

**Assessment Report under the  
*Environmental Protection Act 1994***

*on the*

**Environmental Impact Statement**

*for the*

**Surat to Gladstone Pipeline Project**

*proposed by*

**Surat Gladstone Pipeline Pty Ltd**

**15 January 2010**

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## 1 Introduction

This report provides an evaluation of the Environmental Impact Statement (EIS) process pursuant to Chapter 3 of the *Environmental Protection Act 1994* (EP Act) for the Surat to Gladstone Pipeline Project proposed by Surat Gladstone Pipeline Pty Ltd (SGP). The Department of Environment and Resource Management (DERM), formerly the Environmental Protection Agency (EPA), as the administering authority of the EP Act, coordinated the EIS process. This assessment report has been prepared pursuant to Sections 58 and 59 of the EP Act.

The objective of this assessment report is to:

- (a) address the adequacy of the EIS in addressing the final terms of reference (TOR), and the adequacy of the draft environmental management plan (EM plan);
- (b) summarise key issues associated with the potential adverse and beneficial environmental, economic and social impacts of the Surat to Gladstone Pipeline Project, and the management, monitoring, planning and other measures proposed to minimise any adverse environmental impacts of the project; and
- (c) make recommendations on the suitability of the project to proceed and where so, to make recommendations on necessary conditions for any approval required for the project.

Section 58 of the EP Act lists the criteria that the DERM must consider when preparing an EIS assessment report, while section 59 of the Act states what the content must be.

In summary, this assessment report addresses the adequacy of the EIS in addressing the TOR, and the suitability of the draft EM plan. It also discusses in some detail those issues of particular concern that were either not resolved or require specific conditions for the project to proceed.

The giving of this EIS assessment report to the proponent completes the EIS process under the EP Act.

### 1.1 Project details

SGP, which is a wholly owned subsidiary of the publicly listed Australian company Arