facility should not be thin and extensive or near the surface, but compact, to minimise the surface area of the containing structure;

- the facility should be located with a sufficient buffer distance from the boundary of the relevant petroleum tenure/freehold tenure to minimise the risk of any adverse impact on sensitive environments, land with high ecological value, agricultural lands and useful surface water and groundwater; and
- the facility should be designed and located so that it is protected from any potential adverse consequences of regional or local flooding to the probable maximum flood level.

Condition 8.1. - Brine and Salt Management.
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It is recommended that the CG impose the following conditions:

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for each EA for a gas field development area, must provide to the administering authority a Salinity Management Plan. The Salinity Management Plan must address, but not be limited to:
 - a. the Queensland Government's policy on Coal Seam Gas Water Management;
 - b. the DERM Guideline: *Preparing an environmental management plan (EM Plan) for Coal Seam Gas (CSG) activities*;
 - c. a plan for the containment, use and disposal of salt brought to the surface through CSG production, and produced through the treatment of CSG water;
 - d. any plan for reinjection of brine or untreated water; and
 - e. any long-term plan for the utilization of salts extracted from associated water;
 - f. an assessment of the potential impacts of options considered and appropriate mitigation measure for the preferred option having regard to the decision hierarchy identified in government policy and guidelines;
 - g. a risk assessment methodology which will identify the potential for secondary salinity due to the company's activities. This must include an investigation into wind-borne salt from brine ponds and aggregation dams;
 - h. a list of identified management tools and mitigations that will be used in those locations to minimise and manage the risk of secondary salinity; and
 - i. a commitment to assess and report to the administering authority disturbance and rehabilitation activities which affect salinity risk for each 12 month period of the environmental authority.

9.0. PUBLIC HEALTH WATER QUALITY STANDARDS

As mentioned above, legislative reforms are being proposed in this area. Notwithstanding this, the proponent must demonstrate how drinking water supplies

will be protected and relevant public health water quality standards will be met. This will include demonstrating that the treatment processes and supporting management arrangements will consistently deliver water of the quality required.

Condition 9.1. - Public Health Water Quality Standards.
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It is recommended that the CG impose the following conditions:

1. Prior to any discharge of treated CSG water the proponent must have either:
 - a. appropriate approvals under the *Water Supply (Safety and Reliability) Act 2008*; or
 - b. another appropriate approval that includes conditions requiring: details of the infrastructure for the production and supply, or supply only, of CSG water; a verification plan for final water quality; details of the water quality monitoring program; initial water quality results; and an incident and emergency response plan that demonstrates how these activities will be appropriately managed to ensure protection of public health.”

10.0. DAMS AND WATER MANAGEMENT.

10.1. Background

The Queensland Government's policy on Coal Seam Gas Water Management deals with the following key issues:

- the use of CSG water;
- evaporation dams;
- the design standards for dams;
- transitional standards for dams; and
- disposal of saline effluent and solid salt.

The Coal Seam Gas Water Management Policy of June 2010 (the Policy) provides direction for all government policy (supported by guidelines). Before any conditions can be recommended for an Environmental Authority, an over-arching Environmental Management Plan (EMP) that meets the requirements of section 310D of the *Environmental Protection Act 1994* as set out in the DERM guideline: *Preparing an environmental management plan (EM Plan) for Coal Seam Gas (CSG) activities* must be provided to DERM. This EMP must comprise all the component management plans called for in the various conditions.

DERM, in consultation with Australian Petroleum Production and Exploration Association (APPEA), has also developed and published the guideline: *Model conditions for level 1 environmental authority for coal seam gas activities*. These model conditions provide an indication of the environmental standards required for petroleum activities.

The model conditions refer to conditions for regulated dams, noise and reinjection currently under development for inclusion in the model conditions. The guideline for *'Regulated dams in environmentally relevant activities'* and the *'Manual for Assessing*

Hazard Categories and Hydraulic Performance of Dams' (the Manual) are currently under discussion with the industry (APPEA and Queensland Resources Council).

The objective of the conditions on dams is to ensure that all dams in certain hazard categories (regulated dams) are designed by suitably qualified and experienced persons (engineers), and constructed and operated to best practice standards. The Manual also contains specific conditions for hydraulic performance of CSG dams consistent with the required performance specified in the Policy.

10.2. Flood Risks

Flood damage to associated water storage dams (treated or untreated), and brine dams may result in the release of poor quality water that may have long-term impacts on land and water resources. The model conditions currently preclude the construction of dams below a 1:50 year flood level. The Supplemental information did not provide further advice on this issue.

Dams should be located and designed to be immune to overtopping or erosion from local or regional flooding to the AEP design standard for the dam spillway. The aim is to provide for survival of the dam to a minimum probability of failure.

10.3. Leakage from Brine Dams and Brine Evaporation Basins

Due to the highly saline nature of the brine, it is unacceptable to allow any seepage from these dams. The dams should be constructed to ensure no leakage occurs. Conditions have been included below on the requirements for dams and evaporation basins consistent with the Coal Seam Gas Water Management Policy of June 2010.

10.4. Groundwater Monitoring Plan for dams

The leakage of untreated water and brine has the potential to impact on land, groundwater (including shallow aquifers) and surface water. Soil monitoring is required around all CSG associated water dams and brine dams regardless of whether they are considered a high risk or not. A condition has been included below to require the monitoring of seepage for all dams consistent with the Coal Seam Gas Water Management Policy of June 2010.

A Groundwater Monitoring Plan will be required to deal with monitoring around untreated CSG associated water dams. The monitoring will be designed to detect dam seepage, potential land contamination and groundwater impacts. Note: Conditions in the Policy and Model Conditions for CSG require a relevant hydraulic performance in this regard. Monitoring bores will also be required for recognised aquifers that are considered at risk.

10.5. Decommissioning of dams

On decommissioning of dams, tests should be conducted for contaminated soil and any such material must be treated or disposed of lawfully. There are two options for dam decommissioning, viz. contaminated soils are encapsulated on site or the contaminated soils are transferred to a purpose-built disposal area.

The encapsulation of contaminated materials on the dam site is not an acceptable management strategy. These soils should be transferred to one or a small number of

central disposal areas to reduce the overall long-term land contamination. A condition has been included below to require EM Plans to include an assessment for any dam proposed to be decommissioned in the gas field.

10.6. Rehabilitation of dams

Decommissioned dams are to be rehabilitated and the landform must be reinstated such that it will not function as a dam and will be stable and sustainable for the foreseeable future.

10.7. Notifiable activities

Storages containing brine and raw associated water meet the definition of notifiable activity of schedule 3 of the *Environmental Protection Act 1994*: 37 Waste storage, treatment or disposal.

The proponent is required to meet section 371 of the *Environmental Protection Act 1994* in relation to notifying the administering authority.

A condition has not been specified because this is a legislative requirement.

10.8. Approvals for water supply

The Supplementary EIS states that water will be sourced from groundwater bores where other options do not exist.

Approval is required under the *Water Act 2000* for extraction of groundwater other than water taken under the provisions of the *Petroleum and Gas (Production and Safety) Act 2004* and used for activities on the petroleum tenement authorised under the P&G Act.

No conditions are recommended as the issue above is a legislative requirement.

Condition 10.1. - Dams

It is recommended that the CG impose the following conditions:

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for each EA for a gas field development area, must provide to the administering authority designs for Aggregation dams, CSG water dams and Brine dams such that they will:
 - a. be designed with a floor and sides of material that will contain the wetting front and any entrained contaminants within the bounds of the containment system during its operational life including any period of decommissioning and rehabilitation; and
 - b. have a system that will detect any passage of the wetting front or entrained contaminants through either the floor or sides of the dam; and
 - c. either, be capable of repair to rectify any passage of the wetting front through either the floor or sides of the dam, or else be decommissioned and rehabilitated.

2. Brine dams must have a system for the collection and proper disposal of any contaminants that move beyond the bounds of the containment system.
3. The design, construction, operation, modification and decommissioning of any regulated dam that is part of a CSG project must be undertaken in accordance with DERM's *Manual for Assessing Hazard Categories and Hydraulic Performance of Dams* and the accompanying Guideline *Dams in Environmentally Relevant Activities*. (Draft as of 1st September 2010).

Condition 10.2. - Dam decommissioning
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It is recommended that the CG impose the following conditions:

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for each EA for a gas field development area, must provide to the administering authority an assessment of the disposal options for any contaminated material (i.e. salt or dam liners) in accordance with the DERM waste management hierarchy and consistent with the DERM Guideline: *Preparing an environmental management plan (EM Plan) for Coal Seam Gas (CSG) activities*.
2. Decommissioned dams are to be rehabilitated and the landform must be reinstated such that it will not function as a dam and will be stable and sustainable for the foreseeable future (unless otherwise negotiated with landholders). A minimum depth of 0.25m topsoil must be placed over decommissioned storage dams to ensure an adequate vegetal cover can be established.

11.0. WATER QUALITY AND AQUATIC ECOLOGY MONITORING

The proponent should undertake a program of monitoring of water quality and aquatic ecological parameters at sites upstream and downstream of the proponent's gas fields activities and adjacent to field sites where the proponent's activities will have impacts on surface runoff. This will enable any changes to water quality and aquatic ecosystem health to be assessed. Monitoring of baseline stream conditions and establishment of reference sites prior to construction of works such as river crossings and discharge points together monitoring information from upstream and downstream of impacted areas will enable the impacts associated with the project to be differentiated from impacts caused by rural and urban activities.

APLNG has advised that subsequent to the EIS it has undertaken wet season aquatic ecology studies. APLNG has advised it is designing a monitoring program, based on its experience at Spring Gully using internal resources and advice from FRC Environmental. The program is focussed on monitoring macrophytes and macro-invertebrates. APLNG also proposes to undertake ecological toxicity testing of treated associated water for discharge to water courses in consultation with DERM.

DERM has advised that apart from water quality, APLNG should monitor to ensure there would be no increase in the salt load of the system. DERM has advised that the determination of increased salt loads is based on the assessed salt load in the system in 2000. The objective is for no increase above this level.

Condition 11.1. - Water quality and aquatic ecology monitoring

It is recommended that the CG impose the following conditions:

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for each EA for a gas field development area, must provide to the administering authority a monitoring program of water quality and aquatic ecological parameters at sites upstream and downstream of the proponent's gas fields activities where the proponent's activities will have impacts on surface runoff. The program should:
 - a. have clearly defined objectives;
 - b. be developed in consultation with DERM and Queensland Fisheries;
 - c. be developed by an accredited third party;
 - d. accord with the DERM Monitoring and Sampling Manual;
 - e. accord with the Queensland Water Quality Guidelines;
 - f. draw upon the wet-season aquatic ecologic monitoring undertaken subsequent to the EIS;
 - g. draw upon, and be coordinated with, other river health monitoring programs such as the Sustainable Rivers Audit;
 - h. include visual assessments and a photographic record in regard to any impacts from overland flow such as gullying, impacts to sediment and erosion control structures and exposure of pipes;
 - i. include monitoring of the riparian zone adjacent to the proponent's activities;
 - j. be integrated with the flow quantity gauging program developed in association with any treated CSG water discharge to a watercourse;
 - k. be designed to not result in a deterioration of either water quality or aquatic ecosystem health directly attributable to the proponent's activities compared with baseline conditions;
 - l. specify how monitoring data will be collected, the frequency of collection, its analysis, review and reporting; and
 - m. include a focus on salinity and ecosystem health.
2. Where treated CSG water discharges are proposed the program must include an eco-toxicology risk assessment, including the possible accumulation of constituents. The risk assessment should include the following:
 - a. monitor the contaminants of potential concern in the treated discharge and in the receiving environment;
 - b. compare the concentration of contaminants of potential concern to water quality objectives including relevant published toxicant trigger values;
 - c. where guideline trigger values are exceeded, or in the absence of guideline values, where a potential risk to environmental values has been identified, perform an ecotoxicological risk assessment in accordance with the ANZECC/ARMCANZ (2000) methodology which may require performing toxicity bioassay(s) and/or a direct toxicity assessment(s). The risk assessment should take into consideration important operational and environmental factors such as background environmental concentrations, persistence and degradation rates, and any other relevant environmental fate considerations;

- d. where contaminants of concern in the discharge are known to be bioaccumulating substances and exceed background concentrations, the proponent must design and implement a biological monitoring program that compares the body burdens of contaminants of concern in upstream or reference sites with those of downstream or impacted monitoring sites.. Statistical comparison of body burdens recorded in upstream (unimpacted) monitoring sites to those in downstream (impacted) monitoring sites and interpretation of the results need to be reported to the administering authority within an agreed timeframe; and
 - e. in designing an ecotoxicology study (as per C25(2)c) or biological monitoring program (as per C25(2)d) the proponent must take into account the concerns and recommendations of the administering authority. The program must be accepted by the administering authority prior to commencement of related works.
3. Where remote instrumentation is used to capture water quality data this must be validated as per equipment specification by comparison to equivalent laboratory-based analysis results to ensure quality and reliability in the measures recorded.

12.0. WATERCOURSE CROSSINGS

Petroleum activities are a permitted activity under the Water Regulation 2002 (Sections 49-51), and therefore construction of pipelines within or across water courses does not require a Riverine Protection Permit. Works in or across water courses should be undertaken in accordance with the DERM Guideline: *Activities in a watercourse, lake or spring associated with mining operations*. The Guideline sets out how the impacts of mining related activities within a water course, wetland or spring are minimised. The monitoring of impacts will be consistent with the proponent's Water quality and aquatic ecology monitoring plan.

In addition, the design of all creek crossings and waterway barrier works should take account of the matters discussed in *Waterway barrier works development approvals* (Fish Habitat Management Operational Policy FHMOP 008, DPI&F, July 2009). The Department of Employment, Economic Development and Innovation (DEEDI) and DERM departmental staff should be engaged in the preliminary planning and design of all creek crossing and waterway barrier works.

No additional conditions are recommended.

13.0. APPROVALS FOR WATER SUPPLY

Approval is required under the *Water Act 2000* for extraction of surface and groundwater other than water taken under the provisions of the *Petroleum and Gas (Production and Safety) Act 2004* and used for activities on the petroleum tenement authorised under the P&G Act. No specific conditions are recommended as the issue above is a legislative requirement.

14.0. PROTECTION OF GOOD QUALITY AGRICULTURAL LAND

NOTE: These issues/conditions apply to both, the gasfields and the pipeline corridor

The State's policy on Good Quality Agricultural Land has been in place since 1992. More recently, strategic cropping land (SCL) has been recognised under the Government's Policy: "*Protecting Queensland's strategic cropping land*", released by the Minister for Natural Resources on 23 August 2010. This requires that strategic cropping land be conserved and managed for the longer term. Under this policy it is intended that any development that may permanently alienate strategic cropping will not be permitted. Strategic Cropping Land is defined as land on which soil quality, topography and seasonal rainfall combined enable more than one quality crop to be grown on a commercial agricultural basis. The information provided in the EIS documents is insufficient to determine whether the project (as proposed) will comply with the SCL policy.

DERM has noted that there appears to be some confusion in the EIS between different soil classes and good quality agricultural land (GQAL) as defined under State Planning Policy 1/92. APLNG advised that it has adopted a conservative approach in the EIS and included all class A, B and C1 as GQAL. According to the supplemental information, the total area of Class A land that will be disturbed is a small proportion of the total land disturbed for both the gas fields and pipeline. The loss of agricultural production during the period of operations is minimised by burying the pipelines at a suitable depth to enable other land-use activities to occur. Following decommissioning of the Project, all gas production activities will be removed and areas rehabilitated, unless otherwise agreed with the regulators and the landholders.

Condition 14.1. - Protection of Good Quality Agricultural Land

It is recommended that the CG impose the following condition

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for each EA for a gas field development area, must provide to the administering authority an Operations Environmental Management Plan that describes how the positioning, design and operation of petroleum activities will avoid, or minimise, impacts on land identified as Good Quality Agricultural Land using the assessment methodology that supports the State Planning Policy 1/92 The Protection of Good Quality Agricultural Land Policy particularly the land identified as Class A using this methodology.

15.0. SOILS MANAGEMENT

Pre-construction soil surveys of the gasfields and gas pipeline construction corridor are required to identify SCL, Good Quality Agricultural Land (GQAL), sodic soils, and other potential soil management issues. Site specific construction management plans should be developed to ensure that potential land degradation and associated off site problems are effectively managed.

Soil and landscape mapping of the pipeline corridor and gasfields should be at a scale commensurate with the scale and intensity of likely disturbance, to identify potential impacts of any development on land and water resources. For example, the mapping should inform where there may be risks of shallow saline water tables and sodic soils being intersected by trenching activities for gas or water pipelines, resulting in degraded land and water resources.

The proponent has indicated that improved mapping can be provided. However, the same incorrect mapping has been used in the Supplemental Information - Pipeline soils assessment Callide Infrastructure Corridor and Gladstone State Development Area. For example, in Figure 4.2 *Landform*, the polygons for the Callide Valley are based on the land systems of the Dawson - Fitzroy area (CSIRO, 1968), but the landforms shown do not match the landforms described in the published map and report. Updated soil data separating sodic and non-sodic texture contrast soils which reflect erodibility have not been provided for this study.

DERM has noted that the investigations reported in the EIS were limited to less than 800mm which is less than the likely depth of disturbance) and did not focus on problematic soils. DERM considers that the major soil management issue is likely to be sodic soils and that planning to manage this before disturbance is the best approach. This has been inadequately dealt with in the documentation provided. Issues to be considered include how to treat excess material that may be sodic for disposal on or off-site and the potential loss of yield on farmland due to exposing poor quality subsoil. The best approach is to separate topsoil from sub-soil and replace it in the sequence in which it was removed to recreate the natural soil profile. The construction methodology of the gas transmission pipeline and other infrastructure in the gas fields will require segregation of soil layers during trenching in order to be able to return a suitable soil profile.

The management of sodic soils cannot be undertaken based on a desktop study alone. Soil investigations should be undertaken by suitably qualified and experienced soil scientists.

Where it is intended that applications will be made for Beneficial Use of treated associated water, soil mapping should be carried out at an appropriate scale to enable a full assessment of potential impacts on the land resources. Where the beneficial use is intended for irrigation purposes, an appropriate scale is 1:25 000, and chemical analysis carried out on representative soil samples to ensure there will be no deleterious effects on the irrigated land or on adjacent land and water resources.

Condition 15.1. - Soils Management Plan

It is recommended that the CG impose the following conditions:

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for the EA for the gas fields, must provide to the administering authority a soils assessment and management plan, based on current knowledge, for the activities that would be carried out under the authority.

2. An updated EMP must be provided to the administering authority prior to the commencement of petroleum activities including updated soils information.
3. As well as activities authorized under this approval, this information should also identify any infrastructure - work camps, water storages, constructed roads, etc that may impact on existing and future land uses.
4. The soil management plan must address, but not be limited to the following:
 - a. Soils ground-truthing and mapping, especially all sensitive soil and landform areas in the gasfields and along the pipeline corridor including Good Quality Agricultural Land. The appropriate mapping scale must be determined in consultation with DERM.
 - b. An assessment of the potential adverse impacts due to disturbance of problematic soils along with appropriate mitigation and management measures and construction methods applicable to the identified soil types or landforms to minimize the degradation of the soil resource on site, and to avoid off site impacts.
5. Areas intended for the Beneficial Use of treated associated water must be included in the soil assessment and management plan. This would include soil mapping at an appropriate scale to enable a full assessment of potential impacts on the land resources. Where the beneficial use is intended for irrigation purposes, an appropriate scale is 1:25 000, and chemical analysis carried out on representative soil samples to ensure there will be no deleterious effects on the irrigated land or on adjacent land and water resources.

16.0. CONSTRAINTS PLANNING AND FIELD PROTOCOL

APLNG has briefed DERM on its work on identifying and mapping environmentally sensitive areas. This work has been undertaken on the basis of the maximum possible development case. It is noted that there remains some uncertainty as to exactly where the development of the gas fields will progress.

APLNG has presented an outline of the ecological surveying process that was used as part of the gas fields' development planning and management process. It consists of broad-scale surveying to identify sensitive ecological communities and essential habitat that should be avoided during initial project planning and fine-scale surveying to identify significant flora, or habitat for significant fauna, that should be avoided or otherwise carefully managed prior to actual on site disturbance activities. Potential areas to be avoided were identified on the GIS mapping system during the broad-scale surveying phase and these areas were further identified on the ground during the fine-scale survey phase. APLNG has identified that a total area of approximately 6000ha could be disturbed within the gas fields, although this was a maximum. Up to a third of this area is likely to be disturbed by pipeline, and temporary activity areas will be restored to productive use as soon as construction is completed.

APLNG has expressed concern that the strict application of the model EA conditions for petroleum activities in regard to buffers from categories A, B and C environmentally sensitive areas (ESAs) could lead to unintended adverse consequences. For instance applying a 500m buffer around category B and C ESAs (e.g. related to Brigalow shade lines in otherwise cleared farmland) could potentially

push development into ‘not of concern’ vegetated areas. In response DERM has advised APLNG that the model conditions are conservative and were developed as a default position to manage impacts from petroleum activities. Proponents have an opportunity to negotiate different conditions with DERM, based on detailed field studies and proposed management plans.

Condition 16.1. - Constraints Planning

It is recommended that the CG impose the following conditions:

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for each EA for a gas field development area, must provide to the administering authority a constraints plan and field development protocol for the development of petroleum activities that shows how the following constraints have been identified and avoided.
2. The plan must include:
 - a. all category A, B and C environmentally sensitive areas. It should be noted that Category C Environmentally Sensitive Areas must include:
 - i. Nature Refuges as defined under the *Nature Conservation Act 1992*.
 - ii. Koala Habitat Areas as defined under the *Nature Conservation Act 1992*.
 - iii. State Forests or Timber Reserves as defined under the *Forestry Act 1959*.
 - iv. Declared catchment areas under the *Water Act 2000*.
 - v. Resources reserves under the *Nature Conservation Act 1992*.
 - vi. An area identified as “Essential Habitat” for a species of wildlife listed as endangered, vulnerable, rare or near threatened under the *Nature Conservation Act 1992*.
 - vii. Any wetland shown on the Map of Referable Wetlands available from DERM’s website.
 - viii. “Of concern” regional ecosystems identified in the database maintained by DERM called ‘Regional ecosystem description database’ containing regional ecosystem numbers and descriptions.
 - b. air emissions;
 - c. soils and landscape constraints — including Good Quality Agricultural Land, Strategic Cropping Land, and potential erosion, salinity and sodicity risk areas;
 - d. floodplain areas that are likely to be flooded by runoff events of less than 1:100 yr average recurrence interval (ARI). Permanent infrastructure that may concentrate or divert flood flows, or increase the risk of environmental damage (e.g. risks overflow of brine ponds or other storages) should be precluded from such areas. Includes the

notification of petroleum activities in Riverine Improvement Trust asset areas;

- e. bioregional corridors; and
- f. other constraints identified in the EIS and supplemental information..

3. The constraints plan and field development protocol must:

- a. be consistent with the management plans of the relevant Regional NRM Bodies;
- b. address the property management plans of the relevant landholders;
- c. commit to undertaking and documenting field surveys for all classes of constraint prior to commencing petroleum activities;
- d. commit that field surveys inform the Field Management Protocols and will be undertaken at all times by a qualified person; and
- e. commit to incorporating constraint commitments into operational plans for the life of the project.

17.0. CUMULATIVE IMPACTS.

It is important that the impact assessment of all elements of the project assess these possible impacts and their mitigation not only in terms of the project itself but also cumulatively taking into account all other known relevant projects. APLNG has undertaken a significant level of cumulative assessment based on available information.

There are several significant matters on which a cumulative impacts assessment approach is currently being progressed, for instance: groundwater modelling and monitoring; the discharge of treated CSG water to the Condamine River system; and the 'bundled' pipeline crossing at The Narrows. Additionally, the government is implementing strategies and plans to identify cumulative impacts for social and economic issues in the Surat Basin and in the Gladstone region.

In the report on the EIS for the QGC project the CG confirmed that a CSG Industry Monitoring Group (CIMG) will be established and required that the proponent assist in the establishment and funding of the group and participate in its activities. The group will be chaired by the CG. The objective of the CIMG is to assess and report on the cumulative environmental and social impacts of the CSG Industry and its activities. More specifically the objectives of the group include, to:

- review project environmental and social impacts and interactions between proponents;
- review monitoring data for cumulative environmental impact implications for all proponents;
- respond to community concerns and identify issues where proponents and relevant agencies can take action to manage impacts;
- recommend changes to legislation, policies and guidelines to address emerging issues from the CSG and LNG industry.

Condition 17.1. - Cumulative Impacts

It is recommended that the CG impose the following condition:

1. The proponent must provide to the CG a detailed report on the various assessments of cumulative impacts it has undertaken. This information will be used by the CIMG and integrated with the various regional environmental monitoring programs to be established. Issues on which possible cumulative impacts should be reported include:
 - a. noise associated with multiple LNG facilities on Curtis Island;
 - b. impacts on the Gladstone Air Shed from air emissions arising from the multiple LNG facilities;
 - c. impacts on flora and fauna arising from multiple LNG and other port development on Curtis Island;
 - d. impacts on marine biological values and water quality from multiple LNG and other port development on Curtis Island;
 - e. regional impacts on terrestrial flora and fauna, habitat corridors, biodiversity values, listed species and ecosystems arising from the gas transmission pipelines and the development of the gas fields;
 - f. riparian habitats and aquatic ecosystems; and soils and agricultural production, arising from the gas transmission pipelines and the development of the gas fields.

18.0. CLEARING OF NATIVE VEGETATION

Clearing of native vegetation within a petroleum lease, where it is related to the oil or gas activity, is not assessable under the *Sustainable Planning Act 2009* (SP Act). Where no exemptions exist (outside Petroleum, Pipeline or Petroleum Facility tenure), a permit is required to clear native vegetation if it is shown as remnant vegetation on a certified Regional Ecosystem map and where it is not shown as Category X on a Property Map of Assessable Vegetation (PMAV). Requirements of the *Vegetation Management Act 1999* (VMA) are defined by Regional Vegetation Management Codes, the Regrowth Vegetation Code and the Vegetation Management Offsets Policy (available on the DERM website).

Where clearing is permitted under an exemption:

- Within the Gladstone State Development Area, and other areas classified as 'urban', clearing is allowed for an 'urban purpose' in areas mapped as remnant vegetation except in areas mapped as an endangered regional ecosystem. Industrial development is classed as an 'urban purpose'.
- Clearing for a 'mining activity' or a 'petroleum activity' within a mining lease or petroleum lease as defined under the *Environmental Protection Act 1994* (EP Act).
- Clearing to construct necessary infrastructure in least concern regional ecosystems or in high value regrowth where the footprint of the infrastructure is less than 2 ha.

Areas where the VMA does not apply:

- State forests, forest entitlement areas, timber reserves, national parks and other protected tenures under the *Nature Conservation Act 1992* (NCA);
- Mangroves.

DERM may require the proponent to address vegetation clearing issues through conditions of the environmental authority under the EP Act even though the clearing may be exempt from assessment under the SP Act. In the section on Offsets, the proponent is requested to provide information on how it will meet the requirements of the Queensland Government Environmental Offsets Policy.

Prior to the commencement of any clearing or other activities which have direct impacts on protected wildlife or Queensland's conservation estate the proponent must obtain appropriate permits under the NCA.

19.0. ENVIRONMENTAL OFFSETS

APLNG has submitted (mid-September 2010) a draft offsets strategy to government for review with a view to finalising the strategy by November 2010. Discussions on this are proposed. APLNG is currently reassessing the potential area of each regional ecosystem that could be disturbed based on the current optimised development plan for the gas fields and pipeline crossing of The Narrows.

Offsets are regulated under the Coordinator General's conditions, not under any environmental authorisation, and this includes reconciliation against the approved offset package. The key objective under Queensland's environmental offsets policy is to ensure that environmental values are maintained.

The Coordinator-General's reports on similar CSG-LNG projects have stated conditions for offsets that allowed for an offset package that reflected the degree of certainty associated with the components of the project: the package required that all unavoidable impacts for the entirety of the project be addressed up-front on the basis of a conservative estimate of expected impacts; and that the reconciliation process be undertaken periodically against actual/progressive impacts and achievements specified for the offsets in the associated environmental management plans.

Unavoidable environmental impacts associated with particular components of the project, such as the LNG facility and associated land and marine works on Curtis Island and the pipeline, can be estimated with confidence, as are the early well head locations. However, there is less certainty regarding the number, size and distribution of the wells and gathering lines for later stages. Nevertheless, DERM prefers a project-wide offsets package to be negotiated at the outset.

The Commonwealth also has offsets requirements in relation to matters of NES.

DERM will assess all offset proposals against its strategic and prioritised acquisitions program for the protected estate having regard to the biodiversity values impacted; rehabilitation of strategic areas in biodiversity corridors in the landscape identified via its BAMM methodology; and the specific measures pursuant to the Vegetation Offsets policy and Nature Conservation Act 1992.

Rehabilitation of degraded areas in or proposed as national parks or other conservation areas could be part of an acceptable package. Adjacency/proximity of land to protected estates also is factor considered by DERM, having regard to long term management of such areas. In principle, large strategic offset packages are preferred to a patchwork of small disconnected parcels of land.

Offsets to address the impacts of dredging in Port Curtis overlap with world heritage values. Whilst it is difficult to replace lost seagrass, which is an important habitat for EPBC-listed species, there are opportunities to contribute funding for targeted research for specific affected species as part of the offsets package.

Any work done by NRM Regional Bodies to secure gaps in bioregional corridors of regional and state significance, which could be impacted on by activities in the gas fields and gas transmission pipelines, should be identified (mapped, quantified and qualified). Support to build on such work might also be considered in the offset package.

A key issue in measuring the success of an offsets package is the long-term protection of the offset sites. Given the considerable extent of coal and petroleum tenures over the Brigalow bioregions (north and south), identification of large areas as offset components may be difficult to achieve. However, DERM accepts that offsets may need to be renegotiated with subsequent mining/gas/petroleum interests in the future if areas accepted under any package are disturbed in the future.

APLNG has inquired whether indirect impacts to threatened species, such as cryptic reptiles (about which there is limited information) could be offset through support for research on these species. DERM would consider such offers as part of any package.

Condition 19.1. - Environmental Offsets
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It is recommended that the CG impose the following conditions:

1. Prior to commencement of significant construction works, the proponent must submit to the Coordinator-General an Environment Offsets Strategy which addresses the *Queensland Government Environmental Offset Policy 2008* and associated specific issue policies, including requirements for listed/scheduled species under the *Nature Conservation Act 1992*. The strategy must address impacts on biodiversity, vegetation, wetlands, and coastal and marine areas arising from:
 - a. exploration, development and operation of the coal seam gas fields;
 - b. construction and operation the gas transmission pipeline;
 - c. construction and operation of the LNG facility;
 - d. construction of coastal marine infrastructure;
 - e. other activities (e.g. construction camps, port works for the project, ancillary works).
2. The strategy must be supported by a program detailing the following:
 - a. principles adopted for the environmental offsets strategy;

- b. procedures to identify the requirements for environmental offsets for specific components of the project over the life of the project;
 - c. relevance to any legislative requirements for offsets;
 - d. mechanisms to secure and manage the environmental offset for long term protection of values;
 - e. location, size and values that must be offset;
 - f. location, size and values of the offsets proposed;
 - g. management measures, including funding, required to maintain or enhance values for the life of the offset; and
 - h. a system for reporting to the CG on offset arrangements; their management; how offset values are met and maintained; and the reconciliation process.
- 3. The following is an acceptable solution to the reporting system in the Condition above:
 - a. An initial offset package, consisting of specific land tenures, their environmental values and related management commitments/funding, is to be provided to the CG and DERM within 6 months of the following:
 - b. the issue of any gas field environmental authorities (pursuant to the EP Act); or
 - c. amendment of any existing gas field environmental authorities, relating to proposed activities.
- 4. The offset package is to be based on the specific offset requirement derived from "ground truthing" of endangered ecosystems or species, biodiversity values and other vegetation proposed to be disturbed under the new or amended environmental authority.
- 5. To establish baseline information, the extent of existing project disturbance (on the petroleum tenement areas the subject of the environmental authority) and the status of the operational plan (including progress and status of rehabilitation) be provided at the time of submission of the offset package.
- 6. Each operational plan detail (quantity and quality) disturbance and rehabilitation that includes: (a) a current account (audit at commencement of operational plan period) of disturbance; (b) a planning period proposal (for the duration of the operational plan) of disturbance and rehabilitation; and (c) a reconciliation (actual, third-party audited account at the end of the operational plan period) of disturbance and rehabilitation areas.
- 7. The disturbance and rehabilitation information provided in the operation plan should be both qualitative and quantitative in its description of biodiversity and vegetation values and use category descriptions that are inclusive of and consistent with Commonwealth the EPBC Act (i.e. EPBC- listed communities and species habitat) and Queensland legislation and policy (e.g. areas described include Category A, B and C environmentally sensitive areas).
- 8. The cumulative actual (third-party audit reconciled) vegetation disturbance and rehabilitation information (qualitative and quantitative, using category descriptions as required to be presented in the operational plan), be published, maintained and updated on the proponent's website for the duration of the project.

9. A reconciliation statement should be prepared that accounts for the offsets provided against the actual vegetation disturbance and rehabilitation information (qualitative and quantitative).
10. A list of environmental offsets (accepted and in place) for all reconciled vegetation disturbances is simultaneously presented (with the reconciled vegetation disturbance information) and the listed offsets are clearly described (qualitatively and quantitatively), and maintained and updated on the proponent's website for the duration of the APLNG project.
11. The reconciliation statement is to be updated at least annually by the proponent.
12. The reconciliation statement (third-party audit reconciled) is to be submitted to the CG, and the relevant State and Commonwealth environment administering authorities for the project (DERM and DEWHA) on the first annual anniversary of date of approval, and annually thereafter.

20.0. IMPACTS ON NATIVE FLORA AND FAUNA

Several statutory provisions apply in relation to the clearing of native plants under the *Nature Conservation Act 1992*. Mitigation measures including rehabilitation, restoration of degraded habitat, or other proposals that contribute to the conservation of affected species are necessary.

The impacts on native fauna from the project will typically include:

- impacts to animal breeding places and impacts to habitat (essential or critical) necessary for the survival of the species, including clearing and trenching;
- changes to species assemblages temporally and spatially from development and cumulative impacts;
- impact to operational elements of the development (LNG plant, fields and pipeline) from wildlife, e.g. native animals using the plant as nesting sites, macropods using lawn areas as feed, tree roots affecting the gas pipe lines.

Impacts to fauna in both the development and operational phases of projects must be considered and addressed in accordance with section 33 of the *Nature Conservation (Wildlife Management) Regulation 2006*. Mitigation measures should include the allowance for regrowth of natural vegetation in the parts of the pipeline corridor not required for routine operation and maintenance in order to partially address fragmentation of habitat for small animals including birds, mammals, reptiles and amphibians.

The general requirements under the provisions of the *Nature Conservation Act 1992* in relation to clearing of native plants and impacts to native fauna are as follows:

For land owned by the proponent, an exemption (section 41(1)(b) of the *Nature Conservation (Protect Plants) Conservation Plan 2000*) applies to the requirement for a permit to take least concern plants. Therefore, where the proponent owns land in freehold title, a permit to clear least concern plants is not required. However, impacts to animal breeding places must be addressed through development of a species management program approved by DERM.

Clearing of plant species listed as endangered, vulnerable or near threatened is subject to clearing permit and offset requirements. A species management program (SMP) (granted under section 332 of the *Nature Conservation (Wildlife Management) Regulation 2006*) is required to tamper with the breeding places of any protected

fauna species. (Information on the requirements of a species management program is available from DERM Wildlife Branch).

The rehabilitation of the gas fields and pipeline corridors must allow for the maximum reestablishment of native vegetation including the shrubby understorey and ground cover. This is in addition to any protected plant offsets referred to above and any remedial action taken to mitigate against an impact on an animal breeding place.

The project proposes to clear potential fauna habitat on Curtis Island. Impacts from clearing a green-field site include changes to species assemblages (composition and suite) within the development site. Existing native fauna will be displaced and opportunistic fauna (native and exotic) will become dominant. These species (crows, butcher birds, magpies, magpie larks etc) are aggressive and will impact on other native species in adjacent natural areas, thereby reducing the effectiveness of buffer zones. The clearing will also directly impact “top end” predators such as the vulnerable powerful owl through the loss of essential food resources.

Condition 20.1. - Impacts on Native Flora and Fauna

It is recommended that the CG impose the following conditions:

1. The proponent must comply with the provisions of the *Nature Conservation Act 1992* particularly in regard to the following:
 - a. Where there is a requirement for clearing of plants protected under the *Nature Conservation Act 1992*:
 - i. clearing of protected plants must only occur in accordance with a clearing permit or an exemption under the *Nature Conservation Act 1992*
 - ii. offsets must be provided for the permanent loss (take) of near threatened, rare, vulnerable and endangered plants to achieve an equivalent or better overall outcome at a regional scale in accordance with the Queensland Government Environmental Offsets Policy 2008 and generally in accordance with the Queensland Government Policy for Biodiversity Offsets (Consultation Draft)
 - b. Where the activities of the proponent may cause disturbance to animal breeding places the prior approval of DERM must be obtained.
 - c. Where there is a need to take fauna, the prior approval of DERM must be obtained.

21.0. PAD DRILLING OF MULTIPLE WELLS

Pad drilling of multiple wells (radiating out non-vertically) has the potential to greatly reduce the disturbance area and therefore reduce the impacts on environmental values including cropping land and vegetation values. However, APLNG has advised that their investigations have found several disadvantages with the concept. These include:

- an inability to access the upper and lower coal seams at uniform spacing to maximise CSG recovery;

- limited effectiveness because the coal seams of the WCM are thin and discontinuous;
- limitations on the ability to hydraulically fracture coal seams;
- limitations of the availability of suitable drilling rigs.

DERM has noted that other CSG companies have indicated that pad drilling will be technically feasible for the majority of wells. This would enable the impact of coal seam gas field development on existing agricultural land use to be limited, particularly the impacts on broadscale cropping on strategic cropping lands. If APLNG considers that pad drilling is not feasible, alternative ways of siting drilling rigs and other petroleum facilities in these areas that would allow the agricultural activities to continue would need to be implemented.

APLNG has discussed advances in drilling technology that are being progressively introduced in the industry and on which further trials are needed, e.g. different technologies to enable much smaller well sites, land spraying of drilling mud. APLNG expects that advances in drilling technology, including directional drilling will be well established in the medium-term future. DERM has noted the challenges of reflecting different or more flexible drilling arrangements in the EM Plan and the EA. Future changes could also require an amendment of the EA.

Condition 21.1. - Pad drilling (multiple drill holes from the one location)

It is recommended that the CG impose the following condition:

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for each EA for a gas field development area, must include consideration of pad drilling wherever medium or high environmental values, including strategic cropping lands are impacted by the petroleum activities. The EMP must demonstrate that where pad drilling is shown to be not feasible, alternative ways of siting drilling rigs and other petroleum facilities are proposed to protect environmental values.

22.0. OPERATIONAL PLAN

An Operational Plan that provides detailed information about the activities to be carried out under the environmental authority for the gas fields is necessary.

Condition 22.1. - Operational Plan

It is recommended that the CG impose the following condition:

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for each EA for a gas field development area, must provide to the administering authority an Operational Plan. The Operational Plan must cover development of the gas fields to at least 2014. The activities identified in the Operational Plan must incorporate but not be limited to the petroleum activities set out in the approved Work Program and/or

Development Plan for the relevant petroleum authority as required under the *Petroleum Act (1923)* or the *Petroleum and Gas (Production and Safety) Act 2004*.

2. The Operational Plan must be consistent with the requirements of the environmental authority(s) and include, but not be limited to:
 - a. a stated period, not exceeding three (3) years for subsequent operational plans, to which the operational plan applies;
 - b. a description of the existing infrastructure for conducting the petroleum activities;
 - c. a description of proposed infrastructure that will be developed during the term of the operational plan
 - d. a map or maps that:
 - i. record the location of the infrastructure in place for conducting the petroleum activities that exists at the commencement of the period of the operational plan, including but not limited to:
 1. regulated dams;
 2. wells;
 3. transmission flow lines;
 4. gas processing facilities; and
 5. water treatment facilities;
 - ii. record the location of approved additional infrastructure that will be developed for the conduct of the petroleum activities during the period of the operational plan.
 - e. for proposed disturbance or vegetation clearing in an Environmentally Sensitive Area (ESA) provide details on the scale and extent of the disturbance or clearing and if required a commitment to provide an environmental offset;
 - f. for each site to be disturbed, a description of the rehabilitation activities to be performed during the period of the Plan, including but not limited to:
 - i. location (eg tenure, coordinates) and disturbance type (eg well lease, flow line, access track);
 - ii. area to be rehabilitated;
 - iii. use of reference sites;
 - iv. species compositions; and
 - v. post-disturbance land use;
 - g. a description of progressive rehabilitation carried out including performance in relation to the requirements set out in the environmental authority and the proposed rehabilitation activities set out in the previous operational plan; and

- h. the calculation of the financial assurance for the proposed maximum disturbance expected during the period of the operational plan.
- 3. The Operational Plan must be reviewed and submitted to the CG and the administering authority every year and cover a five-year period of gas field development. The administering authority may amend the EA for the gas field on the basis of changes to the Operational plan.

Note: Where the CSG fields are intended to be operated under separate project environmental authorities, separate Operational Plans can be provided under this condition.

23.0. NOISE IMPACTS ON THE GAS FIELDS

APLNG has provided supplementary information on modifications it has made to the proposed project to reduce possible impacts from noise. For instance, it will now use electrically driven gas compression facilities – which will significantly reduce noise emissions compared to the large gas powered reciprocating engines previously proposed. APLNG advises that the new electric driven compressors are more amenable to enclosure to attenuate noise. Also, the adoption of low-noise cooling fan design (needed to cool compressed process gas) will reduce noise emissions from gas producing facilities (GPFs). APLNG advises that noise modelling using the alternative GPF design has given an indicative reduction in separation distance to a noise sensitive receptor to meet 28dB(A) from >5km (EIS base case) to <1km

Condition 23.1. – Noise constraints plan for fixed plant in gas fields

It is recommended that the CG impose the following conditions:

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for each EA for a gas field development area, must provide to the administering authority a noise constraints plan. The plan must address, but not be limited to:
 - a. How gas field planning will avoid or mitigate the potential impacts from noise to sensitive receptors for the gas fields consistent with the requirements of the Environmental Protection (Noise) Policy 2008 and the *Environmental Protection Act 1994*. The noise constraints plan must implement the following noise hierarchy for fixed plant:
 - i. The design criteria for fixed plant should achieve 25dB(A) $L_{Aeq,adj,15min}$ for night time (10pm to 7am) measured at a sensitive receptor. To achieve 25dB(A) $L_{Aeq,adj,15min}$ for night time (10pm to 7am) measured at a sensitive receptor both the constraints planning/ field development protocol and best practice noise abatement measures must be addressed.
 - ii. In those fixed plant locations that cannot meet the design criteria of 25dB(A) $L_{Aeq,adj,15min}$ for night time despite implementation of constraints planning/ field development protocol and the adoption of best practice noise abatement measures the noise when measured at any sensitive receptor from fixed plant must not exceed 28dB(A) $L_{Aeq,adj,15min}$ for night time (10pm to 7am).

2. The noise constraints plan must address, but not be limited to, the following:
 - a. a monitoring program for evaluation of compliance following commissioning and periodically thereafter;
 - b. community liaison and consultation;
 - c. the method of handling noise complaints; and
 - d. training of staff and contractors in noise management practices.
3. The noise constraints plan must provide commitments to conduct a site based noise assessment for each item of fixed plant in the gas field. The assessment should address, but not be limited to:
 - a. the Environmental Protection (Noise) Policy 2008 and DERM guideline: *Planning for Noise Control*;
 - b. implement and address the requirements of the noise constraints plan containing the noise management hierarchy for fixed plant in the gas fields;
 - c. identification of component noise sources and activities at the place(s) which impact on noise sensitive receptors;
 - d. the measured and/or predicted noise level of these noise sources and activities at noise sensitive receptors;
 - e. the reasonable and practicable control or abatement measures (including location of infrastructure and hours of operation) that can be undertaken to reduce identified intrusive noise sources;
 - f. the reduction in noise level at noise sensitive receptors following the implementation of noise measures in e) above; and
 - g. a determination of compliance with the noise hierarchy for drilling activities.

Condition 23.2. – Noise constraints plan for drilling activities (including hydraulic fracturing and cavitation) in gas fields.

It is recommended that the CG impose the following conditions:

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for each EA for a gas field development area, must provide to the administering authority a noise constraints plan.
2. The plan must address, but not be limited to:
 - a. Mitigation of the potential impacts from drilling noise (including hydraulic fracturing and cavitation) to sensitive receptors for the gas fields consistent with the requirements of the Environmental Protection (Noise) Policy 2008 and the *Environmental Protection Act 1994*. The noise constraints plan must implement the following noise hierarchy for drilling activities:
 - i. The design criteria for drilling activities should achieve 25dB(A) $L_{Aeq,adj,15min}$ for night time (10pm to 7am) measured at a sensitive receptor. To achieve 25dB(A) $L_{Aeq,adj,15min}$ for night

time (10pm to 7am) measured at a sensitive receptor both the constraints planning/ field development protocol and best practice noise abatement measures must be addressed.

- ii. In those drilling locations that cannot meet the design criteria of $25\text{dB(A)}_{\text{LAeq,adj,15min}}$ despite implementation of constraints planning/ field development protocol and the adoption of best practice noise abatement measures the noise when measured indoors at any sensitive receptor from drilling activities must not exceed $30\text{dB(A)}_{\text{LAeq,adj,15min}}$ for night time (10pm to 7am).
- iii. In those drilling locations that cannot meet $30\text{dB(A)}_{\text{LAeq,adj,15min}}$ when measured indoors at any sensitive receptor despite implementation of constraints planning/ field development protocol and the adoption of best practice noise abatement measures then the constraints plan must commit QCLNG to making alternative agreements with the affected sensitive receptors.
 1. As a minimum each agreement of an alternative arrangement must be in writing and state:
 2. the location of the drilling activities;
 3. the location of the sensitive receptor;
 4. the names of the affected persons;
 5. the nature of the alternative arrangement(s) (e.g. provision of alternative accommodation, attenuation of noise at the sensitive place, a benefit to offset the impact of drilling noise, acquisition of the sensitive place); and
 6. the period of the alternative arrangement(s).
- iv. Where alternative agreements cannot be made with sensitive receptors alternative engineering solutions or location of drilling activities must be sought.
3. The noise constraints plan must include commitments to consult with sensitive receptors where $25\text{dB(A)}_{\text{LAeq,adj,15min}}$ is predicted to be exceeded at night time from drilling activities when measured at the sensitive receptor.
4. The noise constraints plan must include a program for continual improvement for drilling activities. The program for continual improvement must include a review of available technology every three years for inclusion in the operational plan for the project.
5. The noise constraints plan must also address commitments to, but not be limited to, the following:
 - a. a monitoring program to evaluate compliance occurring at least weekly;
 - b. community liaison and consultation;
 - c. the method of handling noise complaints; and
 - d. training of staff and contractors in noise management practices.

6. The noise constraints plan must provide commitments to conduct a site based noise assessment for each drilling activity in the gas field. The assessment should address, but not be limited to:
- the Environmental Protection (Noise) Policy 2008 and the DERM guideline: *Planning for Noise Control*;
 - implement and address the requirements of the noise management plan containing the noise management hierarchy for drilling activities in the gas fields;
 - identification of component noise sources and activities at the place(s) which impact on noise sensitive receptors;
 - the measured and/or predicted noise level of these noise sources and activities at noise sensitive receptors;
 - the reasonable and practicable control or abatement measures (including location of infrastructure and hours of operation) that can be undertaken to reduce identified intrusive noise sources;
 - the reduction in noise level at noise sensitive receptors following the implementation of noise measures in e) above; and
 - a determination of compliance with the noise hierarchy for drilling activities.

24.0. COMPATIBILITY OF COAL SEAM GAS ACTIVITIES AND QUARRYING

Given the very large areas covered by petroleum tenure and the proposed spatial location of gas wells and infrastructure, all quarry resources should not be sterilised.

Fair and equitable separation distance should be established that allows for quarry material to be made available to other significant developments underway or in the planning stage within the tenement areas. A condition has been included below to require the proponent to facilitate existing and planned quarrying activities.

Condition 24.1. - Quarrying

It is recommended that the CG impose the following condition:

- Separation distances from CSG activities should be established in consultation with quarry operators and local governments to enable existing and planned quarrying to continue within the petroleum tenement areas.

25.0. APPROVALS REQUIRED UNDER THE FORESTRY ACT 1959

While borrow pits are exempt from environmentally relevant activities assessed under chapter 3 of the *Environmental Protection Act 1994* and the *Sustainable Planning Act 2009* (as incidental activities), they are not exempt from *Forestry Act 1959*. Extraction of sand, gravel and rock from borrow pits located on state land will require approval under the *Forestry Act 1959*.

Condition 25.1. - Borrow pits

It is recommended that the CG impose the following condition:

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for the EA for the gas fields, must provide to the administering authority an assessment of the environmental values, potential impacts, mitigation measures for the siting, construction, operation, decommissioning and rehabilitation of borrow pits required for petroleum activities.

26.0. HISTORIC CULTURAL HERITAGE

The pipeline route, gas fields and LNG facility have not been subject to field survey for historic cultural heritage (non-indigenous) and/or the results have not been provided to DERM as required by the Terms of Reference for the EIS.

Condition 26.1. - Historic cultural heritage

It is recommended that the CG impose the following condition:

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for the EA for the gas fields, must provide to the administering authority the findings of a pre-construction field survey for historic cultural heritage (non-indigenous) within the pipeline, gas fields and LNG facility disturbance areas, and this should include the assessment of significance and proposed mitigation strategies.

27.0. NOTIFICATION REGARDING MILLABLE TIMBER

Timber of commercial specifications supports a dependent industry to which the Government has provided a resource commitment. It remains important for the timber to be utilised consistent with that commitment. APLNG must provide sufficient lead time allowing DERM to arrange timber salvage operations. Alternative solutions for responsible resource utilisation should be implemented in consultation with DERM.

Condition 27.1. - Millable Timber
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It is recommended that the CG impose the following condition:

1. Sufficient lead time should be provided for DERM to arrange timber salvage operations or the proponent will need to provide alternative solutions for responsible resource utilisation.

28.0. STOCK ROUTES

The ToR required that Stock Routes be identified and mitigation measures be developed. Conditions are recommended to ensure the Stock Routes are not adversely affected.

Condition 28.1. - Stock Routes

It is recommended that the CG impose the following conditions:

1. The relevant DERM Senior Lands Officer (Stock Routes) and local government stock route officer must be consulted at the construction planning stage.
2. Where there are to be permanent disruptions to the stock route network, the corridors shall be realigned or replaced with a similar width and suitable country type to allow for the unimpeded movement of travelling stock.
3. Where there are to be temporary disruptions to travelling stock (i.e. from the installation of buried infrastructure), suitable arrangements must be negotiated with the relevant local government prior to the commencement of works.
4. Options for permanent or temporary diversions of stock may be considered provided that the routes are safe for travelling stock and drovers, and the travelling public.
5. Adequate watering facilities and other travelling stock infrastructure shall be provided where existing facilities become redundant due to the approved activities.
6. The parts of the stock route network disturbed or affected by the works must be rehabilitated upon completion of the project to a state that is safe for travelling stock and drovers, and the travelling public, and is consistent with the area's pre-disturbance state unless otherwise agreed by DERM and the local government.

29.0. RAMP UP GAS STORAGE & GAS INJECTION

The management of ramp-up gas may have implications for impacts on environmental values. In-seam storage through injection of gas is a possible storage for ramp-up gas and therefore the potential impacts of such an option should be assessed. A condition has been included below to require EM Plans to include an assessment of any storage of gas proposed in the gas field.

Condition 29.1. - Ramp-up gas

It is recommended that the CG impose the following condition:

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for the EA for the gas fields, must provide to the administering authority an assessment of the environmental values, potential impacts, mitigation measures for any ramp up gas storage.

30.0. ENVIRONMENTAL MANAGEMENT OF PIPELINES.

DERM has had extensive recent experience with developing environmental management conditions to attach to EAs for gas pipelines. Typical conditions to be imposed for the environmental authority for a gas transmission pipeline can be found at Attachment 3.

Condition 30.1. - EM Plan for gas transmission pipeline
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It is recommended that the CG impose the following conditions:

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for the Gas Transmission Pipeline must include but not be limited to:
 - a. Aquatic values impacted by the Gas Transmission Pipeline, and in this regard:
 - i. A detailed assessment of aquatic values (including animal breeding places) along the pipeline route should be provided. Site specific data should be included that accurately and comprehensively describes the environmental values and ecological condition at each aquatic site. The information should be used to determine the location of each watercourse or wetland crossing and site specific mitigation measures to protect the values identified.
2. The information must also demonstrate that mitigation measures for permanent creek crossings are consistent with AS2885 – *Pipelines – Gas, Liquid and Petroleum* and the *Australian Pipeline Industry Association Code of Environmental Practice*. Those documents provide the approach to be taken when determining the optimal route selection as well as engineering standards that must be applied to the construction of the pipeline, including:
 - a. minimisation of adverse impacts on fauna and significant habitat areas
 - b. minimisation of impacts on riparian, aquatic and water dependent flora and fauna
 - c. minimise erosion and sediment impacts
 - d. maintain water quality and water flow requirements
 - e. maximise rehabilitation success of achieving long term site stability.
3. The design of all creek crossings and waterway barrier works should take account of the matters discussed in *Waterway barrier works development approvals* (Fish Habitat Management Operational Policy FHMOP 008, DPI&F, July 2009).
4. Protection of flora and fauna during construction and operation, including reduction or disruption to habitat. Particular mention should be made of any potential disruption to Koala or endangered species habitats.
5. Scheduling of construction to protect the breeding and nesting seasons of the endangered Fitzroy and White Throated Snapping Turtles where applicable must occur.
6. Rehabilitation of disturbed riparian areas including use of locally sourced species and intensive planting.

Condition 30.2. - Hydrostatic test water

It is recommended that the CG impose the following condition:

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for the Gas Transmission Pipeline must include an assessment of the impacts of hydrostatic test water activities to be carried out. The hydrostatic test water assessment must address, but not be limited to source water quality data and characteristics of additives, (particularly biocides) along with the proposed storage, treatment and disposal methods.

Condition 30.3. - Access tracks in ESA's

It is recommended that the CG impose the following condition:

1. The EMP must recognise that access tracks are not permitted within Category B or C Environmentally Sensitive Areas unless they are co-located with gas collection or CSG associated water pipelines, unless otherwise authorised by the administering authority.

31.0. WIDTH OF GAS TRUNKLINE EASEMENTS

It is noted that multiple gas trunklines may be located in the same easement. APLNG has stated that pipeline right-of-way widths can sometimes be reduced, but they typically require up to 18m for major trunk lines to enable safe construction. APLNG has also considered 'trenchless' installation of smaller diameter pipelines by ploughing in black soil plains, but noted there are practical difficulties of using this method more generally because of the terrain or soil types. Further investigations should be undertaken with a view to allowing staged development of adjacent areas to provide for a narrower corridor width by minimising the number of trunklines within the corridor

Condition 31.1. - Gas trunkline easements
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It is recommended that the CG impose the following condition:

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for the EA for the Gas Transmission Pipeline, must provide to the administering authority an assessment of the construction of co-located trunklines to minimise width and total disturbance required for the right of way.

32.0. LNG PIPELINE CROSSING OF THE NARROWS

As the pipeline crossing of The Narrows is proposed to be progressed by Queensland Gas Corporation (QGC), no detailed assessment has been made of the Australia Pacific LNG (APLNG) Environmental Impact Statement (EIS), or the supplementary information to the EIS, relating to these works. No conditions of approval are recommended for inclusion in the CG Report.

33.0. LANDING FACILITIES AND LNG EXPORT FACILITIES – CURTIS ISLAND

APLNG advises that it has optimised the design of the LNG facility and associated infrastructure to reduce environmental and other impacts, including the:

- Ground flare design
- Laydown and stockpile areas
- Location of temporary accommodation facility (TAF)
- Number and location of LNG and LPG storage tanks
- Inclusion of acid gas incinerator on acid gas removal units
- Stormwater and drainage
- Marine facilities, including materials off-loading facility (MOF), temporary rock dock, roll-on roll-off dock and construction ferry dock
- Mainland facilities, including materials transfer and passenger ferry terminal, aggregate handling facility and supporting car parking and offices.

APLNG has advised that at Curtis Island it will need to discharge brine from the desalination plant, effluent from the sewage treatment plant (STP), treated stormwater and process water from plant areas. APLNG has further advised that when water supplies are sourced by pipeline from the mainland, such water supplied would be raw water and would require treatment to meet all requirements. DERM has advised that the Magnetic Island Sewage Treatment Plant discharge conditions are its current benchmark requirements for marine discharge. APLNG has committed to implementing tertiary treatment of sewage, with reduced nitrogen and phosphorous levels.

DERM has indicated its concern about other potential pollutants in the discharge stream, including hydrocarbons. It requires detailed information on all chemical inputs and outputs to effluent streams to fully understand the process management system and to ensure that EA conditions can be set to minimise the risk of environmental harm. The DERM policy position is that there is no toxicity to biota in the mixing zone of marine discharges. (This policy has been adopted since the Gladstone Pacific Nickel project approval and has been applied to the GLNG and QCLNG project conditions).

Condition 33.1. - Fluid Wastes

It is recommended that the CG impose the following condition:

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for the EA for the LNG Facility, must provide to the administering authority:
 - a. detailed information on all chemical inputs to effluent streams proposed to be discharged at Curtis island; and
 - b. details on how these may change over time.

Condition 33.2. - Construction Environmental Management Plan (CEMP)

It is recommended that the CG impose the following conditions:

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for the EA for the LNG Facility, must provide to the administering authority a Construction Environmental Management Plan that provides detailed information about the construction activities to be carried out under the environmental authority for the LNG facility.
2. The CEMP must address, but not be limited to:
 - a. design plans showing the extent of the works proposed;
 - b. a construction schedule and methodology, including plans and maps showing discharge points and emission controls for initial construction stages with periodic updates to provide plans and maps showing discharge points and emission controls for subsequent stages;
 - c. environmental monitoring and a sampling program which details baseline data collection and provides the basis for ongoing monitoring of specified parameters for the period the works, including appropriate triggers for mitigation and cessation of works;
 - d. any potential impacts or effects of the proposed works upon the environment and the means by which adverse impacts will be avoided or mitigated;
 - e. details on the sewage treatment plant and desalination plant, including:
 - i. design and operational performance information for sewage treatment and desalination;
 - ii. design and operational performance information for any outfalls and diffusers for emissions to Port Curtis including detailed analysis of existing water quality, effluent contaminants, acute and chronic toxic effects of contaminants on fauna and flora and any long term ecological effects;
 - iii. a detailed assessment of impacts from the discharge of treated sewage and brine should be provided. Source water quality data and characteristics of additives should be provided and disposal methods to be used. The information should be used to determine the site specific mitigation measures including monitoring and reporting;
 - iv. eco-toxicity of effluent at point of release, mixing zone and cumulative impacts of contaminants in the marine ecosystem over time; and
 - v. adequacy of modelling to predict dimensions and duration of mixing zone.
 - f. details on other plant, equipment or activities that involve emissions to the environment, including:

- i. a description of the plant, equipment or activities; and
 - ii. design and operational performance information for plant, equipment or activities.
- g. engineering design drawings for operational works in the intertidal area for the materials off-load facility, jetties and wharves prior to commencement of construction;
- h. detailed list of all waste streams including their handling, treatment and disposal arrangements;
- i. the environmental protection commitments proposed for the activities (including all associated accommodation and recreation activities on the Island) to protect the environmental values under best practice environmental management;
- j. a rehabilitation program for land proposed to be disturbed during construction of all petroleum infrastructure (including associated accommodation and recreation activities) on Curtis Island;
- k. specific reference to the disposal of dredge spoil within the area, including provisions for the management and treatment of acid sulfate or potentially acid sulfate soils and the protection of terrestrial habitats from saline leachate and/or drainage; and
- l. details of a response plan, with appropriate triggers, which will be initiated in response to any significant impacts on the environment from the works.

33.1 Acid Sulfate Soils

APLNG has identified potential for significant acid sulfate soils (ASS) to be disturbed by works associated with the pipeline crossing of the Kangaroo Island wetlands and the Narrows, as well as the LNG facility site on Curtis Island. Some of the actual and potential ASS sulphide levels are extremely high (up to 6.18% sulphides), possibly the highest recorded in Queensland, with the highest readings within potential ASS areas on Curtis Island. APLNG will need to carefully manage all ASS disturbed to minimise environmental harm, particularly in the sensitive wetlands. An indicative site to treat ASS has been identified. Construction activities on the Curtis Island site cannot commence until a Construction EM Plan, including an ASS management plan, has been submitted and approved by DERM.

The construction of the landing facilities and LNG export facilities on Curtis Island, including the dredging of access channels, will be subject to assessment by DERM through subsequent applications for approval under the *Sustainable Planning Act 2009*. However, the following conditions should be included in the CG's Report to give certainty to the requirements of DERM and to ensure that commitments made in the EIS are reflected in construction.

Condition 33.2. - Acid Sulfate Soils

It is recommended that the CG impose the following conditions:

1. The EM Plan developed in accordance with section 310D of the *Environmental Protection Act 1994* to support the application for the EA for the LNG Facility, must provide to the administering authority, an assessment of acid sulphate soils within the location of landing facilities and the LNG export facilities on Curtis Island, in accordance with the *Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland* (QASSIT).
2. The proponent must provide an acid sulfate soils investigation report and site-specific acid sulfate soils management plans for the proposal detailing management strategies in accordance with the *Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines 2002*. This is needed as part of an application for a development permit for tidal works and before any site works are commenced.

34.0. DREDGING

The location, design, and construction methodology for the construction dock (3 docks) and the materials offload facility will influence the level of impact. However, the main concerns will be the type of dredge used and the disposal of the spoil. At this stage, the APLNG modelling of impacts (Supplementary Report - LNG Coastal Environment) is based on using a cutter suction dredge with pumping direct to the reclamation area north of Fisherman's Landing. Any change to this will require a reassessment of potential impacts.

APLNG advises it has updated the EIS dredge plume modelling to account for the additional marine construction facilities. The modelling includes the assessment of cumulative impacts from the Western Basin Dredging project dredging, assuming a worst case scenario involving coincident dredging activities. Results from modelling of construction docks indicate the sediment plumes (up to a maximum of 0.5kg/m³ total suspended solids) have a very short duration and are focused on the eastern side of The Narrows.

In general, reducing the dredging of inshore high sulfur content material is desirable (and placing fill over PASS is preferred). Moving the berths seawards may assist in achieving this; however, there are navigational requirements that must be met as well.

Condition 34.1. - Dredging in tidal waters for the landing facilities and LNG export facilities at Curtis Island

It is recommended that the CG impose the following conditions:

1. As part of the application for a development permit, the proponent must provide to DERM a Dredge Environmental Management Plan (DEMP) for approval. All dredging associated with construction of the landing facilities and LNG export facilities on Curtis Island must be in accordance with this DEMP.

2. The DEMP must include a monitoring program developed in consultation with and approved by DERM to:
 - a. assess the impacts from the dredging on ecological health and water quality; and
 - b. provide information to support adaptive management of the dredging operation in order to minimise impacts on marine ecosystems.
3. Information obtained from the monitoring program must be made available to DERM within 28 days of survey or data acquisition.
4. The DEMP must include an assessment of acid sulfate soils in accordance with the *Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland* (QASSIT)
5. Any dredging associated with construction of the landing facilities and LNG export facilities on Curtis Island must be conducted using a cutter suction dredge that has:
 - a. an electronic positioning system for defining the location and depth of dredging activities;
 - b. a continuous connection (e.g. floating or submerged pipeline) to an approved placement site; and
 - c. a system or process to ensure the delivery system integrity is maintained at all times.

unless it can be demonstrated to DERM that alternative dredging equipment or methodology is technically necessary and will achieve the same or better outcomes for water quality and protection of marine ecosystems as stated in the EIS.
6. The dredging shall not involve blasting unless specifically authorised by DERM through an approved Dredge Environmental Management Plan.

35.0. INSUFFICIENT INFORMATION TO CONDITION PERMITS OUTSIDE OF PETROLEUM TENURE

There is insufficient information to assess the activities that are proposed to occur outside of the petroleum tenure. Therefore, appropriate conditions cannot be recommended. Such activities include: environmentally relevant activities assessed under the *Environmental Protection Act 1994*; works assessed under the *Vegetation Management Act 1999*; and works assessed under the *Coastal Protection and Management Act 1995* for activities based on the mainland and possible on Curtis Island outside the petroleum tenure.

DERM **requests** that the Coordinator-General's report state that it does not apply to these activities to ensure that the processing of the applications for development approval can include the Information and Referral Stage of the IDAS and the Notification Stage if it would be applicable.

APLNG GAS TRANSMISSION LINE**APPENDIX 1****SCHEDULE A – GENERAL CONDITIONS****Prevent and/or Minimise Likelihood of Environmental Harm**

- (A1) This authority does not authorise environmental harm unless a condition contained within this authority explicitly authorises that harm. Where there is no condition or the authority is silent on a matter, the lack of a condition or silence shall not be construed as authorising harm.
- (A2) In carrying out petroleum activities the holder of this authority must prevent or minimise the likelihood of environmental harm being caused.

Maintenance of Measures, Plant and Equipment

- (A3) The holder of this authority must:
- a) install all measures, plant and equipment necessary to ensure compliance with the conditions of this authority; and
 - b) maintain such measures, plant and equipment in a proper and efficient condition; and
 - c) operate such measures, plant and equipment in a proper and efficient manner.
- (A4) All instruments, equipment and measuring devices used for measuring or monitoring in accordance with any condition of this authority must be calibrated, appropriately operated and maintained.
- (A5) No change, replacement or alteration of any plant or equipment is permitted if the change, replacement or alteration increases the environmental harm caused by the petroleum activities.
- (A6) The holder of this authority must ensure that daily operation and maintenance of all plant and equipment relating to the authorised petroleum activities are carried out by suitability qualified, competent and experienced person(s).
- (A7) All analyses and tests required to be conducted under this authority must be carried out by a laboratory that has NATA certification for such analyses and tests, except as otherwise authorised by the administering authority.

Compliance with Australian Pipeline Industry Association Code of Environmental Practice

- (A8) The holder of this authority must undertake petroleum activities in relation to the operation of petroleum pipelines in accordance with the Australian Pipeline Industry Association *Code of Environmental Practice – Onshore Pipelines, October 2009* (the Code) or subsequent versions thereof. To the extent of any inconsistency between the conditions of this environmental authority and the Code, the conditions of this authority prevail.

Financial Assurance

- (A9) The holder of this authority must provide a financial assurance in the amount and form required by the administering authority for the construction, operation and decommissioning of the relevant petroleum pipeline. The calculation of financial assurance must be calculated in accordance with the DERM guideline *Financial assurance for petroleum activities*.

- (A10) The financial assurance is to remain in force until the administering authority is satisfied that no claim is likely to be made on the assurance.

Definitions

- (A11) Words and phrases used in this authority are defined in Schedule L – Definitions. Where a definition for a term used in this authority is sought and the term is not defined within this authority, the definitions in the *Environmental Protection Act 1994*, its Regulation and Environmental Protection Policies must be used.

Environmental Management Plan

- (A12) An Environmental Management Plan (EM plan) must be implemented that provides for the effective management of the actual and potential impacts resulting from the carrying out of the petroleum activities and which demonstrates compliance with the conditions of this environmental authority. Documentation relating to the EM plan must be kept.
- (A13) The EM plan required by condition (A13) must address, at least, the following:
- a) describe each of the following:
 - i. each relevant resource authority for the environmental authority;
 - ii. all relevant petroleum activities;
 - iii. the land on which the activities are to be carried out;
 - iv. the environmental values likely to be affected by the activities; and
 - v. the potential adverse and beneficial impacts of the activities on the environmental values.
 - b) state the environmental protection commitments the applicant proposes for the activities to protect or enhance the environmental values under best practice environmental management;
 - c) include a rehabilitation program for land and waters proposed to be disturbed under each relevant resource authority for the application;
 - d) state a proposed amount of financial assurance for the environmental authority as part of the rehabilitation program;
 - e) training of staff in the awareness of environmental issues related to carrying out the petroleum activities, which must include at least:
 - i. the environmental policy of the authority holder, so that all persons that carry out the petroleum activities are aware of all relevant commitments to environmental management;
 - ii. any relevant environmental objectives and targets, so that all staff are aware of the relevant performance objectives and can work towards these;
 - iii. control procedures to be implemented for routine operations for day to day activities to minimise the likelihood of environmental harm, however occasioned or caused;
 - iv. contingency plans and emergency procedures to be implemented for non-routine situations to deal with foreseeable risks and hazards, including corrective responses to prevent and mitigate environmental harm (including any necessary site rehabilitation);
 - v. organisational structure and responsibility to ensure that roles, responsibilities and authorities are appropriately defined to ensure effective management of environmental issues;
 - vi. effective communication procedures to ensure two-way communication on environmental matters between operational staff and higher management;
 - vii. obligations with respect to monitoring, notification and record keeping obligations under the EM plan and relevant approvals; and

- viii. monitoring of the release of contaminants into the environment including procedures, methods and record keeping.
- f) the conduct of periodic reviews of environmental performance and procedures adopted, not less frequently than annually; and
- g) a program for continuous improvement.

Third Party Auditing

- (A14) Compliance with the conditions of this authority must be audited by an appropriately qualified third party auditor, nominated by the holder of this authority and accepted by the administering authority:
 - a) every year during the construction of the pipeline; and
 - b) following commissioning of the pipeline.
- (A15) Within three (15) business days of receiving the final third party audit report, the holder of this authority must submit a copy to the administering authority.
- (A16) The third party auditor must certify the findings of the audit in the report.
- (A17) The financial cost of the third party audit is borne by the holder of this authority.
- (A18) The holder of this authority must, within a reasonable period of time agreed in writing with the administering authority, act upon any recommendations arising from the audit report and:
 - a) investigate any non-compliance issues identified; and
 - b) as soon as practicable, implement measures or take necessary action to ensure compliance with this authority.
- (A19) Subject to condition (A19), and not more than three (3) months following the submission of the audit report, the holder of this authority must provide written advice to the administering authority addressing the:
 - a) actions taken by the holder to ensure compliance with this authority; and
 - b) actions taken to prevent a recurrence of any non-compliance issues identified.

Cultural Heritage

- (A20) In the carrying out of the petroleum activities, the holder of this environmental authority must not adversely impact the cultural heritage values of any place registered on the Queensland Heritage Register.

SCHEDULE B – ENVIRONMENTAL NUISANCE**Odour, dust and airborne contaminants**

- (B1) The release of odour, dust or any other airborne contaminant(s), or light from the petroleum activities must not cause an environmental nuisance at any sensitive place or commercial place.
- (B2) Prior to the commencement of any petroleum activities that may generate dust at a sensitive place or commercial place, the holder of this authority must notify and consult with any potentially affected person.

Noise

- (B3) Prior to undertaking petroleum activities, including temporary workers accommodation, that are likely to impact upon a sensitive place or a commercial place, the holder of this authority must investigate potential noise emissions from the proposed petroleum activities and determine if noise emissions are likely to exceed the limits set in Condition (B4).
- (B4) If noise emissions are likely to exceed the limits specified in Schedule B, Table 1, then the holder must take appropriate measures to either relocate the petroleum activities or incorporate noise abatement and / attenuation measures to mitigate those impacts. These measures must be in place prior to undertaking the proposed petroleum activities.
- (B5) In the event of a complaint about noise from a petroleum activity made to the administering authority (and the administering authority considers the complaint is not frivolous nor vexatious nor based on mistaken belief) the emission of noise from the petroleum activity must not exceed the levels specified in Schedule B, Table 1 – Noise limits when measured at the sensitive place.
- (B6) The method of measurement and reporting of noise levels must comply with the latest edition of the Environmental Protection Agency's *Noise Measurement Manual*, the most recent version of AS 1055 *Acoustics – Description and measurement of environmental noise*, the EPA guideline *Assessment of low frequency noise* and the EcoAccess guideline *Planning for noise control*.

Schedule B, Table 1 – Noise Limits

Sensitive place						
Noise level dB(A) measured as:	Monday to Saturday			Sundays and public holidays		
	7am to 6pm	6pm to 10pm	10pm to 7am	9am to 6pm	6pm to 10pm	10pm to 9am
L _{A90} , adj, 15 mins	<i>Noise limits are to be finalised following compliance with the Coordinator-General's report and assessment of the EM Plan required under section 310D of the Environmental Protection Act 1994.</i>					
L _{A10} , adj, 15 mins						
L _{A1} , adj, 15 mins						
Commercial place						
Noise level dB(A) measured as:	Monday to Saturday			Sundays and public holidays		
	7am to 6pm	6pm to 10pm	10pm to 7am	9am to 6pm	6pm to 10pm	10pm to 9am
L _{A90} , adj, 15 mins	<i>Noise limits are to be finalised following compliance with the Coordinator-General's report and assessment of the EM Plan required under section 310D of the Environmental Protection Act 1994.</i>					
L _{A10} , adj, 15 mins						
L _{A1} , adj, 15 mins						

Alternative Arrangements Available When Noise Emissions May Cause Nuisance for Limited Periods

- (B7) Where the holder of this authority has, at their cost, made alternative arrangements to the satisfaction of and with the written agreement of each person affected by nuisance noise emissions for a limited period, at a sensitive or commercial place, then the requirements specified in Table B1, Noise Limits will not apply at that sensitive or commercial place for the period of the alternative arrangements.
- (B8) As a minimum each written agreement of an alternative arrangement must state:
 - a) the location of the sensitive or commercial place;
 - b) the names of the affected persons;
 - c) the nature of the alternative arrangement(s) (e.g. provision of alternative accommodation); and
 - d) the period of the alternative arrangement(s).
 - e) details of the activities causing the noise, including the maximum noise levels expected at the noise sensitive receptor for the period defined in (d).

Blasting Activities

- (B9) Prior to undertaking any blasting activities, the holder of this authority must notify any identified noise sensitive receptor of the proposed blasting activity. The notification must include:
 - a) proposed location of blasting;
 - b) proposed time of blasting; and
 - c) noise levels expected at the sensitive receptor.
- (B10) All blasting must be carried out in a proper manner by a competent person in accordance with best practice environmental management and Australian Standard 2187 to minimise the likelihood of any adverse effects being caused by airblast overpressure and/or ground borne vibrations at any sensitive receptor.
- (B11) Noise from blasting operations must not exceed an airblast overpressure level, when measured at or extrapolated to any noise sensitive or commercial place, of 120 dB (linear peak) at any time.
- (B12) Ground-borne vibration peak particle velocity caused by blasting operations, when measured at or extrapolated to any noise sensitive or commercial place, must not exceed 5 mm per second at any time.

Blast and Vibration Monitoring

- (B12) Should complaints about blasting and/or vibration be received or when requested by the Administering Authority, monitoring and recording of air blast overpressure and ground borne vibration (as relevant to the complaint) must be undertaken to investigate any complaint of nuisance, and the results notified within 14 days to the administering authority. Monitoring must include:
 1. maximum instantaneous charge;
 2. location of the blast within the site (including any bench level);
 3. airblast overpressure level (dB Linear Peak);
 4. peak particle velocity (mms-1);
 5. location, date and time of recording;

6. measurement instrumentation and procedure;
7. meteorological conditions for blast monitoring (including temperature, relative humidity, temperature gradient, cloud cover, wind speed and direction); and
8. distance/s from blast site to potentially noise-affected building/s or structure/s.

1.1

RTI DL RELEASE - EHP

1.2 SCHEDULE C – WATER MANAGEMENT

Release to Surface Waters

- (C1) The holder of this authority must not release contaminants to surface waters.

Release to Land

- (C2) The holder of this authority may allow pipeline trench water to be released to land for disposal provided that the water does not have any properties nor contain any organisms or other contaminants in concentrations that are capable of causing environmental harm.
- (C3) Subject to Condition (C2), the holder of this authority must ensure that the release of trench water to land must be carried out in a manner that ensures that:
- vegetation is not damaged;
 - soil erosion and soil structure damage is avoided;
 - the quality of groundwater is not adversely affected; and
 - there are no releases of trench water to any surface waters.
- (C4) The holder of this authority is not authorised to use untreated CSG water for dust suppression whilst undertaking petroleum activities authorised under this authority.

Coal Seam Gas Water Use for Dust Suppression

- (C5) CSG water produced from the authorised petroleum activities may be used for dust suppression within tenures covered by this environmental authority, provided the water quality meets the limits specified in Schedule C, Table 1 – Road dust suppression water contaminant release limits for each of the water quality characteristics.

Schedule C, Table 1 – Road dust suppression water contaminant release limits

Water Quality Characteristics	Unit	Limit	Limit Type
pH	pH units	6.0 to 9.0	range
Total Suspended Solids	mg/L	30	maximum
Total Dissolved Salts	mg/L	2000	maximum
Total Petroleum Hydrocarbons	mg/L	10	maximum
Sodium Adsorption Ratio (SAR)	ratio	15	maximum
Bicarbonate Ion Concentration	mg/L	100	maximum

- (C6) Dust suppression can only be carried out in a particular location for a period not exceeding three months, whereupon more permanent solutions for dust suppression shall be developed, if required.
- (C7) Use of CSG water for dust suppression activities must be carried out in a manner that:
- vegetation is not damaged
 - soil erosion and soil structure damage is avoided

- c) there is no surface damming of the CSG water
- d) minimises deep drainage below the root zone of any vegetation
- e) quality of shallow aquifers is not adversely affected
- f) there are no releases of CSG waters to any surface waters.

Management of Hydrostatic Test Water

- (C8) The holder of this authority must develop a hydrostatic water management plan prior to the commencement of any hydrostatic water testing of the pipeline. The management plan must include but not be limited to the following:
- a) details of the impacts of hydrostatic test water activities along the pipeline route;
 - b) source water quality data and characteristics of additives (particularly biocides);
 - c) the proposed storage, treatment and disposal methods; and
 - d) site specific mitigation measures including monitoring and reporting.
- (C9) The hydrostatic water management plan must be submitted to DERM for review prior to the commencement of any hydrostatic testing of the pipeline.
- (C10) The holder of this authority must have due regard to any comments provided by the administering authority in finalising and implementing the hydrostatic test water management measures.
- (C11) The holder of this authority must ensure that:
- a) hydrostatic test water is not released to waters;
 - b) hydrostatic test water containing chemical additives is not released to land without written consent from the administering authority; and
 - c) hydrostatic test water released to land does not exceed the water quality limits specified in Schedule C, Table 1 – Limits for the disposal of hydrostatic test water to land.

Note: Where contaminants contained in the hydrostatic test water are to be stored in a dam, an assessment against the latest version of the DERM Manual for assessing the hazard category and hydraulic performance of dams is required to determine the hazard level of the dam.

Schedule C, Table 1 – Limits for the disposal of hydrostatic test water to land

Parameter	Maximum Value
pH	6.5 - 8.5 (Range)
Arsenic (mg/L)	2.0
Cadmium (mg/L)	0.05
Chromium (mg/L)	1
Copper (mg/L)	5
Iron (mg/L)	10
Lead (mg/L)	5
Manganese	10
Zinc (mg/L)	5
Nitrogen (mg/L)	35
Phosphorus (mg/L)	10
Electrical Conductivity (µS/cm)	2000

(C12) Any release of hydrostatic test water authorised by Condition (C11) must be located at least 100 metres from the nearest watercourse and carried out in a manner that ensures that:

- a) vegetation is not damaged;
- b) soil erosion and soil structure damage is avoided; and
- c) hydrotest water does not migrate outside the nominated land discharge areas.

(C13) The holder of this authority must undertake hydrotesting of pipe sections crossing water bodies prior to installation of these pipe sections.

Determining Water Quality Contaminants

(C14) All determinations of the quality of contaminants released must be made in accordance with methods prescribed in the latest edition of the *DERM Monitoring and Sampling Manual, 2009*, and carried out on samples that are representative of the discharge.

Contaminant Releases to Groundwater

(C15) The holder of this authority must not release contaminants to groundwater.

RTI DL RELEASE - EHP

SCHEDULE D – WASTE MANAGEMENT

- (D1) The holder of this authority must develop and implement a waste management plan consistent with the *Environmental Protection (Waste) Policy 2000*.
- (D2) The waste management plan must address at least the following matters:
- a) the types and amounts of waste generated;
 - b) how the waste will be dealt with, including a description of the types and amounts of waste that will be dealt with under each of the waste management practices mentioned in the waste management hierarchy (section 10 of the *Environmental Protection (Waste Management) Policy 2000*);
 - c) procedures for dealing with accidents, spills and other incidents that may impact on waste management;
 - d) how often the performance of the waste management practices will be assessed (i.e. at least annually); and
 - e) the indicators or other criteria on which the performance of the waste management practices will be assessed.
- (D3) The holder of this authority must ensure that petroleum activities do not result in the release or likely release of contaminants to the environment from the storage, conditioning, treatment and disposal of regulated waste materials.
- (D4) The holder of this authority must ensure that petroleum activities do not result in the release or likely release of a hazardous contaminant to the environment.
- (D5) Any spillage of hazardous waste or other contaminants that may cause environmental harm, must be effectively contained and cleaned up as quickly as practicable. Such spillages must not be cleaned up by hosing, or otherwise thereby releasing such waste or contaminants to any land or waters.
- (D6) The holder of this authority must as soon as practicable remove and dispose of all regulated waste to a licensed waste disposal facility or recycling facility.
- (D7) All regulated waste removed from the site must be removed by a person who holds a current authority to transport such waste under the provisions of the *Environmental Protection Act 1994* and sent to a facility licensed to accept such waste.
- (D8) When regulated waste is removed from within the boundary of the petroleum tenure and transported by the holder of this authority, a record must be kept of the following:
- a) date of waste transport;
 - b) quantity of waste removed and transported;
 - c) type of waste removed and transported;
 - d) route selected for transport of waste;
 - e) quantity of waste delivered; and
 - f) any incidents (e.g. spillage) that may have occurred on route.
- (D9) If a person removes regulated waste associated with activities within the operational land and disposes of such waste in a manner which is not authorised or is improper or unlawful then, as soon as practicable, notify the administering authority of all relevant facts, matters and circumstances known concerning the disposal.

Sewage Treatment and Disposal Works

- (D10) Any sewage treatment and disposal activities undertaken within the pipeline license area must be designed with a peak design capacity of 21 to 450 EP and must not exceed this peak design capacity.

- (D11) The sewage treatment activities must be designed to produce a Class C effluent standard using a disinfection process.

Release of Treated Sewage Effluent Contaminants to Land

- (D12) Sewage pump stations must be fitted with a stand-by pump and a visible or audible high-level alarm.
- (D13) Any release to land authorised under this authority requires a buffer distance of at least 100 metres to any residential area, watercourse, wetland or protected area.
- (D14) Treated effluent may only be released to land at the designated, fenced and delineated contaminant release area/s.
- (D15) The contaminant release area/s must be maintained in a proper and efficient condition so as to provide adequate assimilation, percolation, evaporation and transpiration of the released contaminants.
- (D16) Treated effluent must not be applied by spray irrigation and must be applied in a manner that does not cause damming or runoff of effluent beyond the contaminant release area/s.
- (D17) When weather conditions or soil conditions preclude the release of contaminants, the contaminants must be directed to on-site storage or lawfully disposed of off-site.
- (D18) All sewage sludge and sanitary bio-solids resulting from treatment is to be disposed at a licenced sewerage disposal facility.

Quality of Contaminants Released from the Sewage Treatment Works

- (D19) Treated effluent must comply, at the sampling and in-situ measurement point(s), with each of the release limits specified in Schedule D, Table 1 – Treated sewage effluent standards for each quality characteristic.
- (D20) The release of treated effluent to land must be monitored at the frequency and at the sampling and in-situ measurement point specified in Schedule D, Table 1 – Treated sewage effluent standards and records of the monitoring results kept for at least five years and made available to the administering authority on request.

Schedule D, Table 1 – Treated sewage effluent standards

Quality characteristic	Sampling Unit	Sampling and in-situ measurement point location	1.2.1 Limit type	1.2.2 Release limit	Frequency
5-day Biochemical Oxygen Demand (inhibited)	mg/L	<i>To be finalised following assessment of the EM Plan required</i>	Median	20	Monthly
Suspended Solids	mg/L		Median	5	

Quality characteristic	Sampling Unit	Sampling and in-situ measurement point location	1.2.1 Limit type	1.2.2 Release limit	Frequency
Turbidity	NTU	under section 310D of the Environmental Protection Act 1994.	Median (95 th %ile)	2	
			Maximum (95 th %ile)	5	
Total N	mg/L		50 th %ile	30	
			Maximum	45	
Total P	mg/L		Maximum	15	
TDS	mg/L		Median	<1000	
EC	µS/cm		Median	<1600	
pH	pH unit		Range	6-8.5	
<i>E. coli</i>	cfu/100 ml		Maximum	<10	

1.3 SCHEDULE E – LAND AND WATERWAY MANAGEMENT

Minimising Disturbance to Land and Soil Management

(E1) The holder of this authority must:

- a) limit the pipeline right of way width to a maximum of 40 metres except as otherwise authorised by the administering authority in writing;
- b) minimise disturbance to land in order to prevent land degradation;
- c) ensure that for land that is to be significantly disturbed by petroleum activities (except in areas of highly erosive soils), 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 in accordance with condition (E39).

(E2) The holder of this environmental authority must develop and implement soils management procedures for areas to be disturbed by petroleum activities prior to commencement of petroleum activities in these areas to prevent or minimise the impacts of soil disturbance. These procedures must include but not be limited to:

- a) the establishment of baseline soils information for areas to be disturbed including soil depth, pH, electrical conductivity (EC), chloride, cations (calcium, magnesium and sodium), exchangeable sodium percentage (ESP), particle size and soil fertility (including nitrogen, phosphorous, potassium, sulphur and micronutrients);
- b) the identification of baseline soil units at a scale of 1:100,000 for areas to be disturbed in accordance with the *Guidelines for Surveying Soil and Land Resources, 2nd Edition* (McKenzie et al. 2008), *Australian Soil and Land Survey Handbook, 3rd Edition* (National Committee on Soil and Terrain 2009) and *The Australian Soil Classification* (Isbell 2002);
- c) the development of soil descriptions that are relevant to assessment for agricultural suitability, topsoil assessment, erodibility and rehabilitation, for example:
 - i. shallow cracking clay soils;
 - ii. deep cracking clay soils;
 - iii. deep saline and/or sodic cracking clay soils with melonholes;
 - iv. thin surface, sodic duplex soils;
 - v. medium to thick surface (>15 cm), sodic duplex soils; and
 - vi. non-sodic duplex soils.
- d) assessment of the potential impacts of the petroleum activities with appropriate mitigation measures and construction methods applicable to the identified soil types or landforms;
- e) identification by ground truthing of all sensitive soil and landform areas along the pipeline corridor including Good Quality Agricultural Land and Strategic Cropping Land;
- f) measures to protect and restore any Good Quality Agricultural Land and land that could qualify as Strategic Cropping Land under the Government's *Protecting Queensland's strategic cropping land – A policy framework, August 2010*;
- g) a soils monitoring program outlining the parameters to be monitored, frequency of monitoring and maximum limits for each parameter;
- h) detailed mitigation measures and procedures to manage the risk of adverse soil disturbance in the carrying out of the petroleum activities; and
- i) for areas of good quality agricultural land, detailed methods to be undertaken to minimise potential impacts.

- (E3) The holder of this authority must provide details of the soils management procedures to DERM for review prior to the commencement of construction of the pipeline.
- (E4) The holder of this authority must have due regard to any comments provided by the administering authority when implementing the soils management measures.
- (E5) The holder of this authority must undertake an acid sulfate soils (ASS) investigation for the proposed linear disturbance (excavation, filling) on land areas that may potentially contain ASS (including all areas <5 m AHD) according to the *Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils (ASS) in Queensland 1998*.
- (E6) The holder of this authority must provide detailed management measures in accordance with the *Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines 2002* to the administering authority at least 20 business days prior to commencement of excavation or filling activities within areas identified as potential for containing ASS in the investigation outlined in Condition (E5).
- (E7) The holder of this authority must have due regard to any comments provided by the administering authority when implementing ASS management measures.

Good Quality Agricultural Land

- (E8) On land with GQAL class A or B, the holder of this authority must bury the pipeline to at least 1.2 m below the finished land surface, or greater if deep ripping occurs as a normal farming practice.
- (E9) On land with GQAL class C1, the holder of this authority must bury the pipeline to at least 0.9 m below the finished land surface, or greater if deep ripping occurs as a normal farming practice.
- (E10) Upon completion of construction of the pipeline, on any land identified as being good quality agricultural land (GQAL), the holder of the authority must:
 - a) remove temporary access tracks, unless otherwise agreed in writing with the affected landholder;
 - b) lightly rip disturbed areas, replace topsoil and return the surface to a land use condition that serves the preconstruction use; and
 - c) implement and maintain land management and erosion control measures.

Erosion and Sediment Control Plans

- (E11) An erosion and sediment control plan must be developed and implemented for all stages of the petroleum activities and which has been certified by a Certified Professional in Sediment and Erosion Control, or a professional with appropriate experience and or qualifications accepted by the administering authority.
- (E12) Appropriate measures to achieve compliance with Condition (E11) for the petroleum activities must be described in the EM plan and include:
 - a) diverting uncontaminated stormwater run-off around areas disturbed by pipeline activities or where contaminants or wastes are stored or handled that may contribute to stormwater;
 - b) collecting, treating, reusing or releasing contaminated stormwater runoff and incident rainfall in accordance with the conditions of this environmental authority;
 - c) roofing or minimising the size of areas where contaminants or wastes are stored or handled;
 - d) using alternate materials and or processes (such as dry absorbents) to clean up spills that will minimise the generation of contaminated waters;

- e) erosion and sediment control structures are placed to minimise erosion of disturbed areas and prevent the contamination of any waters;
 - f) an inspection and maintenance program for the erosion and sediment control features; and
 - g) provision for adequate access to maintain all erosion and sediment control measures especially during the wet season months from December to March; and
 - h) identification of remedial actions that would be required to ensure compliance with the conditions of this environmental authority.
- (E13) Erosion protection measures and sediment control measures must be implemented and maintained to minimise erosion and the release of sediment and contamination of stormwater from disturbed areas.
- (E14) The maintenance and cleaning of any vehicles, plant or equipment must not be carried out in areas from which contaminants can be released into any waters, roadside gutter or a stormwater drainage system.
- (E15) Any spillage of wastes, contaminants or other materials must be cleaned up as quickly as practicable. Such spillages must be cleaned up using dry methods that minimise the release of wastes, contaminants or materials to any waters, stormwater drainage system or roadside gutter.

Minimising Disturbance to Areas of Ecological Value

- (E16) Prior to conducting petroleum activities that involve significant disturbance to vegetation, an assessment must be undertaken of the condition, type and ecological value of any vegetation in such areas where the activity is proposed to take place.
- (E17) The assessment required by Condition (E16) must be undertaken by a suitably qualified person and include the carrying out of field validation surveys, observations and mapping of any category A, B or C Environmentally Sensitive Areas (ESA's) and the presence of species classed as endangered, vulnerable, rare or near threatened under the *Nature Conservation Act 1992*.
- (E18) The holder of this environmental authority, when carrying out petroleum activities must:
- a) avoid, minimise or mitigate (in order of preference) any impacts on areas of vegetation or other areas of ecological value;
 - b) minimise the risk of injury, harm, or entrapment to wildlife and stock;
 - c) minimise disturbance to land that may otherwise result in land degradation;
 - d) ensure that for land that is to be significantly disturbed by petroleum activities:
 - i. the top layer of the soil profile is removed;
 - ii. stockpiled in a manner that will preserve its biological and chemical properties; and
 - iii. used for rehabilitation purposes (in accordance with Condition H4).
 - e) prior to carrying out field based activities, make all relevant staff, contractors or agents carrying out those activities, aware of the location of any category A, B or C ESA's and the requirements of this environmental authority.
- (E19) Any vegetation clearing authorised under this authority must be stockpiled in a manner that facilitates respreading or salvaging and does not impede vehicle, stock or wildlife movements.
- (E20) Remnant vegetation must not be cleared for the purposes of camps, borrow pits, vehicle access tracks or additional work areas associated with the construction of the pipeline.

- (E21) The holder of this environmental authority must comply with any environmental offset agreement made in accordance with the conditions of this environmental authority.

Environmentally Sensitive Areas

- (E22) A maximum area of **<INSERT quantity>** hectares of vegetation may be cleared within the PPL **<INSERT PPL no.>** boundary for the pipeline right of way, receipt station, mainline valves and turnaround bays comprising:
- a) Endangered Regional Ecosystems **<INSERT RE Type and quantity>**
 - b) Of Concern Regional Ecosystems **<INSERT RE Type and quantity>**
 - c) Not Of Concern Regional Ecosystems **<INSERT RE Type and quantity>**
- (E23) The holder of this authority must ensure that:
- a) petroleum activities are not located in or within 200 metres of any listed category A ESA; and
 - b) all camps, borrow pits, vehicle access tracks or additional work areas associated with the construction of the pipeline right of way and turnaround bays are not located in or within 200 metres of any listed category B or C ESA.
- (E24) Activities may only be undertaken within State Forests or Timber Reserves provided the holder of the environmental authority has written approval from the authority responsible for the administration of the *Forestry Act 1959*, the Queensland Parks and Wildlife Service.

Minimising Disturbance to River and Creek Crossings

- (E25) All crossings must be in accordance with the construction methods described in the **<INSERT Document that details proposed water crossing construction methods for each water crossing>**.
- (E26) All investigation summaries, alignment sheets and specific crossing drawings for each creek and river crossing must be made available to the administering authority upon request.
- (E27) The construction of the pipeline must not be in or within 100 metres of any natural wetland, lake or spring.
- (E28) The design and construction of the pipeline, including all creek crossings and waterway barriers must:
- a) minimise impacts on riparian, aquatic and water dependent flora and fauna;
 - b) protect flora and fauna during construction and operation, including reduction or disruption to habitat, particularly any potential disruption of endangered species habitat; and
 - c) rehabilitate disturbed riparian areas including use of locally sourced species and intensive planting.
- (E29) Pipeline and road construction works may be undertaken in watercourses, where there is no practicable alternative such as the use of horizontal directional drilling methods, for a maximum period of ten (10) days, provided that the works are conducted in accordance with the following order of preference:
- a) conducting work in times of no flow;

- b) using all reasonable and practical measures to reduce impacts in times of flow; and
 - c) horizontal directional drilling may be used for the construction of the pipeline unless the construction occurs in times of no flow or an alternative construction methodology is agreed with the administering authority in writing.
- (E30) Activities or works resulting in significant disturbance to the bed or banks in accordance with Conditions (E30) and (E31) of a watercourse must:
- a) only be undertaken where necessary for the construction and/or maintenance of roads, tracks and pipelines that are essential for carrying out the authorised petroleum activities and no reasonable alternative location is feasible;
 - b) be no greater than the minimum area necessary for the purpose of the significant disturbance;
 - c) be designed and undertaken by a suitably qualified and experienced person taking into account the matters listed in Section 5 - Planning Activities and Section 6 - Impact Management During Activities of DERM's *Guideline – Activities in a watercourse, lake or spring associated with mining operations* dated April 2008, or more recent editions as such become available; and
 - d) upon cessation of the activities or works, commence rehabilitation immediately such that the final rehabilitation is to a condition that will ensure the ongoing physical integrity and the natural ecosystem values of the site.
- (E31) The holder of this environmental authority must not excavate or place fill in a way that interferes with the flow of water in a watercourse including works that divert the course of flow of the water or works that impound the water.
- (E32) Sediment control measures must be implemented to minimise any increase in water turbidity due to carrying out petroleum activities in the bed or banks of a watercourse.
- (E33) Routine, regular and frequent visual monitoring must be undertaken while carrying out construction work and/or any maintenance of completed works in a watercourse. If, due to the petroleum activities, water turbidity increases in the watercourse, outside contained areas, works must cease and the sediment control measures must be rectified to limit turbidity before activities recommence.
- (E34) Petroleum activities must not be carried out in River Improvement Trust Asset Areas without the approval of the relevant River Improvement Trust.
- Note: Locations and details of River Improvement Trust Asset Areas can be obtained from the relevant River Improvement Trust. A list of the relevant River Improvement Trusts will be provided by DERM.*

Rehabilitation Requirements

- (E35) Progressive rehabilitation of disturbed areas must commence as soon as practicable following the completion of any construction or operational works associated with the authorised petroleum activities on the relevant petroleum authority.
- (E36) The holder of this authority must ensure that the pipeline right of way is reinstated to a maximum width of 12 metres once construction of the pipeline is completed.
- (E37) For areas of native vegetation, revegetation must use seed sourced from local provenance native species, where available.
- (E38) Rehabilitation of the pipeline corridor should allow for the maximum re-establishment of native vegetation including the shrubby understorey and ground cover, providing habitat for small ground dwelling fauna species and restoration of landscape connectivity.

- (E39) As soon as practicable and within three months at the end of petroleum activities that cause any significant disturbance to land, the holder of this authority must investigate contaminated land status in accordance with *Environmental Protection Act 1994* requirements and the *National Environment Protection (Site Assessment) Measure 1999* where land has been subject to contamination caused by petroleum activities authorised under this authority.
- (E40) All land significantly disturbed by petroleum activities must be rehabilitated to:
- a) a stable landform with a self-sustaining vegetation cover with same species and density of cover to that of the surrounding undisturbed areas, except over the area that must be maintained free of large flora species for pipeline integrity and access, and in cases where approval is sought in accordance with Condition (E37);
 - b) ensure that all land is reinstated to the pre-disturbed land use and suitability class;
 - c) ensure that the maintenance requirements for rehabilitated land is no greater than that required for the land prior to its disturbance by petroleum activities.
- (E41) Notwithstanding Condition (E37), for any planned rehabilitation outcome that will not fulfil the rehabilitation requirements listed in Condition (E42), written agreement must be sought from the administering authority, prior to the rehabilitation being carried out.
- (E42) Maintenance of rehabilitated areas must take place to ensure and demonstrate:
- a) stability of landforms;
 - b) erosion control measures remain effective;
 - c) stormwater runoff and seepage from rehabilitated areas does not negatively affect the environmental values of any waters;
 - d) plants show healthy growth and recruitment is occurring; and
 - e) declared pest plants are controlled on rehabilitated areas to a level consistent with the surrounding property and prevented from spreading to unaffected areas through authorised petroleum activities.
- (E43) Rehabilitation can be considered successful when the site can be managed for its designated land-use (either similar to that of surrounding undisturbed areas or as otherwise agreed in a written document with the landowner/holder and administering authority) without any greater management input than for other land in the area being used for a similar purpose and there is evidence that the rehabilitation has been successful for at least three years.

Pest and Weed Management

- (E44) The holder of this authority must develop and implement a pest and weed control program that includes but is not limited to the following:
- a) identification of areas requiring pest and weed control;
 - b) control measures to prevent the spread of pest and weed species;
 - c) measures to eliminate infestations of noxious pest and weed species that may occur.

Storage and Handling of Chemicals, Flammable and Combustible Liquids

- (E45) All explosives, hazardous chemicals, corrosive substances, toxic substances, gases and dangerous goods must be stored and handled in accordance with the relevant Australian Standards.

- (E46) Flammable and combustible liquids (including petroleum products and associated piping and infrastructure), must be stored, handled and maintained in accordance with the latest edition of *Australian Standard 1940 – The Storage and Handling of Flammable and Combustible Liquids*.
- (E47) Any liquids stored on site that have the potential to cause environmental harm must be stored in or serviced by an effective containment system that is impervious to the materials stored and managed to prevent the release of liquids to waters or land. Where no relevant Australian Standard is available, the following must be applied:
- a) storage tanks must be banded so that the capacity and construction of the band is sufficient to contain at least 110% of a single storage tank or 100% of the largest storage tank plus 10% of the second largest storage tank in multiple storage areas; and
 - b) drum storages must be banded so that the capacity and construction of the band is sufficient to contain at least 25% of the maximum design storage volume within the band.
- (E48) All containment systems must be designed to minimise rainfall collection within the system.

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SCHEDULE F – FAUNA MANAGEMENT

- (F1) The holder of this authority must develop and implement a species management plan for all fauna, including all endangered, vulnerable or rare (EVR) listed species likely to be impacted by the pipeline activities. The plan must:
- a) address the impacts to the species; and
 - b) provide for the survival of the species in the wild.
- (F2) The holder of this authority must develop and implement fauna management procedures in such a manner that petroleum activities are undertaken to prevent and/or minimise environmental harm. The fauna management procedures must include but not be limited to:
- a) training and awareness of staff and contractors;
 - b) conduct of a preconstruction ecological survey to identify the presence of any endangered, vulnerable or rare fauna species and identify and mark hollow-bearing trees;
 - c) minimising the clearing of mature and hollow-bearing trees;
 - d) minimising the length of time the trench is open through the staging of activities;
 - e) temporary exclusion fencing where practicable to restrict fauna access to the trench;
 - f) the use of “night caps” over open pipe string ends to prevent the ingress of wildlife;
 - g) pipes being strung with gaps to allow for fauna movement across the line of the pipe;
 - h) a suitably qualified person for fauna handling must be present during clear and grade activities to relocate fauna or recover any injured fauna and must check the entire trench for captured fauna at least daily, preferably in the morning;
 - i) ensure any vertebrates injured by clearing activities under this permit are referred to an appropriate wildlife carer group or veterinarian (to be predetermined prior to clearing) and DERM must be notified within 24 hours of any injuries or deaths;
 - j) installation of ramps and trench plugs with a slope less than 50% at least every 1,000 metres to assist fauna to leave the trench; and
 - k) installation of shelter material to provide wet weather protection and reduction of heat stress, such as by placing sawdust filled Hessian bags in pairs every 250 metres.
- (F3) A copy of the fauna management procedures must be made available to the administering authority on request.

Note: This environmental authority does not authorise the taking of protected animals or the tampering with an animal breeding place as defined under the Nature Conservation Act 1992 and Regulations.

SCHEDULE G – DECLARED WILD RIVER AREAS – No conditions

SCHEDULE H – PROJECT INFRASTRUCTURE

- (H1) The pipeline corridor must be built within the locations outlined in Schedule H, Table 1 – Location of the PPL <INSERT PPL no.> pipeline corridor.

Schedule H, Table 1 – Location of the PPL <INSERT PPL no.> pipeline corridor

Pipeline Licence No.	Location (KP)	Easting (MGA Zone 56)	Northing (MGA Zone 56)
PPL <INSERT PPL no.>			

- (H2) All petroleum infrastructure must be removed from the relevant petroleum authority prior to the surrender of this authority, except where agreed in writing by the administering authority and the current landowner.
- (H3) Prior to the commencement of decommissioning or abandonment activities, the scope of work for decommissioning or abandonment of project infrastructure shall be developed and agreed to with the administering authority.
- (H4) The holder of this authority must decommission the pipeline to a situation where ongoing, or potential environmental harm is prevented or minimised. As a minimum, the pipeline must be decommissioned such that:
- it no longer contains hazardous contaminants;
 - it is left in stable condition;
 - all the above ground infrastructure is removed; and
 - all areas disturbed by above ground infrastructure are rehabilitated in accordance with the requirements of this authority.

1.4 SCHEDULE I – MONITORING PROGRAMS

- (K1) The holder of this authority must:
- a) develop and implement a monitoring program that will demonstrate compliance with the conditions in this authority; and
 - b) document the monitoring and inspections carried out under the program and any actions taken.
- (K2) The holder of this authority must ensure that a suitably qualified, experienced and competent person(s) conduct all monitoring required by this authority.
- (K3) The holder of this authority must record, compile and keep for a minimum of five years all monitoring results required by this authority and make available for inspection all or any of these records upon request by the administering authority. Monitoring results relating to rehabilitation must be kept until the relevant petroleum tenure is surrendered.
- (K4) An annual monitoring report must be prepared each year and submitted to the administering authority when requested. This report shall include but not be limited to:
- a) a summary of the previous twelve (12) months monitoring results obtained under any monitoring programs required under this authority and, a comparison of the previous twelve (12) months monitoring results to both this authority limits and to relevant prior results; and
 - b) an evaluation/explanation of the data from any monitoring programs; and
 - c) a summary of any record of quantities of releases required to be kept under this authority; and
 - d) a summary of the record of equipment failures or events recorded for any site under this approval; and
 - e) an outline of actions taken or proposed to minimise the environmental risk from any deficiency identified by the monitoring or recording programs.

1.5 SCHEDULE J – COMMUNITY ISSUES

Managing Complaints

- (L1) When the administering authority advises the holder of a complaint alleging nuisance (e.g. caused by dust or noise), the holder must investigate the complaint and advise the administering authority of the action proposed or undertaken in relation to the complaint.
- (L2) If the administering authority is not satisfied with the proposed or completed action, the holder must undertake monitoring or other actions requested by the administering authority.
- (L3) Maintain a record of complaints and incidents causing environmental nuisance or environmental harm, and actions taken in response to the complaint or incident.
- (L4) Retain the record of complaints required by this condition for five (5) years.

Complaint Response

- (L5) The holder of this authority must record the following details for all complaints received and provide this information to the administering authority on request:
 - a) time, date, name and contact details of the complainant;
 - b) reasons for the complaint;
 - c) any investigations undertaken;
 - d) conclusions formed; and
 - e) any actions taken.

1.6 SCHEDULE K – NOTIFICATION PROCEDURES

Notification of Emergencies and Incidents

- (M1) The holder of this authority must telephone the DERM's Pollution Hotline (1300 130 372) and any affected landholder or occupier on the day of becoming aware of any release of contaminants or any event where environmental harm has been caused or may be threatened not in accordance with the conditions of this authority.
- (M2) Subject to Condition (K1), the holder of this authority is required to report in the case of uncontained spills (including hydrocarbon) of the following volumes or kind:
 - a) releases of any volume to water;
 - b) releases of volume greater than 200 L to land; and
 - c) releases of any volumes where potential serious or material environmental harm is considered to exist.
- (M3) The notification of emergencies or incidents as required by Conditions (K1 and K2) must include but not be limited to the following:
 - a) the holder of the authority;
 - b) the location of the emergency or incident;
 - c) the number of the authority;
 - d) the name and telephone number of the designated contact person;
 - e) the time of the release;
 - f) the time the holder of the authority became aware of the release;
 - g) the suspected cause of the release;
 - h) the environmental harm caused, threatened, or suspected to be caused by the release; and
 - i) actions taken to prevent any further release and mitigate any environmental harm caused by the release.
- (M4) Not more than fourteen (14) days following the initial notification of an emergency or incident, written advice must be provided of the information supplied in accordance with Condition (K3) in addition to:
 - a) proposed actions to prevent a recurrence of the emergency or incident; and
 - b) outcomes of actions taken at the time to prevent or minimise environmental harm.
- (M5) As soon as practicable, but not more than six (6) weeks following the conduct of any environmental monitoring performed in relation to the 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 this authority, written advice must be provided of the results of any such monitoring performed to the administering authority.
- (M6) A record of incidents must be maintained to include a record of all incidents occurring in the previous 5 years.

APLNG LIQUIFIED NATURAL GAS FACILITY APPENDIX 2

SCHEDULE A – GENERAL CONDITIONS

PREVENT AND/OR MINIMISE LIKELIHOOD OF ENVIRONMENTAL HARM

- (A1) This authority does not authorise environmental harm unless a condition contained within this authority explicitly authorises that harm. Where there is no condition or the authority is silent on a matter, the lack of a condition or silence shall not be construed as authorising harm.
- (A2) In carrying out petroleum activities the holder of this authority must prevent and / or minimise the likelihood of environmental harm being caused.

MAINTENANCE OF MEASURES, PLANT AND EQUIPMENT

- (A3) The holder of this authority must:
 - (a) install all measures, plant and equipment necessary to ensure compliance with the conditions of this authority; and
 - (b) maintain such measures, plant and equipment in a proper and efficient condition; and
 - (c) operate such measures, plant and equipment in a proper and efficient manner.
- (A4) All instruments, equipment and measuring devices used for measuring or monitoring in accordance with any condition of this authority must be calibrated, appropriately operated and maintained.
- (A5) The holder of this authority must ensure that daily operation and maintenance of all plant and equipment relating to the authorised petroleum activities are carried out by suitability qualified, competent and experienced person(s).
- (A6) No change, replacement or alteration of any plant or equipment is permitted if the change, replacement or alteration increases the risk of environmental harm from the petroleum activities.
- (A7) All analyses and tests required to be conducted under this authority must be carried out by a laboratory that has NATA certification for such analyses and tests, except as otherwise authorised by the administering authority.

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

- (A8) The holder of this authority must conduct construction in accordance with the Construction Environmental Management Plan approved by the Coordinator-General in accordance with condition **<INSERT CG Report Condition Reference>** “Coordinator-General’s report on the environmental impact statement for the APLNG Project”, dated **<INSERT Date>**.

ENVIRONMENTAL MANAGEMENT PLAN

(A9) An Environmental Management Plan (EM plan) must be implemented that provides for the effective management of the actual and potential impacts resulting from the carrying out of the petroleum activities. Documentation relating to the EM plan must be kept.

(A10) The EM plan required by condition (A9) must address, at least, the following:

1. Describe each of the following:
 - (a) each relevant resource authority for the environmental authority;
 - (b) all relevant petroleum activities;
 - (c) the land on which the activities including associated accommodation and recreational activities are to be carried out;
 - (d) the environmental values likely to be affected by the activities including associated accommodation and recreational activities ; and
 - (e) the potential adverse and beneficial impacts of the activities including associated accommodation and recreational activities on the environmental values.
2. State the environmental protection commitments the applicant proposes for the activities, including associated accommodation and recreational activities, to protect or enhance the environmental values under best practice environmental management;
3. Include a rehabilitation program for land proposed to be disturbed under each relevant resource authority for the application; and
4. State a proposed amount of financial assurance for the environmental authority as part of the rehabilitation program.
5. Training staff in the awareness of environmental issues related to carrying out the petroleum activities, which must include at least:
 - (a) The environmental policy of the authority holder, so that all persons that carry out the petroleum activities are aware of all relevant commitments to environmental management;
 - (b) Any relevant environmental objectives and targets, so that all staff are aware of the relevant performance objectives and can work towards these;
 - (c) Control procedures to be implemented for routine operations for day to day activities including associated accommodation and recreational activities, to minimise the likelihood of environmental harm, however occasioned or caused;
 - (d) Contingency plans and emergency procedures to be implemented for non-routine situations to deal with foreseeable risks and hazards, including corrective

responses to prevent and mitigate environmental harm (including any necessary site rehabilitation);

- (e) Organisational structure and responsibility to ensure that roles, responsibilities and authorities are appropriately defined to ensure effective management of environmental issues;
- (f) Effective communication procedures to ensure two-way communication on environmental matters between operational staff and higher management;
- (g) Obligations with respect to monitoring, notification and record keeping obligations under the EM plan and relevant approvals; and
- (h) Monitoring of the release of contaminants into the environment including procedures, methods and record keeping.

- 6. The conduct of periodic reviews of environmental performance and procedures adopted, not less frequently than annually; and
- 7. A program for continuous improvement.

(A11) The EM Plan must not be implemented or amended in a way that contravenes or is inconsistent with any condition of this approval.

(A12) Contingency plans and emergency procedures must be developed and implemented for non-routine situations to deal with foreseeable risks and hazards including corrective responses to prevent and mitigate environmental harm (including a contingency plan when plant shuts down for maintenance or other reasons).

THIRD PARTY AUDITING

(A13) Compliance with the conditions of this authority must be audited by an appropriately qualified third party auditor, nominated by the holder of this authority and accepted by the administering authority, within one year of the completion of commissioning of the LNG Facility, and every three years thereafter.

(A14) Within 15 business days of receiving the final third party audit report, the holder of this authority must submit a copy to the administering authority.

(A15) The third party auditor must certify the findings of the audit in the report.

(A16) The financial cost of the third party audit is borne by the holder of this authority.

(A17) The holder of this authority must, within a reasonable period of time agreed in writing with the administering authority, act upon any recommendations arising from the audit report and:

- (a) investigate any non-compliance issues identified; and

- (b) as soon as practicable, implement measures or take necessary action to ensure compliance with this authority.
- (A18) Subject to condition (A13), and not more than three (3) months following the submission of the audit report, the holder of this authority must provide written advice to the administering authority addressing the:
 - (a) actions taken by the holder to ensure compliance with this authority; and
 - (b) actions taken to prevent a recurrence of any non-compliance issues identified.

FINANCIAL ASSURANCE

- (A19) The holder of this authority must provide a financial assurance in the amount and form required by the administering authority for the construction, operation and decommissioning of the relevant petroleum pipeline at the time of the submission of the original or any amended work program or development plan. The calculation of financial assurance must be calculated in accordance with the guideline "Financial assurance for petroleum activities".
- (A20) The financial assurance is to remain in force until the administering authority is satisfied that no claim is likely to be made on the assurance.

DEFINITIONS

- (A21) Words and phrases used in this authority are defined in Appendix 1 – Definitions. Where a definition for a term used in this authority is not defined within this authority, the definitions in the *Environmental Protection Act 1994*, its Regulation and Environmental Protection Policies must be used.

SCHEDULE B – AIR EMISSIONS

NUISANCE

- (B1) The release of noxious or offensive odours or any other noxious or offensive airborne contaminants resulting from the activities must not cause an environmental nuisance at any nuisance sensitive or commercial place.
- (B2) The release of dust and/or particulate matter resulting from the activities must not cause an environmental nuisance at any nuisance sensitive or commercial place.
- (B3) Dust and particulate matter must not exceed any of the following levels when measured at any nuisance sensitive or commercial place:
 - (a) Dust deposition of 120 milligrams per square metre per day over a 30-days averaging period, when monitored in accordance with Australian Standard AS 3580.10.1 of 2003 (or more recent editions); OR
 - (b) A concentration of particulate matter with an aerodynamic diameter of less than 10 micrometre (μm) (PM10) suspended in the atmosphere of 50 micrograms per cubic metre (with five one day exceedances allowed in any one year period); and over a 24 hour averaging time, at a dust sensitive place downwind of the licensed place, when monitored in accordance with:
 - i. Australian Standard AS 3580.9.6 of 2003 (or more recent editions) 'Ambient air - Particulate matter - Determination of suspended particulate PM10 high-volume sampler with size-selective inlet - Gravimetric method'; or
 - ii. any alternative method of monitoring PM10 which may be permitted by the 'Air Quality Sampling Manual' as published from time to time by the administering authority.

Note: The above 5 days exceedances per year are based on the expected exceedances from the natural events such as bushfires and dust storm.

THE RELEASE OF CONTAMINANTS TO THE ATMOSPHERE

- (B4) The release of contaminants to the atmosphere from a point source must only occur from those release points identified in *Schedule B, Table 1 - Contaminant Release Points* and must be directed vertically upwards without any impedance or hindrance.
- (B5) Contaminants must be released to the atmosphere from a release point at a height and a flow rate not less than the corresponding height and velocity stated for that release point in *Schedule B, Table 1 - Contaminant Release Points*.
- (B6) Contaminants must not be released to the atmosphere from a release point at a mass emission rate/concentration, as measured at a monitoring point, in excess of that stated in *Schedule B, Table 1 - Contaminant Release Points*.

- (B7) Contaminants must be monitored not less frequently than specified in *Schedule B, Table 2 - Contaminant Release Limits to Air*.
- (B8) Monitoring of any releases to the atmosphere required by a condition of this approval must be carried out in accordance with the following requirements:
1. Monitoring provisions for the release points listed in *Schedule B, Table 1 - Contaminant Release Points* must comply with the Australian Standard AS 4323.1 - 1995 'Stationary source emissions, Method 1: Selection of sampling positions' (or more recent editions).
 2. The following tests must be performed for each determination specified in *Schedule B, Table 2 - Contaminant Release Limits to Air*:
 - i) gas velocity and volume flow rate;
 - ii) temperature;
 - iii) water vapour concentration (moisture content).
 3. Samples must be taken when emissions are expected to be at maximum rates.
 4. During the sampling period the following additional information must be gathered:
 - i) production rate at the time of sampling;
 - ii) raw materials and fuel used;
 - iii) number of plant or equipment and operating units operating;
 - iv) reference to the actual test methods and accuracy of the methods.
- (B9) All release points referred to in *Schedule B, Table 1 - Contaminant Release Points* must be conspicuously marked with the corresponding release point number.

SCHEDULE B, TABLE 1 – CONTAMINANT RELEASE POINTS

Determination Required	Release Point Numbers	Frequency
<i>To be finalised through assessment of EM Plan required by 310D of the Environmental Protection Act 1994</i>		

SCHEDULE B, TABLE 2 – CONTAMINANT RELEASE LIMITS TO AIR

Release point number	Minimum release height (metres)	Minimum velocity (m/sec)	Contaminant release	Maximum release limit ¹
<i>To be finalised through assessment of EM Plan required by 310D of the Environmental Protection Act 1994</i>				

- (B10) Within 3 months of commissioning the facility, the holder of this environmental authority must conduct air emission monitoring to demonstrate compliance with air emission limits listed in Schedule B, Table 2 - *Contaminant Release Limits to Air* and submit report to the administering authority.

FLARE CONDITIONS

- (B11) The flare must be equipped with a flare tip design to provide good mixing with air, flame stability and achieve a minimum Volatile Organic Compound (VOC) removal efficiency of 98% under varied gas flow rate and meteorological conditions and meet the best practice design standards (e.g. NSW EPA: Protection of the Environment Operations (Clean Air) Amendment (Industrial and Commercial Activities) Regulation 2005, or the US EPA Code of Federal Regulations: 40 CFR 60.18 and 40 CFR 63.11).
- (B12) The flare must be equipped with a continuously burning pilot or other automatic ignition system that assures gas ignition and provides immediate notification to appropriate personnel when the ignition system ceases to function.
- (B13) The flare must be designed to handle large fluctuations in both the volume and the chemical content of gases.
- (B14) Visible smoke and particulate emissions must not be permitted for more than five minutes in any two hour period during normal operating conditions, other than during LNG train start-up.
- (B15) Contingency plans and emergency procedures must be developed and implemented for non-routine situations to deal with foreseeable risks and hazards including corrective responses to prevent and mitigate environmental harm (including a contingency plan when plant shuts down for maintenance or other reasons).

FUGITIVE EMISSIONS

- (B16) The holder of this environmental authority must ensure that all reasonable and practicable measures are taken in the design and operation of the plant to minimise fugitive VOC emissions. Reasonable and practicable measures include but are not limited to:
- (a) implementation of a monitoring program to regularly leak test all units/components including pumps, piping and controls, vessels and tanks; and

- (b) operating, maintenance and management practices to be implemented to mitigate fugitive VOC sources.
- (B17) The ducting and extraction systems that transfer effluent gases from one location to another must be constructed, operated and maintained so as to minimise any leakage of VOCs and vapours to the atmosphere occurring from these sources.
- (B18) In the event of emissions of contaminants occurring from industrial plant or ducting systems that transfer effluent gases from one location to another, the fault or omission that resulted in that emission must be corrected as soon as practicable.

FUEL BURNING

- (B19) This authority only permits the burning of natural gas in the fuel burning equipment under normal operating conditions at the rate of the design capacity of the equipment.
- (B20) The sulphur content of fuel burned in the power generators must not exceed 0.5 percent by weight

GREENHOUSE GAS EMISSIONS

- (B21) The holder of this authority must develop and implement a greenhouse gas reduction strategy for the LNG Facility. The strategy must include, but not limited to, the company's policy on greenhouse gas emissions, an energy efficiency program, a continuous improvement program, better control systems and a CO₂ recovery plan.

SCHEDULE C – WATER MANAGEMENT**RELEASE TO WATERS****PERMITTED CONTAMINANT RELEASE AND DISCHARGE POINT(S)**

- (C1) The only contaminant(s) permitted to be released directly or indirectly to any waters from the petroleum activities authorised on the petroleum facilities licence are the following releases to Port Curtis:
1. Reverse Osmosis Concentrate (ROC) via the diffuser discharge point DF1 to Port Curtis, refer plan **<INSERT Plan>**; and
 2. Treated sewage effluent via the diffuser discharge point DF1 to Port Curtis during the construction of train 1 and train 2, refer plan **<INSERT Plan>**; and
 3. Treated sewage effluent via the diffuser discharge point DF1 to Port Curtis during the any period where soil cannot be irrigated and wet weather storage is at maximum capacity during operations, refer plan **<INSERT Plan>**;
 4. Uncontaminated stormwater from the LNG Facility site via the Stormwater Discharge Point SW1 to Port Curtis, refer plan **<INSERT Plan>**.
- (C2) The release of contaminants directly or indirectly to waters:
1. must not produce any visible discolouration of receiving waters; nor
 2. must not produce any slick or other visible or odorous evidence of oil, grease or petrochemicals nor contain visible floating oil, grease, scum, litter or other objectionable matter.

**SCHEDULE C, TABLE 1 – QUALITY CHARACTERISTIC LIMITS
(TREATED SEWAGE EFFLUENT)**

Monitoring Point	QUALITY CHARACTERISTICS	RELEASE LIMIT	LIMIT TYPE	MINIMUM MONITORING FREQUENCY
S1 ¹	5-day Biochemical Oxygen Demand	<5 mg/L	80 th percentile compliance	Weekly (composite sample ²)
	5-day Biochemical Oxygen Demand	35 mg/L	maximum	Weekly (composite sample ²)
	Suspended Solids	<5 mg/L	80 th percentile compliance	Weekly (composite sample ²)
	Suspended Solids	50 mg/L	maximum	Weekly (composite sample ²)
	pH	6.5 to 8.5 pH units	range	Online continuous
	Faecal Coliforms, based on a minimum of 5 samples collected at not less than weekly intervals.	1000 colonies per 100mL sample	median	Weekly (composite sample ²)
	Total -N	3 mg/L	50 th percentile compliance	Weekly (composite sample ²)
	Total - N	10 mg/L	maximum	Weekly (composite sample ²)
	Total -P	0.1 mg/L	50 th percentile compliance	Weekly (composite sample ²)
	Total - P	1 mg/L	maximum	Weekly (composite sample ²)
	Ammonia -N	1 mg/L	50 th percentile compliance	Weekly (composite sample ²)
	Ammonia - N	3 mg/L	maximum	Weekly (composite sample ²)

	Dissolved Oxygen	4 mg/L	minimum	Online continuous
¹ Monitoring point S1 described as the Discharge Monitoring Point (NXX EXX), refer plan XXXX attached to this environmental authority. ² Composite Sample – Taken as a composite grab sample over a 2 hour period. The sample to be made up of sub-samples taken at least every 15 minute and mixed in equal proportion, all sub samples must comply the provisions of the DERM's most recent version of the Water Quality Sampling Manual.				

QUALITY CHARACTERISTICS OF RELEASE TO WATERS

- (C3) The release of contaminants from the sewage treatment plant to waters must comply, at the sampling and in situ monitoring point(s) specified in Schedule C, Table 1 - *Quality Characteristic Limits (Treated Sewage Effluent)*, with each of the limits specified in Schedule C Table 1 - *Quality Characteristic Limits (Treated Sewage Effluent)* for each quality characteristic.
- (C4) **Monitoring**
Monitoring of treated sewage effluent contaminants released to Port Curtis must be undertaken for the quality characteristics and parameters, at the monitoring point(s), and at the frequencies specified in Table 1.
- (C5) **Reverse Osmosis Concentrate (ROC)**
The total quantity of ROC released to waters on any one day must not exceed <INSER Quantity> megalitres.
- (C6) The ROC released via the diffuser discharge point DF1 must not exceed the release limits specified in Table 1 when measured at the monitoring point S1 described as the Discharge Monitoring Point (N<INSER> E<INSER>), refer plan <INSER Plan> attached to this approval.

SCHEDULE C, TABLE 2 – QUALITY CHARACTERISTIC LIMITS (REVERSE OSMOSIS CONCENTRATE (ROC))

MONITORING POINT	QUALITY CHARACTERISTICS	RELEASE LIMIT	LIMIT TYPE	MINIMUM MONITORING FREQUENCY
S2	Total Chlorine (as Cl)	0.5 mg/L	Long term 50th percentile	Daily (grab sample/ single measurement)
		1 mg/L	Maximum	
	Dissolved Oxygen	4.0 mg/L	Minimum	Weekly (composite sample ²)
	Chemical Oxygen Demand	No Limit	No Limit	
	5-day Biochemical Oxygen Demand (inhibited)	20 mg/L	Maximum	
	Turbidity	5 NTU	Long term 50th percentile	Daily (single measurement)
		15 NTU	Maximum	
	pH	6.5 to 8.5	Range	

¹ Monitoring point S2 described as the Discharge Monitoring Point (N<INSERT >E<INSERT Plan>), refer plan <INSERT Plan> attached to this environmental authority.

² Composite Sample – Taken as a composite grab sample over a 2 hour period. The sample to be made up of sub-samples taken at least every 15 minute and mixed in equal proportion, all sub samples must comply the provisions of the DERM's most recent version of the Water Quality Sampling Manual.

Schedule C, Table 3 Reverse Osmosis Concentrate release trigger limits (Toxicants)

RELEASE POINT	MONITORING POINT	QUALITY CHARACTERISTICS	TRIGGER LIMIT (dissolved fraction µg/L)	TRIGGER TYPE	MINIMUM MONITORING FREQUENCY
DF1 – Diffuser Discharge Point	S2	The ANZECC 95 th protection levels for toxicant should be added here		Maximum	Weekly

¹ Monitoring point S2 described as the Discharge Monitoring Point (N<INSERT >E<INSERT Plan>), refer plan <INSERT Plan> attached to this environmental authority.

² Composite Sample – Taken as a composite grab sample over a 2 hour period. The sample to be made up of sub-samples taken at least every 15 minute and mixed in equal proportion, all sub samples must comply the provisions of the DERM's most recent version of the Water Quality Sampling Manual.

(C7) Monitoring

Monitoring of contaminants released to Port Curtis must be undertaken for the quality characteristics and parameters, at the monitoring point(s), and at the frequencies specified in Table 2 and Table 3.

(C8) Toxic Substances (Acute and Chronic)

Notwithstanding any other condition of this environmental authority, there must be no discharge of any contaminants to any waters where the no observed effect concentration (NOEC) for acute toxicity tests to any test organisms in a direct toxicity assessment (DTA) is observed at a 100% concentration i.e. the lowest observed effect concentration (LOEC) must only be observed at a dilution greater than 1:1.

(C9): There must be no discharge of any contaminants to any waters where the NOEC for chronic toxicity tests to any test organisms in DTA is observed at a <INSERT Percentage appropriate to 1m or smaller chronic zone>% concentration i.e. the LOEC must only be observed at a dilution greater than <INSERT Dilution appropriate to 1m or smaller chronic zone>.

(C10): Diffuser Validation

Provide to the administering authority a monitoring plan for the diffuser modelling validation within 40 business days from the issue of this environmental authority. The monitoring plan must have the following objectives:

1. To validate all modelling and investigations related to the diffuser; and
2. To confirm that expected dilutions predicted in design of the diffuser under specified flow conditions are met as a minimum.

(C11): The Monitoring Plan (Diffuser Validation), required by condition (C10), must include (but not be limited to) the following:

1. A description of the diffuser as installed;
2. A list of the environmental values to be protected within and adjacent to the diffuser;

3. Sampling of reference sites to determine the background concentration of relevant water quality parameters;
4. Sampling of the water column in the plume to determine and confirm the extent of the acute and chronic toxicity zone;
5. Investigate employing other approaches (e.g. dye-based diffuser validation techniques) where electrical conductivity-based methods are inconclusive;
6. Sufficient samples must be collected to determine the temporal and spatial extent of the toxicity zones within the plume;
7. The methods for the collection and analysis of samples (including the Quality Assurance and Quality Control protocols adopted);
8. The methods of analysing the data and responding to the results; and
9. Monitoring must be done by a competent person(s) in accordance with methods prescribed in the latest edition of the *Department of Environment and Resource Management Water Quality Sampling Manual*; and carried out on representative samples.

(C12): The holder of the environmental authority must have due regard to comments, provided by the administering authority, in the finalisation of the Monitoring Plan (Diffuser Validation).

(C13): The holder of the environmental authority must provide to the administering authority a Diffuser Validation Report, not more than 20 business days after receipt of the results obtained from the Monitoring Plan (Diffuser Validation). The report must include:

1. The outcome of the monitoring including the methodology, findings and recommendations of the Monitoring Plan (Diffuser Validation);
2. A determination on the validation of modelling and investigations undertaken;
3. Any resulting recommendations for changes necessary to minimise the likelihood of environmental harm and size of the toxicity zones.

(C14): **Routine Direct Toxicity Assessment**

The holder of the environmental authority must routinely undertake a DTA to quantify the toxicity of the ROC effluent combined with Treated Sewage Effluent. The Routine DTA must be undertaken in accordance with the following minimum requirements:

1. During the first 12 months following the commencement of discharge of ROC to the Port Curtis, a DTA must be carried out on a quarterly basis (with approximately 3 months between each Routine DTA).
2. After the first 12 months of operation and subject to four consecutive quarterly DTA results showing compliance with the release limits, the minimum frequency of Routine DTA shall be annual, except as provided by sub-clause (3) of this condition.
3. If a DTA result shows non-compliance with conditions Water 13 and or Water 14 of this development approval, then monitoring must recommence on a quarterly basis as in subclause 1 unless the registered operator can demonstrate with data and information, to the administering authority, that the

cause of the non-complaint DTA result has been rectified and it is unlikely to recur.

(C15): Event-based Direct Toxicity Assessment

The holder of the environmental authority must undertake an Event-based DTA where one or more of the same trigger limits specified in Schedule C, Table 3 - *Reverse Osmosis Concentrate release trigger limits (Toxicants)* are exceeded on four consecutive occasions (weekly sampling) when measured at the monitoring point S1 described as the Discharge Monitoring Point (E<INSERT> N<INSERT>), refer plan <INSERT Plan> attached to this environmental authority.

When any third consecutive exceedance of any same trigger limit is detected, the registered operator must make arrangements for priority analysis and reporting of the results of the subsequent sample and also make preparations with the DTA testing laboratories such that, should a fourth consecutive exceedance of the same toxicant occur, a DTA can be promptly undertaken. The DTA must occur forthwith following the fourth consecutive exceedance.

(C16): Influent Quality & Treatment Train Critical Assessment

The holder of the environmental authority must undertake an Influent Quality and Treatment Train Critical Assessment to determine the potential toxicity of the ROC when any factor in the treatment process or influent water quality change may result in an increased toxicological effect to aquatic organisms in the receiving environment. [An example would be use of a new water treatment chemical which has product information or chemical formulation showing a toxicological effect to aquatic organisms].

(C17): Where the Influent Quality & Treatment Train Critical Assessment determines that an increased toxicological effect may occur, a DTA must be undertaken utilising indicator organism(s) appropriate to the change and the results reported to the administering authority. [An example would be a change is planned in treatment processes and material toxicity to Crustaceans is indicated by reference material. A DTA using a Crustacean(s) or related indicator organism(s) must be carried out].

(C18) The DTA procedure followed must address the following:

1. All specific methods and protocols to determine whether concentrations of toxicants are neither acutely toxic outside the approved acute toxicity zone nor chronically toxic outside the approved chronic toxicity zone to the test biota, including:
 - (a) Specific test organisms to be utilised for DTA testing, in accordance with Section 8.3.6.8 of the ANZECC 2000 Guidelines, to provide an accurate indication of actual & chronic toxic effects in the receiving waters, taking into consideration locally occurring species and the nature of any change being investigated; and
 - (b) The selection and characterisation of environmental waters for dilution of the ROC; and
 - (c) Characterisation of the ROC waste stream, including potential toxicants present; and
 - (d) The nature of the contaminant(s); and
 - (e) Acute and chronic DTA testing conducted on end-of-pipe ROC discharged; and
 - (f) Test/biological end points; and
 - (g) DTA end-points (including NOEC and LOEC); and

- (h) Quality assurance/quality control; and
- (i) Applicable Toxicity Identification Evaluation (TIE) procedures to be followed should the administering authority require such an evaluation; and
- (j) Reporting of DTA procedure results promptly to the administering authority, which must include but not be limited to:
 - (i) NOEC for all bioassay results;
 - (ii) LOEC for all bioassay results;
 - (iii) All relevant sample collection information for the ROC test sample and receiving environment dilution water;
 - (iv) Timing of ROC test sample collection in relation to process performance;
 - (v) Details of any manipulation of the ROC test sample or receiving environment dilution water;
 - (vi) ROC Test sample and receiving environment dilution water delivery details;
 - (vii) Results of the chemical analysis of the ROC test sample for known toxicants of concern (i.e. all parameters on Tables 1 and 2 are a minimum requirement in addition to parameters indicative of any change), receiving environment dilution water, and the test water (ROC/receiving water) for each of the dilutions;
 - (viii) Time between test sample collection and commencement of the DTA, and
 - (ix) Interpretation of results.

2. Reporting of the progress and/or results of DTA testing to the administering authority no more than 20 business days following the initial results of the toxicity assessment.

- (C19) A written DTA procedure that effectively measures toxicity of the effluent must be developed by the registered operator to which this development approval relates, and be submitted to the administering authority within 20 business days of issue of this development approval.
- (C20) The holder of the environmental authority must have due regard to the administering authority's comments in the finalisation and any review of the DTA procedure.
- (C21) The finalised DTA procedure must not be changed without the prior written consent from the administering authority.
- (C22) The DTA must be designed and performed by a suitably qualified person.
- (C23) **Minimum Responses to any Non Compliant Toxicity in Effluent**

Where a DTA has demonstrated observable toxicological effects for related tests at or greater dilutions than defined in the approved acute and chronic toxicity limits, the registered operator of the activity to which this development approval relates must:

- 1. Immediately advise the administering authority; and

2. Promptly investigate the toxicity result by:
 - (a) Identifying any trend or excessive presence in any contaminant likely to cause the observed toxicity; and
 - (b) Undertake an additional DTA or an appropriate single-species Toxicity Bioassay (following consultation with and as agreed with the administering authority) to investigate whether the non-compliant toxicity is still present; and
 3. If following results of the investigations in either subclause 1(a) or 1(b) likely compliance with the toxicity release limits is not demonstrated, immediately advise the administering authority of the results and within 5 business days prepare and submit to the administering authority a Toxicity Management Plan (TMP) that has the following objectives:
 - (a) Identify the causative agent(s) responsible for the observed increase in toxicity; and
 - (b) Assess the risk posed to the environment by the non-compliant toxicity; and
 - (c) Reduce toxicity to the approved acute and/or chronic toxicity limits specified by this development approval forthwith.
- (C24) The TMP must, at a minimum, present the tasks and timeframes for corrective actions directed at identifying and eliminating the observed toxicological effect(s) outside of the approved toxicity zones.
- Note: A Toxicological Identification Evaluation (TIE) maybe required as part of this TMP to determine the toxicant(s) responsible for the observed toxicological effect(s).*
- (C25) A Confirmation DTA must be undertaken as soon as practicable after completion of the corrective action(s) required by the TMP/condition Water 25 to verify that the actions taken have been effective in eliminating the observed toxicological effects outside of the approved toxicity limits.
- Note: This is an additional assessment other than normally required by the conditions of this development approval.*

MONITORING OF VOLUME OF SEAWATER DESALINATION PLANT SEAWATER INFLUENT, DESALINATION EFFLUENT AND BRINE

- (C26) The daily volume and daily average flow rate of seawater influent treated must be determined or estimated by an appropriate method with an accuracy of +/- 5%, and records kept of such determinations.
- (C27) The daily volume and daily average flow rate of desalination effluent released from the premises must be determined or estimated by an appropriate method with an accuracy of +/- 5%, and records kept of such determinations.
- (C28) The daily volume and daily average flow rate in m³/s of the brine component of the desalination effluent discharged to marine waters must be determined or estimated by an appropriate method with an accuracy of +/- 5%, and records kept of such determinations.
- (C29) Monitoring of seawater influent for pH, temperature, turbidity, and conductivity must involve instrumentation that is continuous, on-line, real-time and be able to be recorded and alarmed.
- (C30) Monitoring of desalination effluent for pH, chlorine, dissolved oxygen concentration and percent saturation, temperature, turbidity, and conductivity must involve instrumentation that is continuous, on-line, real-time and be able to be recorded and alarmed.

RECEIVING ENVIRONMENT MONITORING PROGRAM (REMP)

- (C30) A REMP must be developed and implemented, based on the surface water quality management plan in condition (C1), to monitor and record the effects of the release of contaminants on the receiving environment whilst contaminants are being discharged, with the aims of identifying and describing the extent of any adverse impacts to local environmental values, and monitoring any changes in the receiving water. For the purposes of the REMP the receiving environment is defined as the waters of Port Curtis and connected waterways. The REMP should address at least the following:
1. Description of potentially affected receiving waters including key communities and background water quality characteristics based on accurate and reliable monitoring data that takes into consideration any temporal variation (e.g. seasonality); and
 2. Description of applicable environmental values and water quality objectives to be achieved (i.e. as scheduled pursuant to the *Environmental Protection (Water) Policy 2009*); and
 3. Any relevant reports prepared by other governmental or professional research organisations that relate to the receiving environment within which the REMP is proposed; and
 4. Water quality targets within the receiving environment to be achieved, and clarification of contaminant concentrations or levels indicating adverse environmental impacts during the REMP.
- (C31) The REMP must be maintained by a person possessing appropriate qualifications and experience in the field of hydrology and surface water monitoring program design.
- (C32) The REMP must address but not be limited to the following:
1. Monitoring for any potential adverse environmental impacts caused by the intake or release, particularly in terms of potentially toxic contaminants that may be present in the ROC or Treated Sewage Effluent;
 2. Monitoring performance of the diffuser to ensure adequate mixing and dilution;
 3. Sampling to determine the extent of the near-field mixing zone at various tidal phases (including the vertical profile) to validate modelling estimates;
 4. Monitoring of selected toxicants (including ammonia nitrogen, total and free chlorine, dissolved metals and metalloids likely to be present in intake water) to assess the extent of the compliance of concentrations with water quality objectives and the extent of the toxicity zone,
 5. Monitoring of selected physical chemical parameters (including turbidity, pH, dissolved oxygen saturation, conductivity, temperature) that would assist in quantifying the mixing and dilution of the diffusers
 6. The locations of monitoring points including monitoring transects away from the outfall of the designated release point as well as control locations;
 7. The proposed sampling depths;
 8. The frequency or scheduling of sampling and analysis;
 9. Any historical datasets to be relied upon;
 10. Description of the statistical basis on which conclusions are drawn, and
 11. Any spatial and temporal controls to exclude potential confounding factors.
- (C33) The REMP must be prepared and submitted in writing to the administering authority 3 months prior to the commencement of discharge to Port Curtis.

STORMWATER MANAGEMENT PLAN

(C34) A Stormwater Management Plan must be prepared for the site prior to, and implemented during construction and operation. The Stormwater Management Plan must address at least the following:

- (a) the location of discharge points;
- (b) prevention of incident storm water and storm water run-off from contacting wastes or contaminants;
- (c) diversion of upstream run-off away from areas where it may be contaminated by bulk products being loaded or unloaded, wastes, contaminants or other materials; and
- (d) collection, treatment and disposal of all contaminated storm water run-off.

(C35) The holder of the environmental authority must submit the stormwater management plan required by Condition (C34), to the administering authority for its review and comment and have due regard to that comment in the finalisation of the plan.

(C36) The stormwater management plan must be reviewed and updated annually.

MAINTENANCE OF STORMWATER MANAGEMENT DEVICES

(C37) Suitable banks and/or diversion drains must be installed and maintained to exclude stormwater runoff from entering the LNG facility footprint.

(C38) All stormwater management devices must be installed and maintained to ensure they are working properly at all times, including the following:

- (a) oil and grit separator devices;
- (b) detention basin(s);
- (c) grass swales; and
- (d) trash racks and protected risers.

(C39) Detention basins must be of a sufficient capacity to contain the runoff expected from a 24 hour storm with an average recurrence interval of 1 in 10 years.

(C40) The release of contaminants from the stormwater discharge points to waters must comply, at the sampling and in situ monitoring point(s) specified in Schedule C, Table 4 - *Stormwater Release Limits*, with each of the limits specified in Schedule C Table 4 - *Stormwater Release Limits* for each quality characteristic.

MONITORING

(C41) Monitoring of stormwater contaminants released to Port Curtis must be undertaken for the quality characteristics and parameters, at the monitoring point(s), and at the frequencies specified in Schedule C, Table 4.

SCHEDULE C, TABLE 4 – STORMWATER RELEASE LIMITS

RELEASE POINT	MONITORING POINT	QUALITY CHARACTERISTICS	LIMIT	LIMIT TYPE	MINIMUM MONITORING FREQUENCY
Limits for Construction					
Prescribed in Stormwater Management Plan	Prescribed in Stormwater Management Plan	Temperature	BG ± 2°C	Range	Prior to discharge and daily during discharge events. Periods of no discharge must be recorded.
		pH	6.5 - 8.5	Range	
		Total Suspended Solids	50 mg/L	Maximum	
		Total hydrocarbons	10 mg/L and no visible sheen, oil or objectionable material	Maximum	
		Dissolved Oxygen	4 mg/L	Minimum	
		Cadmium	5.5 *µg/L	Maximum	• Quarterly • Prior to discharge; and • During first day of discharge; and Periods of no discharge must be recorded.
		Chromium (Cr III)	27.4 *µg/L	Maximum	
		Chromium (Cr IV)	4.4 *µg/L	Maximum	
		Cobalt	1 *µg/L	Maximum	
		Copper	1.3 *µg/L	Maximum	
		Lead	4.4 *µg/L	Maximum	
		Mercury (inorganic)	0.4 *µg/L	Maximum	
		Nickel	70 *µg/L	Maximum	
		Silver	1.4 *µg/L	Maximum	
		Tributyltin	0.006 *µg/L	Maximum	
		Vanadium	100 *µg/L	Maximum	
		Zinc	15 *µg/L	Maximum	
Limits for Operational Plant					
Prescribed in Stormwater Management Plan	Prescribed in Stormwater Management Plan	Temperature	BG ± 2°C	Range	Prior to discharge and daily during discharge events. Periods of no discharge must be recorded.
		pH	6.5 - 8.5	Range	
		Total Suspended Solids	15 mg/L	Maximum	
		Total hydrocarbons	10 mg/L and no visible sheen, oil or objectionable material	Maximum	
		Dissolved Oxygen	4 mg/L	Minimum	
		Cadmium	5.5 *µg/L	Maximum	• Quarterly
		Chromium (Cr III)	27.4 *µg/L	Maximum	

RELEASE POINT	MONITORING POINT	QUALITY CHARACTERISTICS	LIMIT	LIMIT TYPE	MINIMUM MONITORING FREQUENCY
		Chromium (Cr IV)	4.4 *µg/L	Maximum	<ul style="list-style-type: none"> • Prior to discharge; and • During first day of discharge; and <p>Periods of no discharge must be recorded.</p>
		Cobalt	1 *µg/L	Maximum	
		Copper	1.3 *µg/L	Maximum	
		Lead	4.4 *µg/L	Maximum	
		Mercury (inorganic)	0.4 *µg/L	Maximum	
		Nickel	70 *µg/L	Maximum	
		Silver	1.4 *µg/L	Maximum	
		Tributyltin	0.006 *µg/L	Maximum	
		Vanadium	100 *µg/L	Maximum	
		Zinc	15 *µg/L	Maximum	

*** Dissolved Fraction**

RELEASE TO LAND

PERMITTED CONTAMINANT RELEASE AND DISCHARGE POINT(S)

(C42) The only contaminant(s) permitted to be released directly or indirectly to land from the petroleum activities are the following releases:

1. Treated sewage effluent via the discharge point L1 prescribed in the Wastewater Irrigation Management Plan required by condition (C52).

QUALITY CHARACTERISTICS (TREATED SEWAGE EFFLUENT)

(C43) The release of contaminants from the sewage treatment plant to land must comply, at the sampling and in situ monitoring point(s) specified in Schedule C, Table 5 - *Release Quality Characteristic (Discharge to Land)* with each of the limits specified in Schedule C, Table 5 – *Release Quality Characteristic (Discharge to Land)* for each quality characteristic.

(C44) Notwithstanding the quality characteristic limits specified in Schedule C, Table 5 the effluent released must not have any properties nor contain any organisms or contaminants in concentrations which are capable of causing environmental harm or an environmental nuisance.

SCHEDULE C, TABLE 5 - RELEASE QUALITY CHARACTERISTIC (DISCHARGE TO LAND)

RELEASE POINT	QUALITY CHARACTERISTICS	RELEASE LIMIT	LIMIT TYPE	MONITORING FREQUENCY
L1	Total -N	3 mg/L	50 percentile compliance	Weekly
	Total - N	10 mg/L	maximum	Weekly
	Total -P	0.1 mg/L	50 percentile	Weekly

			compliance	
	Total - P	1 mg/L	maximum	Weekly
	Ammonia -N	1 mg/L	50 percentile compliance	Weekly
	5-day Biochemical Oxygen Demand	<5 mg/L	80 percentile compliance	Weekly
	Suspended Solids	<5 mg/L	80 percentile compliance	Weekly
	pH	6.5 – 8.0	range	Daily
	Faecal Coliforms	5 colonies per 100mL sample	geometric mean	Weekly

ACCESS AND SIGNAGE

- (C45) Signage must be placed around the land irrigation area and irrigation equipment warning the public that the area and equipment has been set aside for irrigation by treated effluent, which is not to be used for drinking purposes. The signs must be maintained in a visible and legible condition.
- (C46) Any treated effluent irrigation area must, not be used for:
- recreational activities or as a traffic thoroughfare during irrigation; and
 - any activity which may involve members of the public or employees without appropriate personal protective equipment coming in contact with treated wastewater during irrigation periods and for at least four hours after irrigation has ceased or until irrigated vegetation has dried.

WASTEWATER RELEASE CONTROL

- (C47) Treated sewage effluent must not be irrigated when weather or soil conditions would cause run-off or ponding of any wastewater irrigated.
- (C48) The amount of treated sewage effluent irrigated must be matched to the water requirements of the vegetation irrigated, without exceeding a reasonable estimation of the field capacity of the soil, in the root zone, in the irrigation area.
- (C49) The rate of application of treated sewage effluent to the release area must not exceed the capacity of the soil in the contaminant release area to absorb it.

SUPPLY OF TREATED EFFLUENT FOR THE PURPOSE OF IRRIGATION

- (C50) The holder of the environmental authority is responsible for the quality of the treated effluent released to other parties for the purpose of

irrigation. The quality of the effluent must comply, at the sampling point specified, with each of the release limits specified in Schedule C, Table 5 - *Release Quality Characteristic for (Discharge to Land)* for each quality characteristic.

- (C51) Copies of agreements to supply treated sewage effluent from the Sewage Treatment Plant for the purpose of irrigation must be forwarded to the administering authority within thirty (30) days of the date of their ratification.

WASTEWATER IRRIGATION MANAGEMENT PLAN

- (C52) The holder of this environmental authority must prepare a Wastewater Irrigation Management Plan, where wastewater is proposed to be discharged to land. The Wastewater Irrigation Management Plan is to be developed in accordance with the “*Queensland Water Recycling Guidelines, 2005*” produced by the Environmental Protection Agency or the “*Draft National Guidelines for Sewerage Systems: Reclaimed Water*” endorsed by NH&MRC in 2000. The Wastewater Irrigation Management Plan should address at least, but not be limited to, the following matters:
- (a) the measurement of the quantity and quality of treated effluent produced by the activity;
 - (b) an assessment of the suitability of the area of land available for wastewater irrigation;
 - (c) the definition and clear identification of areas to be used for wastewater irrigation;
 - (d) carrying out daily time step modelling (using MEDLI or similar) to estimate at least wastewater irrigation application rates, the wastewater irrigation area required and the volume of wet weather storage required, taking into account at local tropical climatic conditions, soils in the wastewater irrigation area and the vegetation grown in the wastewater irrigation area;
 - (e) an assessment of surface waters, including stormwater, that may be affected;
 - (f) an assessment of the characteristics of the soils in the wastewater irrigation area including assessment of nutrient and salt levels of the soils in the disposal area and how soils will be managed;
 - (g) an assessment of the potential impacts of odour resulting from wastewater irrigation; and
 - (h) management of human and fauna health issues associated with the irrigation of wastewater.
- (C53) Prior to discharge of wastewater to land the holder of this environmental authority must lodge a copy of the Wastewater Irrigation Management Plan with the administering authority for its review and comment and have due regard to that comment in the finalisation of the plan.

OTHER APPLICATIONS OF WASTEWATER (SEWAGE EFFLUENT) TO LAND

(C54) The holder of this authority must develop and implement a Wastewater Re-use Management Plan for proposed uses of sewage effluent water other than irrigation prescribed under the Wastewater Irrigation Management Plan. The plan must:

- (a) provide a description of the proposed use/s of the wastewater; and
- (b) be developed in accordance with the "Queensland Water Recycling Guidelines, 2005" produced by the Environmental Protection Agency or the "Draft National Guidelines for Sewerage Systems: Reclaimed Water" endorsed by NH&MRC in 2000;
- (c) present sufficient water quality data to demonstrate:
 - i. the water is fit for the intended purpose/s; and
 - ii. the water presents no risk to the environment or to public health.

(C55) Prior to the reuse of wastewater the holder of this environmental authority must lodge a copy of the Wastewater Re-use Management Plan with the administering authority for its review and comment and have due regard to that comment in the finalisation of the plan.

RELEASE TO LAND

PERMITTED CONTAMINANT RELEASE AND DISCHARGE POINT(S)

- (L1) The only contaminant(s) permitted to be released directly or indirectly to land from the petroleum activities are treated sewage effluent via the discharge point L1 to <insert designated area>, refer plan XXXX.

QUALITY CHARACTERISTICS (TREATED SEWAGE EFFLUENT)

- (L2) The release of contaminants from the sewage treatment plant to land must comply, at the sampling and in situ monitoring point(s) specified in Schedule L, Table 1 with each of the limits specified in Schedule C Table 3 for each quality characteristic.
- (L3) Notwithstanding the quality characteristic limits specified in Table 3 Schedule C the effluent released must not have any properties nor contain any organisms or contaminants in concentrations which are capable of causing environmental harm or an environmental nuisance.

SCHEDULE L, TABLE 1 - RELEASE QUALITY CHARACTERISTIC FOR DISCHARGE TO LAND

RELEASE POINT	QUALITY CHARACTERISTICS	RELEASE LIMIT	LIMIT TYPE	MONITORING FREQUENCY
L1	Total -N	3 mg/L	50 percentile compliance	Weekly
	Total - N	10 mg/L	maximum	Weekly
	Total -P	0.1 mg/L	50 percentile compliance	Weekly
	Total - P	1 mg/L	maximum	Weekly
	Ammonia -N	1 mg/L	50 percentile compliance	Weekly
	5-day	<5 mg/L	80 percentile	Weekly

	Biochemical Oxygen Demand		compliance	
	Suspended Solids	<5 mg/L	80 percentile compliance	Weekly
	pH	6.5 – 8.0	range	Daily
	Faecal Coliforms	5 colonies per 100mL sample	geometric mean	Weekly

ACCESS AND SIGNAGE

- (L4) Signage must be placed around the land irrigation area and irrigation equipment warning the public that the area and equipment has been set aside for irrigation by treated effluent, which is not to be used for drinking purposes. The signs must be maintained in a visible and legible condition.
- (L5) Any treated effluent irrigation area must, not be used for:
- (c) recreational activities or as a traffic thoroughfare during irrigation; and
 - (d) any activity which may involve members of the public or employees without appropriate personal protective equipment coming in contact with treated wastewater during irrigation periods and for at least four hours after irrigation has ceased or until irrigated vegetation has dried.

WET WEATHER STORAGE

- (L6) Sufficient wet weather storage should be provided for a 3 month period.

WASTEWATER RELEASE CONTROL

- (L7) When weather conditions or soil conditions preclude the irrigation of treated effluent the treated effluent must only be discharged at location DF1 identified in Schedule X, refer plan and when wet weather storage is at capacity
- (L8) Treated sewage effluent must not be irrigated when weather or soil conditions would cause run-off or ponding of any wastewater irrigated.
- (L9) *The amount of treated sewage effluent irrigated must be matched to the water requirements of the vegetation irrigated, without exceeding a reasonable estimation of the field capacity of the soil, in the root zone, in the irrigation area.*
- (L10) The rate of application of treated sewage effluent to the release area must not exceed the capacity of the soil in the contaminant release area to absorb it.

BUFFER DISTANCES

- (L11) The irrigation of treated effluent must be carried out with a sufficient buffer distance to comply with conditions in schedule B, schedule C and schedule D of this Development Permit.

SUPPLY OF TREATED EFFLUENT FOR THE PURPOSE OF IRRIGATION

- (L12) The holder of the environmental authority is responsible for the quality of the treated effluent released to other parties for the purpose of irrigation. The quality of the effluent must comply, at the sampling point specified, with each of the release limits specified in schedule L,, Table 1 - *Release Quality Characteristic for Discharge to Land* for each quality characteristic.
- (L13) Copies of agreements to supply treated sewage effluent from the Sewage Treatment Plant for the purpose of irrigation must be forwarded to the administering authority within thirty (30) days of the date of their ratification.

WASTEWATER DISPOSAL MANAGEMENT PLAN

- (L14) *The holder of this environmental authority must prepare a Wastewater Irrigation Management Plan as part of the Environmental Management Plan. The Wastewater Irrigation Management Plan is to be developed in accordance with the "Interim Guidelines for the Reuse of Reclaimed Wastewater in Queensland, 1996" produced by the Department of Natural Resources or the "Draft National Guidelines for Sewerage Systems: Reclaimed Water" endorsed by NH&MRC in 2000. The Wastewater Irrigation Management Plan should address at least, but not be limited to, the following matters:*
- (a) the measurement of the quantity and quality of treated effluent produced by the activity;
 - (b) an assessment of the suitability of the area of land available for wastewater irrigation;
 - (c) the definition and clear identification of areas to be used for wastewater irrigation;
 - (d) carrying out daily time step modelling (using MEDLI or similar) to estimate at least wastewater irrigation application rates, the wastewater irrigation area required and the volume of wet weather storage required, taking into account at local tropical climatic conditions, soils in the wastewater irrigation area and the vegetation grown in the wastewater irrigation area;
 - (e) an assessment of surface waters, including stormwater, that may be affected;
 - (f) an assessment of the characteristics of the soils in the wastewater irrigation area including assessment of nutrient and salt levels of the soils in the disposal area and how soils will be managed;
 - (g) an assessment of the potential impacts of odour resulting from wastewater irrigation; and
 - (h) management of human and fauna health issues associated with the irrigation of wastewater.
- (L15) Prior to discharge of wastewater to land the holder of this environmental authority must lodge a copy of the Wastewater Irrigation Management Plan with the administering authority for its review and

comment and have due regard to that comment in the finalisation of the plan.

CONTAMINANT RELEASES TO GROUNDWATER

(C56) There must be no release of contaminants to groundwater.

OVER WATER ABRASIVE BLASTING AND SURFACE COATING

(C57) Where abrasive blasting or surface coating activities are to be carried out over water, on land below the highest astronomical tide or on land subject to 1:10 year flood regime, the holder of this authority must carry out the activity in accordance with the requirements and procedures outlined in the following DERM guidelines to prevent the release of contaminants to waters:

- (a) Over-water abrasive blasting in marine and other aquatic environments; (guideline) and
- (b) Over-water abrasive blasting – environmental risk assessment (information sheet).

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SCHEDULE D – NOISE MANAGEMENT

- (D1) Noise from the construction or operation of LNG plant activities must not cause environmental nuisance at any sensitive place or commercial place.
- (D2) 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.
- (D3) If the authority holder can provide evidence through monitoring that the limits defined in Schedule D – Table 1 are not being exceeded then the holder is not in breach of Condition (D1). Monitoring and subsequent analysis must provide:
- (a) the location (and relevant noise limits) prescribed in Schedule D - Table 1, that is closest to the sensitive place or commercial place that will be used to determine compliance with Condition (D1);
 - (b) a determination of:
 - i. $L_{A_{Max, adj, 15 mins}}$ for construction noise at the sensitive place or commercial place; or,
 - ii. $L_{Aeq, 15 mins}$ for the LNG plant noise (operational) at the sensitive place or commercial place
 - (c) A narrow band analysis and the noise 'signature' of the LNG plant to determine the contribution from the LNG plant to the total noise level at the noise sensitive place or commercial place;
 - (d) the level and frequency of occurrence of impulsive or tonal noise;
 - (e) taking measurements of the low frequency noise below 200 Hz;
 - (f) atmospheric conditions including temperature, wind speed and direction; and
 - (g) location, date and time of recording.
- (D4) If monitoring indicates exceedence of the limits in Schedule D – Table 1 due to the contribution from the construction activities or the LNG plant activities, then the holder of this authority must:
- (a) resolve the complaint with the use of appropriate dispute resolution techniques to the satisfaction of the administering authority; or
 - (b) consider Best Practice Environmental Management in instigating noise abatement measures to comply with noise emission limits in Schedule D – Table 1.
- (D5) The method of measurement and reporting of noise levels must comply with the latest edition of the Department of Environment and Resource Management's Noise Measurement Manual.

SCHEDULE D, TABLE 1 – NOISE COMPONENT LIMITS FOR THE LNG PLANT

Location		Gladstone city	Fishermans Road	Passage are (Tide Island)	South End	Targinie area
	Construction Noise Criteria dB(A), (L _{AMax} , adj, 15 mins)					
	Monday - Friday	7am – 6pm 6pm – 10pm 10pm – 7am	To be finalised following assessment of the EM Plan required by 310D of the Environmental Protection Act 1994			
	Saturday	7am – 12pm 12pm – 6pm 6pm – 7am				
	Sunday/ Public Holidays	7am – 6 pm 6pm – 7am				
	NOTE: (-) Means no criteria apply during this time period					
Operations Noise Criteria dB(A) (L _{Aeq} , 1 hour)						

Monday – Sunday / Public Holidays	7am – 6pm 6pm – 10pm 10pm – 7am	<i>To be finalised following assessment of the EM Plan required by 310D of the Environmental Protection Act 1994</i>
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LOW FREQUENCY NOISE

- (D6) Notwithstanding condition (D1) and the limits specified in Schedule D, Table 1, emission of any noise below 200 Hz must not cause an environmental nuisance.
- (D7) Low frequency noise from the LNG plant is NOT considered to be a nuisance under condition (D6) if monitoring shows that noise emissions do not exceed the following limits:
- 50 dB(Z) measured inside the noise sensitive place or commercial place; and
 - the difference between the internal A-weighted and Z-weighted noise levels is no greater than 15 dB.

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SCHEDULE E – WASTE MANAGEMENT

- (E1) A Waste Management Program (WMP) in accordance with Part 5 of the *Environmental Protection (Waste Management) Policy 2000* must be developed, implemented within 3 (three) months from the date of this authority, and maintained for the authorised petroleum activities.
- (E2) Waste generated in the carrying out the activities must be stored, handled and transferred in a proper and efficient manner. Waste must not be released to the environment, stored, transferred or disposed contrary to any condition of this authority.
- (E3) The holder of this authority must ensure that activities authorised under this environmental authority do not result in the release or likely release of a hazardous contaminant to land or waters.
- (E4) The holder of this authority must ensure that all general waste produced from the conducting of the activities under this environmental authority is removed and disposed of at a facility that is permitted to accept such waste.
- (E5) All regulated waste removed from the site must be removed by a person who holds a current authority to transport such waste under the provisions of the *Environmental Protection Act 1994* and sent to a facility that is permitted to accept such waste.
- (E6) When regulated waste is removed from within the boundary of the authorised facility and transported by the holder of this authority, a record must be kept of the following:
 - a) date of waste transport;
 - b) quantity of waste removed and transported;
 - c) type of waste removed and transported;
 - d) quantity of waste delivered; and
 - e) any incidents (e.g. spillage) that may have occurred en route.
- (E7) Regulated waste is not permitted to be disposed on site, including untreated septic waste, untreated sewage, and concentrate and back wash water from the reverse osmosis plant.

SCHEDULE F – LAND MANAGEMENT**EROSION AND SEDIMENT CONTROL PLANS**

- (F1) An Erosion and Sediment Control Plan must be developed and implemented for all stages of the petroleum activities and which has been certified by a Certified Professional in Sediment and Erosion Control, or a professional with appropriate experience and or qualifications accepted by the administering authority.
- (F2) Appropriate measures to achieve compliance with condition (F1) for the petroleum activity must be described in the EM plan and include:
1. diverting uncontaminated stormwater run-off around areas disturbed by petroleum activities or where contaminants or wastes are stored or handled that may contribute to stormwater;
 2. contaminated stormwater runoff and incident rainfall is collected; and treated, reused, or released in accordance with the conditions of this environmental authority;
 3. roofing or minimising the size of areas where contaminants or wastes are stored or handled;
 4. using alternate materials and or processes (such as dry absorbents) to clean up spills that will minimise the generation of contaminated waters;
 5. erosion and sediment control structures are placed to minimise erosion of disturbed areas and prevent the contamination of any waters;
 6. an inspection and maintenance program for the erosion and sediment control features;
 7. provision for adequate access to maintain all erosion and sediment control measures especially during the wet season months from December to March; and
 8. identification of remedial actions that would be required to ensure compliance with the conditions of this environmental authority.
- (F3) Erosion protection measures and sediment control measures must be implemented and maintained to minimise erosion and the release of sediment and contamination of stormwater.
- (F4) The maintenance and cleaning of any vehicles, plant or equipment must not be carried out in areas from which contaminants can be released into any waters, roadside gutter or a stormwater drainage system.
- (F5) Any spillage of wastes, contaminants or other materials must be cleaned up as quickly as practicable. Such spillages must be cleaned up using dry methods that minimise the release of wastes, contaminants or materials to any stormwater drainage system, roadside gutter or waters.

ACID SULFATE SOILS

- (F6) The holder of this authority must conduct an acid sulfate soils (ASS) investigation prior to construction and in accordance with the requirements of the State Planning Policy 2/02 *Development involving Acid Sulfate Soils* and relevant guidelines such as the *Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland 1998*.
- (F7) Acid sulfate soils must be managed in accordance with:
 - (a) the *Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines 2002* such that contaminants are not directly or indirectly released, as a result of the activity, to any waters or the bed and banks of any waters; and,
 - (b) an Acid Sulfate Soil Management Plan (ASSMP), implemented over the full period of construction, and for a period after completion of construction as defined by the ASSMP, for land above the mean high water springs tide; and
 - (c) Acid Sulfate Soil Management Plans (ASSMP), implemented over the full period of construction, and for a period after completion of construction as defined by the ASSMP for works below the mean high water springs tide.
- (F8) The holder of the environmental authority must submit the Acid Sulfate Soil Management Plans required by condition (F7), to the administering authority for its review and comment and have due regard to that comment in the finalisation of the plan.
- (F9) As soon as practicable and within 3 (three) months of cessation of authorised activities that cause any significant disturbance to land, the holder of this authority must investigate contaminated land status in accordance with *Environmental Protection Act 1994* requirements and the NEPM where land has been subject to contamination caused by activities authorised under this authority;

PEST AND WEED SPECIES

- (F10) Pest and weed species must be managed to prevent their growth and proliferation.

LAND DISTURBANCE

- (F11) The holder of this authority, when carrying out petroleum activities must:
 - (a) avoid, minimise or mitigate (in order of preference) any impacts on areas of vegetation or other areas of ecological value;
 - (b) minimise the risk of injury, harm, or entrapment to wildlife and stock;
 - (c) minimise disturbance to land that may otherwise result in land degradation;
 - (d) ensure that for land that is to be significantly disturbed by petroleum activities:
 - i. the top layer of the soil profile is removed;

- ii. stockpiled in a manner that will preserve its biological and chemical properties; and
 - iii. used for rehabilitation purposes;
- (e) prior to carrying out field based activities, make all relevant staff, contractors or agents carrying out those activities, aware of the location of any category A, B or C ESA's and the requirements of this environmental authority.

Note: This environmental authority does not authorise the taking of protected animals or the tampering with an animal breeding place as defined under the Nature Conservation Act 1992 and Regulations.

VEGETATION CLEARING

- (F12) A total maximum area of XXXX hectares of vegetation can be cleared within the boundary of PFXXXX, comprising: **<INSERT Specific disturbance>**
- (F13) Cleared vegetation is not authorised to be burnt on-site.

MANAGEMENT OF FAUNA

- (F14) The holder of this authority must develop and implement a species management plan for affected endangered, vulnerable and rare listed species (both terrestrial and marine) for PFL11 including, construction, operation and decommissioning phases. The plan shall be developed to:
- (a) address the impacts to the species;
 - (b) provide for the survival of the species in the wild; and
 - (c) achieve a net conservation benefit for the species.
- (F15) A suitably qualified, licensed and experienced fauna spotter will be present during the vegetation clearing activities to relocate fauna prior to clearing and recover any injured fauna.
- (F16) The holder of this authority must ensure any protected animals injured by clearing activities under this permit are referred to an appropriate wildlife carer group or veterinarian (to be predetermined prior to clearing) and the administering authority must be notified within 24 hours of any injuries or deaths.
- (F17) Unless required for the safe construction and operation of the LNG Plant, the holder of this authority must minimise lighting disturbance to marine turtles by:
- (a) physically shielding lights and directing the lights onto work areas;
 - (b) keeping light heights as low as practicable;
 - (c) using long wave length lights instead of short wavelength lights unless required for the safe operation of the LNG Facility;
 - (d) minimising reflective surfaces; and

(e) fitting motion detectors and light timers where practicable.

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**SCHEDULE G – STORAGE AND HANDLING OF CHEMICALS,
FLAMMABLE AND COMBUSTIBLE SUBSTANCES**

- (G1) All explosives, hazardous chemicals, corrosive substances, toxic substances, gases, dangerous goods, flammable and combustible liquids (including petroleum products and associated piping and infrastructure) must be stored and handled in accordance with the relevant Australian Standard where such is available.
- (G2) Notwithstanding the requirements of any Australian Standard and any other relevant Australian or State legislation, any liquids stored on site that have the potential to cause environmental harm must be stored in or serviced by an effective containment system that is impervious to the materials stored and managed to prevent the release of liquids to waters or land. Where no relevant Australian Standard is available, the following must be applied:
- a) storage tanks must be bunded so that the capacity and construction of the bund is sufficient to contain at least 110% of a single storage tank or 100% of the largest storage tank plus 10% of the second largest storage tank in multiple storage areas; and
 - b) drum storages must be bunded so that the capacity and construction of the bund is sufficient to contain at least 25% of the maximum design storage volume within the bund.
- (G3) All containment systems must be roofed and designed to minimise rainfall collection within the system.

SCHEDULE H - PETROLEUM INFRASTRUCTURE

- (H1) All infrastructure (including buildings, structures, petroleum equipment and plant erected and/or used for the authorised activities) but excluding the Material Offload Facility and haul road, authorised under this authority must be removed from the relevant environmental authority prior to surrender of this authority, except where agreed in writing by the administering authority and the current landowner.
- (H2) Prior to the commencement of decommissioning or abandonment activities, the scope of work for decommissioning or abandonment of project infrastructure shall be developed and agreed to with the administering authority.

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SCHEDULE I – MONITORING PROGRAMS

- (11) The holder of this authority must:
 - a) develop and implement a monitoring program, within six (6) months from the date of this approval or three (3) months from commencement of construction activities, that will demonstrate compliance with the conditions in this authority; and
 - b) document the monitoring and inspections carried out under the program and any actions taken.
- (12) The holder of this authority must ensure that a suitably qualified, experienced and competent person(s) conducts all monitoring required by this authority.
- (13) The holder of this authority must record, compile and keep for a minimum of five (5) years all monitoring results required by this authority and make available for inspection all or any of these records upon request by the administering authority. Monitoring results relating to rehabilitation should be kept until the administering authority has accepted surrender of the environmental authority.
- (14) Any management or monitoring plans, systems or programs required to be developed and implemented by a condition of this authority must be reviewed for performance and amended if required on an annual basis.
- (15) An annual monitoring report must be prepared each year and presented in the format requested (including electronic) to the administering authority when requested. Information and results held by the administering authority in relation to this approval may be used for any purpose including supply to third parties. This report shall include but not be limited to:
 - a) a summary of the previous twelve (12) months monitoring results obtained under any monitoring programs required under this authority and, a comparison of the previous twelve (12) months monitoring results to both this authority limits and to relevant prior results; and
 - b) an evaluation/explanation of the data from any monitoring programs; and
 - c) a summary of any record of quantities of releases required to be kept under this authority; and
 - d) a summary of the record of equipment failures or events recorded for any site under this approval; and
 - e) an outline of actions taken or proposed to minimise the environmental risk from any deficiency identified by the monitoring or recording programs.

SCHEDULE J – COMMUNITY ISSUES

- (J1) When the administering authority advises the holder of a complaint alleging environmental nuisance, the holder must investigate the complaint and advise the administering authority in writing of the action proposed or undertaken in relation to the complaint.
- (J2) When requested by the administering authority, the holder of this authority must undertake monitoring specified by the administering authority, within a reasonable and practicable timeframe nominated by the administering authority, to investigate any complaint of environmental harm at any sensitive or commercial place.
- (J3) The results of the investigation (including an analysis and interpretation of the monitoring results) and abatement measures implemented must be provided to the administering authority within fourteen (14) days of completion of the investigation, or receipt of monitoring results, whichever is the latter.
- (J4) If monitoring in accordance with Condition (J2), indicates that emissions exceed the limits set by this authority or are causing environmental nuisance, then the holder of this authority must:
 - a) address the complaint including the use of appropriate dispute resolution if required; and/or
 - b) as soon as practicable implement abatement or attenuation measures so that noise, dust, particulate or odour emissions from the authorised activities do not result in further environmental nuisance.
- (J5) Maintain a record of complaints and incidents causing environmental harm, and actions taken in response to the complaint or incident; and
- (J6) The holder of this authority must record the following details for all complaints received and provide this information to the administering authority on request:
 - a) name, address and contact number for complainant;
 - b) time and date of complaint;
 - c) reasons for the complaint;
 - d) investigations undertaken;
 - e) conclusions formed;
 - f) actions taken to resolve complaint;
 - g) any abatement measures implemented; and
 - h) person responsible for resolving the complaint.
- (J7) The holder of this authority must retain the record of complaints required by this condition for five (5) years.

SCHEDULE K – NOTIFICATION PROCEDURES

- (K1) The holder of this authority must telephone the Department of Environment and Resource Management's Pollution Hotline (1300 130 372) on the day of becoming aware of any release of contaminants or any event where environmental harm has been caused or may be threatened not in accordance with the conditions of this authority.
- (K2) The holder of this authority is required to report on the day of becoming aware of, in the case of uncontained spills (including hydrocarbon, contaminated water or mixtures of both), the following volumes or kind:
- a) releases of any volume to water;
 - b) releases of water contaminated with hydrocarbons of volume greater than 200L to land; and
 - c) releases of any volumes where potential serious or material environmental harm is considered to exist.
- (K3) The notification of emergencies or incidents as required by Conditions number (K1 and K2) must include but not be limited to the following:
- a) the authority number and name of holder;
 - b) the name and telephone number of the designated contact person;
 - c) the location of the emergency or incident;
 - d) the date and time of the release;
 - e) the time the holder of the authority became aware of the emergency or incident;
 - f) the estimated quantity and type of any substances involved in the incident;
 - g) the actual or potential suspected cause of the release;
 - h) a description of the effects of the incident including the environmental harm caused, threatened, or suspected to be caused by the release;
 - i) any sampling conducted or proposed, relevant to the emergency or incident; and
 - j) actions taken to prevent any further release and mitigate any environmental harm caused by the release.
- (K4) Within fourteen (14) days following the initial notification of an emergency or incident or receipt of monitoring results, whichever is the later, further written advice must be provided to the administering authority, including the following:
- a) results and interpretation of any samples taken and analysed;
 - b) outcomes of actions taken at the time to prevent or minimise environmental harm; and
 - c) proposed actions to prevent a recurrence of the emergency or incident.

- (K5) As soon as practicable, but not more than six (6) weeks following the conduct of any environmental monitoring performed in relation to the 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 this authority, written advice must be provided of the results of any such monitoring performed to the administering authority.

End of Conditions

RTI DL RELEASE - EHP

DEFINITIONS

APPENDIX 3

Note: Where a term is not defined in an environmental authority the definition in the Environmental Protection Act 1994, its regulations and Environmental Protection Policies or the Petroleum and Gas (Production and Safety) Act 2004 and its regulations must be used in that order.

“associated works” in relation to a dam, means:

- operations of any kind and all things constructed, erected or installed for that dam; and
- any land used for those operations.

“background noise level” means the sound pressure level, measured in the absence of the noise under investigation, as the L A90,T being the A-weighted sound pressure level exceeded for 90 percent of the measurement time period T of not less than 15 minutes, using Fast response.

“bed and banks” for a watercourse or wetland means land over which the water of the watercourse or wetland normally flows or that is normally covered by the water, whether permanently or intermittently; but does not include land adjoining or adjacent to the bed or banks that is from time to time covered by floodwater.

“beneficial use” means

- with respect to dams, that the current or proposed owner of the land on which a dam stands, has found a use for that dam that is:
 - of benefit to that owner in that it adds real value to their business or to the general community,
 - in accordance with relevant provisions of the *Environmental Protection Act 1994*,
 - sustainable by virtue of written undertakings given by that owner to maintain that dam, and
 - the transfer and use have been approved or authorised under any relevant legislation. Or
- with respect to coal seam gas water, refer the DERM’s Operational Policy *Management of water produced in association with petroleum activities (CSG water)* and *Notice of decision to approve a resource for beneficial use – CSG water* which can be accessed on DERM’s website at www.derm.qld.gov.au.

“brine” means either saline water with a total dissolved solid concentration greater than 40 000mg/l or CSG water after it has been concentrated through water treatment processes and/or evaporation.

“bund or bunded” in relation to spill containment systems for fabricated or manufactured tanks or containers designed to a recognised standard means an embankment or wall of brick, stone, concrete or other impervious material which may form part or all of the perimeter of a compound and provides a barrier to retain liquid. Since the bund is the main part of a spill containment system, the whole system (or bunded area) is sometimes colloquially referred to within industry as the bund. The bund is designed to contain spillages and leaks from liquids used, stored or processed above ground and to facilitate clean-up operations. As well as being used to prevent pollution of the receiving environment, bunds are also used for fire protection, product recovery and process isolation.

“category A ESA” means any area listed in Section 25 of the *Environmental Protection Regulation 2008*.

“category B ESA” means any area listed in Section 26 of the *Environmental Protection Regulation 2008*.

“category C ESA” means any of the following areas:

- Nature Refuges as defined under the *Nature Conservation Act 1992*;
- Koala Habitat Areas as defined under the *Nature Conservation Act 1992*;
- State Forests or Timber Reserves as defined under the *Forestry Act 1959*;
- Declared catchment areas under the *Water Act 2000*;
- Resources reserves under the *Nature Conservation Act 1992*
- An area identified as “Essential Habitat” for a species of wildlife listed as endangered, vulnerable, rare or near threatened under the *Nature Conservation Act 1992*;

- Any wetland shown on the Map of Referable Wetlands available from DERM's website; or
- "Of concern" regional ecosystems identified in the database maintained by DERM called 'Regional ecosystem description database' containing regional ecosystem numbers and descriptions.

"certification or certified by a suitably qualified and experienced person" in relation to a design plan or an annual report regarding dams, means that a statutory declaration has been made by that person and, when taken together with any attached or appended documents referenced in that declaration, all of the following aspects are addressed and are sufficient to allow an independent audit at any time:

- exactly what is being certified and the precise nature of that certification.
- the relevant legislative, regulatory and technical criteria on which the certification has been based;
- the relevant data and facts on which the certification has been based, the source of that material, and the efforts made to obtain all relevant data and facts; and
- the reasoning on which the certification has been based using the relevant data and facts, and the relevant criteria.

"clearing" means:

- in relation to grass, scrub or bush—the removal of vegetation by disturbing root systems and exposing underlying soil (including burning), but does not include—
 - the flattening or compaction of vegetation by vehicles if the vegetation remains living; or
 - the slashing or mowing of vegetation to facilitate access tracks; or
 - the clearing of noxious or introduced plant species; and
- in relation to trees—cutting down, ringbarking, pushing over, poisoning or destroying in any way.

"commercial place" means a work place used as an office or for business or commercial purposes, which is not part of the petroleum activities and does not include employees accommodation or public roads.

"construction" in relation to a dam includes building a new dam and modifying or lifting an existing dam.

"CSG water" means groundwater that is necessarily or unavoidably brought to the surface in the process of coal seam gas exploration or production. CSG water typically contains significant concentrations of salts, has a high sodium adsorption ratio (SAR) and may contain other contaminants that have the potential to cause environmental harm if released to land or waters through inappropriate management. CSG water is a waste, as defined under s13 of the EP Act.

"CSG water dams" include any type of dam (storage or evaporation) used to contain groundwater that is necessarily or unavoidably brought to the surface in the process of coal seam gas exploration or production.

"dam" means a land-based structure or a void that is designed to contain, divert or control flowable substances, and includes any substances that are thereby contained, diverted or controlled by that land-based structure or void and associated works. A dam does *not* mean a fabricated or manufactured tank or container, designed and constructed to an Australian Standard that deals with strength and structural integrity of that tank or container.

"design plan" means the documentation required to describe the physical dimensions of the dam, the materials and standards to be used for construction of the dam, and the criteria to be used for operating the dam. The documents must include design and investigation reports, specifications and certifications, together with the planned decommissioning and rehabilitation works and outcomes. A design plan may include 'as constructed' drawings.

"discharge area" means:

- that part of the land surface where groundwater discharge produces a net movement of water out of the groundwater; and
- identified by an assessment process consistent with the document: Salinity Management Handbook, Queensland Department of Natural Resources, 1997; or
- identified by an approved salinity hazard map held by the Department of Environment and Resource Management.

"ecosystem functioning" means the interactions between and within living and nonliving components of an ecosystem and generally correlates with the size, shape and location of an area of vegetation.

“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 petroleum activity, the time at which the petroleum authority ends or the time that the land in question ceases to be part of an authority.

“equivalent person or EP” means an equivalent person under volume 1, section 2 of the *Guidelines for Planning and Design of Sewerage Schemes*, October 1991, published by the Water Resources Commission, Department of Primary Industries, Fisheries and Forestry.

“evaporation dam” means a dam where CSG water or brine is contained until the water content has been removed by evaporation.

“fill” means any kind of material in solid form (whether or not naturally occurring) capable of being deposited at a place but does not include material that forms a part of, or is associated with, a structure constructed in a watercourse, wetland or spring including a bridge, road, causeway, pipeline, rock revetment, drain outlet works, erosion prevention structure or fence.

“flowable substance” means matter or a mixture of materials which can flow under any conditions potentially affecting that substance. Constituents of a flowable substance can include water, other liquids fluids or solids, or a mixture that includes water and any other liquids fluids or solids either in solution or suspension.

“foreseeable future” means the period used for assessing the total probability of an event occurring. Permanent structures and ecological sustainability should be expected to still exist at the end of a 150 year foreseeable future with an acceptably low probability of failure before that time.

“hazard” in relation to a dam as defined, means the potential for environmental harm resulting from the collapse or failure of the dam to perform its primary purpose of containing, diverting or controlling flowable substances.

“hazard category” means a category, either low significant or high, into which a dam is assessed as a result of the application of tables and other criteria in *DERM’s Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (Version 1.0, 2008)* or any updated version of the Manual that becomes available from time to time

“heritage place” means any place that may be of cultural heritage significance, or any place with potential to contain archaeological artefacts that are an important source of information about Queensland’s history.

“high bank” means the defining terrace or bank or, if no bank is present, the point on the active floodplain, which confines the average annual peak flows in a watercourse.

“highly erodible soils” means very unstable soils that are generally described as Sodosols with hard –setting, fine sandy loam to silty clay loam surfaces (solodics, solodised solonetz and solonetz) or soils with a dispersible layer located less than 25cm deep or soils less than 25cm deep.

“hydraulic performance” means the capacity of a regulated dam to contain or safely pass flowable substances based on a probability (AEP) of performance failure specified for the relevant hazard category in the *Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (Version 1.0, 2008)* published by the Environmental Protection Agency on its website.

“impulsive sound” means sound characterised by brief excursions of sound pressure (acoustic impulses) that significantly exceed the background sound pressure. The duration of a single impulsive sound is usually less than one second.

“infrastructure” means water storage dams, roads and tracks, equipment, buildings and other structures built for the purpose and duration of the conduct of the petroleum activities, but does not include other facilities required for the long term management of the impact of those activities or the protection of potential resources. Such other facilities include dams other than water storage dams (e.g. evaporation dams), pipelines and assets, that have been decommissioned, rehabilitated, and lawfully recognised as being subject to subsequent transfer with ownership of the land.

“itinerant activities” means [to be defined through the noise consultation process].

“lake” means:

- (a) a lagoon, swamp or other natural collection of water, whether permanent or intermittent; and
- (b) the bed and banks and any other element confining or containing the water.

“landfill monocell” means a specialised, isolated landfill facility where a single specific waste type is exclusively disposed (i.e. salt).

“leachate” means a liquid that has passed through or emerged from, or is likely to have passed through or emerged from, a material stored, processed or disposed of on site which contains soluble, suspended or miscible contaminants likely to have been derived from the said material.

“levee” means a dyke or bund that is designed only to provide for the containment and diversion of stormwater or flood flows from a contributing catchment, or containment and diversion of flowable materials resulting from unplanned releases from other works of infrastructure, during the progress of those stormwater or flood flows or those unplanned releases; and does not store any significant volume of water or flowable substances at any other times.

“limited petroleum activities” mean activities including geophysical surveys (including seismic activities), well sites, well pads, sumps, flare pits, flow lines and supporting access tracks. Limited petroleum activities do not include the construction of production infrastructure for processing or storing petroleum or by-products, dams, compressor stations, campsites/workforce accommodation, power supplies, waste disposal or other supporting infrastructure for the project.

“max $L_{PZ,15 \text{ min}}$ min” means the maximum value of the Z-weighted sound pressure level measured over 15 minutes.

“mg/L” means milligrams per litre.

“overland flow water” means water, including floodwater, flowing over land, otherwise than in a watercourse or lake:

- after having fallen as rain or in any other way; or
- after rising to the surface naturally from underground.

“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.

“pest” means species:

- (a) declared under the *Land Protection (Pest and Stock route Management) Act 2002*;
- (b) declared under Local Government model local laws; and
- (c) which may become invasive in the future.

“ppt” means parts per thousand.

“regulated dam” means any dam in the significant or high hazard category as assessed using the *Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (Version 1.0, 2008)* or any updated version of the Manual that becomes available from time to time

“rehabilitation” means the process of reshaping and revegetating land to restore it to a stable landform and in accordance with the acceptance criteria set out in this environmental authority and, where relevant, includes remediation of contaminated land

“remnant unit” means a continuous area of remnant vegetation representative of a single Regional Ecosystem type or a single heterogeneous unit (multiple Regional Ecosystem types that cannot be distinguished individually due to the scale of mapping).

“River Improvement Trust Asset Area” means an area within a River Improvement Area declared under the *River Improvement Trust Act 1940* that is or has been subject to restoration or flood mitigation works. The locations and details of these areas can be obtained from the relevant River Improvement Trust.

“sensitive place” means

- a dwelling (including residential allotment, mobile home or caravan park, residential marina or other residential premises, motel, hotel or hostel; or
- a library, childcare centre, kindergarten, school, university or other educational institution;
- a medical centre, surgery or hospital; or
- a protected area; or
- a public park or garden that is open to the public (whether or not on payment of money) for use other than for sport or organised entertainment.

“significantly disturbed land or significant disturbance to land” means disturbance to land as defined in section 28 of the *Environmental Protection Regulation 2008*.

“site” means the petroleum authority(ies) to which the environmental authority relates.

“spring” means the land to which water rises naturally from below the ground and the land over which the water then flows.

“stable” in relation to land, means landform dimensions are or will be stable within tolerable limits now and in the foreseeable future. Stability includes consideration of geotechnical stability, settlement and consolidation allowances, bearing capacity (trafficability), erosion resistance and geochemical stability with respect to seepage, leachate and related contaminant generation.

“state heritage place” means a place entered in the Queensland heritage register under Part 4 of the *Queensland Heritage Act 1992*.

“suitably qualified person” means a person who has professional qualifications, training, skills or experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis to performance relative to the subject matter using the relevant protocols, standards, methods or literature.

“suitably qualified and experienced person” in relation to a hazard assessment of a dam, means that a statutory declaration has been made by that person and, when taken together with any attached or appended documents referenced in that declaration, all of the following aspects are addressed and are sufficient to allow an independent audit at any time:

- exactly what has been assessed and the precise nature of that assessment;
- the relevant legislative, regulatory and technical criteria on which the assessment has been based;
- the relevant data and facts on which the assessment has been based, the source of that material, and the efforts made to obtain all relevant data and facts; and
- the reasoning on which the assessment has been based using the relevant data and facts, and the relevant criteria.

“suitably qualified and experienced person” in relation to dams means one who is a Registered Professional Engineer of Queensland (RPEQ) under the provisions of the Professional Engineers Act 1988, OR registered as a National Professional Engineer (NPER) with the Institution of Engineers Australia, OR holds equivalent professional qualifications to the satisfaction of the administering authority for the Act; AND the administering authority for the Act is satisfied that person has knowledge, suitable experience and demonstrated expertise in relevant fields, as set out below:

- knowledge of engineering principles related to the structures, geomechanics, hydrology, hydraulics, chemistry and environmental impact of dams; and
- a total of five years of suitable experience and demonstrated expertise in the geomechanics of dams with particular emphasis on stability, geology and geochemistry, and
- a total of five years of suitable experience and demonstrated expertise each, in three of the following categories:
 - investigation and design of dams.
 - Construction, operation and maintenance of dams.
 - hydrology with particular reference to flooding, estimation of extreme storms, water management or meteorology.
 - hydraulics with particular reference to sediment transport and deposition, erosion control, beach processes.
 - hydrogeology with particular reference to seepage, groundwater.
 - solute transport processes and monitoring thereof.
 - dam safety.

“third party auditor” means a suitably qualified person who is either a certified third party auditor or an internal auditor employed by the holder of the environmental authority and the person is independent of the day to day management and operation of activities covered by this environmental authority

“threatening processes” means processes, features and actions that can have a detrimental effect upon the health and viability of an area of vegetation. For example altered hydrology, land use practices, invasion by pest and weed species, land degradation, edge effects and fragmentation.

“tolerable limits” means a range of parameters regarded as being sufficient to meet the objective of protecting relevant environmental values. For example, a range of settlement for

a tailings capping, rather than a single value, could still meet the objective of draining the cap quickly, preventing damage and limiting infiltration and percolation.

“topsoil” means the surface (top) layer of a soil profile, which is more fertile, darker in colour, better structured and supports greater biological activity than underlying layers. The surface layer may vary in depth depending on soil forming factors, including parent material, location and slope, but generally is not greater than about 300mm in depth from the natural surface.

“void” means any man-made, open excavation in the ground (includes borrow pits, drill sumps, frac pits, flare pits, cavitation pits and trenches).

“waters” includes all or any part of a creek, river, stream, lake, lagoon, dam, swamp, wetland, spring, unconfined surface water, unconfined water in natural or artificial watercourses, 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 underground water.

“watercourse” means a river, creek or stream in which water flows permanently or intermittently:

- (a) in a natural channel, whether artificially improved or not; or
- (b) in an artificial channel that has changed the course of the watercourse; but, in any case, only:
- (c) unless a regulation under paragraph (d), (e) or (f) declares otherwise at every place upstream of the point (point A) to which the high spring tide ordinarily flows and reflows, whether due to a natural cause or to an artificial barrier; or
- (d) if a regulation has declared an upstream limit for the watercourse-the part of the river, creek or stream between the upstream limit and point A; or
- (e) if a regulation has declared a downstream limit for the watercourse-the part of the river, creek or stream upstream of the limit; or
- (f) if a regulation has declared an upstream and a downstream limit for the watercourse-the part of the river, creek or stream between the upstream and the downstream limits.

Watercourse includes the bed and banks and any other element of a river, creek or stream confining or containing water.

“wetland” means an area shown as a wetland on a ‘Map of referable wetlands’, a document approved by the chief executive (environment). A map of referable wetlands can be viewed at www.derm.qld.gov.au.

“wild river declaration” means a statutory instrument under the *Wild Rivers Act 2005*. A declaration lists the relevant natural values to be preserved and delineates certain parts of the wild river area and the different constraints that may apply in these areas. With reference to environmental authorities for petroleum, each declaration also specifies conditions to be included in a new authority if the activity is to be located within the wild river area.

Definitions

Aggregation dam is a dam that receives and contains CSG water or CSG water concentrate. An aggregation dam must be designed and operated so that during any period of thirty (30) days, following the first ninety (90) days of operation of the dam, the total volume of water leaving the dam other than by evaporation must not be less than 85% of the volume of water that has entered the dam.

Brine is defined as saline water with a total dissolved solid concentration greater than 40 000mg/l.

Brine dam means a dam designed to receive, contain or evaporate brine.

CSG water is defined as underground water brought to the surface of the earth or moved underground in connection with exploring for or producing coal seam gas.

CSG water concentrate is the concentrated saline water waste stream from a water treatment process that does not exceed a total dissolved solid concentration of 40 000mg/l.

CSG evaporation dam is defined as an impoundment, enclosure or structure that is designed to be used to hold CSG water for evaporation.

Definitions

“associated works” in relation to a dam, means:

- operations of any kind and all things constructed, erected or installed for that dam; and
- any land used for those operations.

“background noise level” means the sound pressure level, measured in the absence of the noise under investigation, as the L A90, T being the A-weighted sound pressure level exceeded for 90 percent of the measurement time period T of not less than 15 minutes, using Fast response.

“bed and banks” for a watercourse or wetland means land over which the water of the watercourse or wetland normally flows or that is normally covered by the water, whether permanently or intermittently; but does not include land adjoining or adjacent to the bed or banks that is from time to time covered by floodwater.

“beneficial use” means

- with respect to dams, that the current or proposed owner of the land on which a dam stands, has found a use for that dam that is:
 - of benefit to that owner in that it adds real value to their business or to the general community,
 - in accordance with relevant provisions of the *Environmental Protection Act 1994*,
 - sustainable by virtue of written undertakings given by that owner to maintain that dam, and
 - the transfer and use have been approved or authorised under any relevant legislation. Or
- with respect to coal seam gas water, refer the DERM’s Operational Policy *Management of water produced in association with petroleum activities (CSG water)* and *Notice of decision to approve a resource for beneficial use – CSG water* which can be accessed on DERM’s website at www.derm.qld.gov.au.

“brine” means either saline water with a total dissolved solid concentration greater than 40,000 mg/l or CSG water after it has been concentrated through water treatment processes and/or evaporation.

“bund or banded” in relation to spill containment systems for fabricated or manufactured tanks or containers designed to a recognised standard means an embankment or wall of brick, stone, concrete or other impervious material which may form part or all of the perimeter of a compound and provides a barrier to retain liquid. Since the bund is the main part of a spill containment system, the whole system (or banded area) is sometimes colloquially referred to within industry as the bund. The bund is designed to contain spillages and leaks from liquids used, stored or processed above ground and to facilitate clean-up operations. As well as being used to prevent pollution of the receiving environment, bunds are also used for fire protection, product recovery and process isolation.

“category A ESA” means any area listed in Section 25 of the *Environmental Protection Regulation 2008*.

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“category C ESA” means any of the following areas:

- Nature Refuges as defined under the *Nature Conservation Act 1992*;
- Koala Habitat Areas as defined under the *Nature Conservation Act 1992*;
- State Forests or Timber Reserves as defined under the *Forestry Act 1959*;
- Declared catchment areas under the *Water Act 2000*;
- Resources reserves under the *Nature Conservation Act 1992*;
- An area identified as “Essential Habitat” for a species of wildlife listed as endangered, vulnerable, rare or near threatened under the *Nature Conservation Act 1992*, and adopted for the purpose of the *Vegetation Management Act 1999*;

- Any wetland shown on the Map of Referable Wetlands available from DERM's website; or
- "Of concern" regional ecosystems identified in the database maintained by DERM called 'Regional ecosystem description database' containing regional ecosystem numbers and descriptions.

"certification or certified by a suitably qualified and experienced person" in relation to a design plan or an annual report regarding dams, means that a statutory declaration has been made by that person and, when taken together with any attached or appended documents referenced in that declaration, all of the following aspects are addressed and are sufficient to allow an independent audit at any time:

- exactly what is being certified and the precise nature of that certification;
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- the relevant data and facts on which the certification has been based, the source of that material, and the efforts made to obtain all relevant data and facts; and
- the reasoning on which the certification has been based using the relevant data and facts, and the relevant criteria.

"clearing" means:

- in relation to grass, scrub or bush—the removal of vegetation by disturbing root systems and exposing underlying soil (including burning), but does not include—
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 - the slashing or mowing of vegetation to facilitate access tracks; or
 - the clearing of noxious or introduced plant species; and
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"commercial place" means a work place used as an office or for business or commercial purposes, which is not part of the petroleum activities and does not include employees accommodation or public roads.

"construction" in relation to a dam includes building a new dam and modifying or lifting an existing dam.

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"CSG water dams" include any type of dam (storage or evaporation) used to contain groundwater that is necessarily or unavoidably brought to the surface in the process of coal seam gas exploration or production.

"dam" means a land-based structure or a void that is designed to contain, divert or control flowable substances, and includes any substances that are thereby contained, diverted or controlled by that land-based structure or void and associated works. A dam does *not* mean a fabricated or manufactured tank or container, designed and constructed to an Australian Standard that deals with strength and structural integrity of that tank or container.

"design plan" means the documentation required to describe the physical dimensions of the dam, the materials and standards to be used for construction of the dam, and the criteria to be used for operating the dam. The documents must include design and investigation reports, specifications and certifications, together with the planned decommissioning and rehabilitation works and outcomes. A design plan may include 'as constructed' drawings.

"discharge area" means:

- (a) that part of the land surface where groundwater discharge produces a net movement of water out of the groundwater; and
- (b) identified by an assessment process consistent with the document *Salinity Management Handbook, Queensland Department of Natural Resources, 1997*; or
- (c) identified by an approved salinity hazard map held by the Department of Environment and Resource Management.

“ecosystem functioning” means the interactions between and within living and nonliving components of an ecosystem and generally correlates with the size, shape and location of an area of vegetation.

“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 petroleum activity, the time at which the petroleum authority ends or the time that the land in question ceases to be part of an authority.

“equivalent person” or “EP” means an equivalent person under volume 1, section 2 of the *Guidelines for Planning and Design of Sewerage Schemes*, October 1991, published by the Water Resources Commission, Department of Primary Industries, Fisheries and Forestry.

“evaporation dam” means a dam where CSG water or brine is contained until the water content has been removed by evaporation.

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“foreseeable future” means the period used for assessing the total probability of an event occurring. Permanent structures and ecological sustainability should be expected to still exist at the end of a 150 year foreseeable future with an acceptably low probability of failure before that time.

“hazard” in relation to a dam as defined, means the potential for environmental harm resulting from the collapse or failure of the dam to perform its primary purpose of containing, diverting or controlling flowable substances.

“hazard category” means a category, either low significant or high, into which a dam is assessed as a result of the application of tables and other criteria in DERM's *Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (Version 1.0, 2008)* or any updated version of the Manual that becomes available from time to time

“heritage place” means any place that may be of cultural heritage significance, or any place with potential to contain archaeological artefacts that are an important source of information about Queensland's history.

“high bank” means the defining terrace or bank or, if no bank is present, the point on the active floodplain, which confines the average annual peak flows in a watercourse.

“highly erodible soils” means very unstable soils that are generally described as Sodosols with hard –setting, fine sandy loam to silty clay loam surfaces (solodics, solodised solonetz and solonetz) or soils with a dispersible layer located less than 25 cm deep or soils less than 25 cm deep.

“hydraulic performance” means the capacity of a regulated dam to contain or safely pass flowable substances based on a probability (AEP) of performance failure specified for the relevant hazard category in the *Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (Version 1.0, 2008)* published by the Environmental Protection Agency on its website.

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“infrastructure” means water storage dams, roads and tracks, equipment, buildings and other structures built for the purpose and duration of the conduct of the petroleum activities, but does not include other facilities required for the long term management of the impact of those activities or the protection of potential resources. Such other facilities include dams other than water storage dams (e.g. evaporation dams), pipelines and assets, that have been decommissioned, rehabilitated, and lawfully recognised as being subject to subsequent transfer with ownership of the land.

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- (a) a lagoon, swamp or other natural collection of water, whether permanent or intermittent; and
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“leachate” means a liquid that has passed through or emerged from, or is likely to have passed through or emerged from, a material stored, processed or disposed of on site which contains soluble, suspended or miscible contaminants likely to have been derived from the said material.

“levee” means a dyke or bund that is designed only to provide for the containment and diversion of stormwater or flood flows from a contributing catchment, or containment and diversion of flowable materials resulting from unplanned releases from other works of infrastructure, during the progress of those stormwater or flood flows or those unplanned releases; and does not store any significant volume of water or flowable substances at any other times.

“limited petroleum activities” mean activities including geophysical surveys (including seismic activities), well sites, well pads, sumps, flare pits, flow lines and supporting access tracks. Limited petroleum activities do not include the construction of production infrastructure for processing or storing petroleum or by-products, dams, compressor stations, campsites/workforce accommodation, power supplies, waste disposal or other supporting infrastructure for the project.

“max $L_{pZ,15 \text{ min}}$ ” means the maximum value of the Z-weighted sound pressure level measured over 15 minutes.

“mg/L” means milligrams per litre.

“overland flow water” means water, including floodwater, flowing over land, otherwise than in a watercourse or lake:

- after having fallen as rain or in any other way; or
- after rising to the surface naturally from underground.

“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.

“pest” means species:

- (a) declared under the *Land Protection (Pest and Stock route Management) Act 2002*;
- (b) declared under Local Government model local laws; and
- (c) which may become invasive in the future.

“ppt” means parts per thousand.

“regulated dam” means any dam in the significant or high hazard category as assessed using the *Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (Version 1.0, 2008)* or any updated version of the Manual that becomes available from time to time.

“rehabilitation” means the process of reshaping and revegetating land to restore it to a stable landform and in accordance with the acceptance criteria set out in this environmental authority and, where relevant, includes remediation of contaminated land.

“remnant unit” means a continuous area of remnant vegetation representative of a single Regional Ecosystem type or a single heterogeneous unit (multiple Regional Ecosystem types that cannot be distinguished individually due to the scale of mapping).

“River Improvement Trust Asset Area” means an area within a River Improvement Area declared under the *River Improvement Trust Act 1940* that is or has been subject to restoration or flood mitigation works. The locations and details of these areas can be obtained from the relevant River Improvement Trust.

“sensitive place” means

- a dwelling (including residential allotment, mobile home or caravan park, residential marina or other residential premises, motel, hotel or hostel; or
- a library, childcare centre, kindergarten, school, university or other educational institution;
- a medical centre, surgery or hospital; or
- a protected area; or
- a public park or garden that is open to the public (whether or not on payment of money) for use other than for sport or organised entertainment.

“significantly disturbed land or significant disturbance to land” means disturbance to land as defined in section 28 of the *Environmental Protection Regulation 2008*.

“site” means the petroleum authority(ies) to which the environmental authority relates.

“spring” means the land to which water rises naturally from below the ground and the land over which the water then flows.

“stable” in relation to land, means landform dimensions are or will be stable within tolerable limits now and in the foreseeable future. Stability includes consideration of geotechnical stability, settlement and consolidation allowances, bearing capacity (trafficability), erosion resistance and geochemical stability with respect to seepage, leachate and related contaminant generation.

“state heritage place” means a place entered in the Queensland heritage register under Part 4 of the *Queensland Heritage Act 1992*.

“suitably qualified person” means a person who has professional qualifications, training, skills or experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis to performance relative to the subject matter using the relevant protocols, standards, methods or literature.

“suitably qualified and experienced person” in relation to a hazard assessment of a dam, means that a statutory declaration has been made by that person and, when taken

together with any attached or appended documents referenced in that declaration, all of the following aspects are addressed and are sufficient to allow an independent audit at any time:

- exactly what has been assessed and the precise nature of that assessment;
- the relevant legislative, regulatory and technical criteria on which the assessment has been based;
- the relevant data and facts on which the assessment has been based, the source of that material, and the efforts made to obtain all relevant data and facts; and
- the reasoning on which the assessment has been based using the relevant data and facts, and the relevant criteria.

“suitably qualified and experienced person” in relation to dams means one who is a Registered Professional Engineer of Queensland (RPEQ) under the provisions of the *Professional Engineers Act 1988*, OR registered as a National Professional Engineer (NPER) with the Institution of Engineers Australia, OR holds equivalent professional qualifications to the satisfaction of the administering authority for the Act; AND the administering authority for the Act is satisfied that person has knowledge, suitable experience and demonstrated expertise in relevant fields, as set out below:

- knowledge of engineering principles related to the structures, geomechanics, hydrology, hydraulics, chemistry and environmental impact of dams; and
- a total of five years of suitable experience and demonstrated expertise in the geomechanics of dams with particular emphasis on stability, geology and geochemistry, and
- a total of five years of suitable experience and demonstrated expertise each, in three of the following categories:
 - investigation and design of dams;
 - construction, operation and maintenance of dams;
 - hydrology with particular reference to flooding, estimation of extreme storms, water management or meteorology;
 - hydraulics with particular reference to sediment transport and deposition, erosion control, beach processes;
 - hydrogeology with particular reference to seepage, groundwater;
 - solute transport processes and monitoring thereof; or
 - dam safety.

“third party auditor” means a suitably qualified person who is either a certified third party auditor or an internal auditor employed by the holder of the environmental authority and the person is independent of the day to day management and operation of activities covered by this environmental authority.

“threatening processes” means processes, features and actions that can have a detrimental effect upon the health and viability of an area of vegetation. For example, altered hydrology, land use practices, invasion by pest and weed species, land degradation, edge effects and fragmentation.

“tolerable limits” means a range of parameters regarded as being sufficient to meet the objective of protecting relevant environmental values. For example, a range of settlement for a tailings capping, rather than a single value, could still meet the objective of draining the cap quickly, preventing damage and limiting infiltration and percolation.

“topsoil” means the surface (top) layer of a soil profile, which is more fertile, darker in colour, better structured and supports greater biological activity than underlying layers. The surface layer may vary in depth depending on soil forming factors, including parent material, location and slope, but generally is not greater than about 300 mm in depth from the natural surface.

“void” means any man-made, open excavation in the ground (includes borrow pits, drill sumps, frac pits, flare pits, cavitation pits and trenches).

“waters” includes all or any part of a creek, river, stream, lake, lagoon, dam, swamp, wetland, spring, unconfined surface water, unconfined water in natural or artificial watercourses, 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 underground water.

“watercourse” means a river, creek or stream in which water flows permanently or intermittently:

- (a) in a natural channel, whether artificially improved or not; or
- (b) in an artificial channel that has changed the course of the watercourse; but, in any case, only:
- (c) unless a regulation under paragraph (d), (e) or (f) declares otherwise-at every place upstream of the point (point A) to which the high spring tide ordinarily flows and reflows, whether due to a natural cause or to an artificial barrier; or
- (d) if a regulation has declared an upstream limit for the watercourse-the part of the river, creek or stream between the upstream limit and point A; or
- (e) if a regulation has declared a downstream limit for the watercourse-the part of the river, creek or stream upstream of the limit; or
- (f) if a regulation has declared an upstream and a downstream limit for the watercourse-the part of the river, creek or stream between the upstream and the downstream limits.

Watercourse includes the bed and banks and any other element of a river, creek or stream confining or containing water.

“wetland” means an area shown as a wetland on a ‘Map of referable wetlands’, a document approved by the chief executive (environment). A map of referable wetlands can be viewed at www.derm.qld.gov.au.

“wild river declaration” means a statutory instrument under the *Wild Rivers Act 2005*. A declaration lists the relevant natural values to be preserved and delineates certain parts of the wild river area and the different constraints that may apply in these areas. With reference to environmental authorities for petroleum, each declaration also specifies conditions to be included in a new authority if the activity is to be located within the wild river area.

Note: Where a term is not defined in an environmental authority the definition in the Environmental Protection Act 1994, its regulations and Environmental Protection Policies or the Petroleum and Gas (Production and Safety) Act 2004 and its regulations must be used in that order.



Enquiries Chris Shaw
Telephone 3872 0993
Your reference TN 139852/ MH31/DIP
Our reference BNE36171

Environmental Protection Agency

17 August 2009

The Coordinator-General
C/- The EIS Project Manager: Gladstone Liquefied Natural Gas Project
Significant Projects Coordination Division
Department of Infrastructure and Planning
PO Box 15009
CITY EAST QLD 4002

Dear Mr *Alan* Hutchings

**RE: SUBMISSION ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT –
GLADSTONE LNG PROJECT**

I refer to your letter inviting comment on the draft terms of reference for the Santos Gladstone LNG Project, received on 30 June 2009.

The Department of Environment and Resource Management (DERM) has reviewed the environmental impact statement (EIS) and has identified a number of areas where clarification and further information is required to fully assess the EIS.

There are components of the project undergoing front end engineering design and in many cases this, along with detailed mitigation measures, are required before a satisfactory assessment of the proposal can be made. Additionally, the information provided in the EIS and draft environmental management plans is inadequate to enable the DERM to develop conditions that could be applied to the project, should the Coordinator-General recommend it proceed.

The attached submission provides detailed comments on the EIS and recommends the provision of necessary information.

Due to the substantial material to be assessed across the Department and the timeframes imposed, it may be that other issues will come to light as assessment of the project progresses. However, DERM has made every effort to be comprehensive in its submission. The attachment provides general comments that require further information across all three components of the EIS.

Release

I trust that the comments are of assistance. Should you have any queries regarding this submission please contact the DERM's project manager, Chris Shaw, on 3872 0993.

Yours sincerely

sch4p4(6) Personal Information

Stuart Cameron
Director, Assessment
Environment and Natural Resource Regulation

RTI DL RELEASE - EHP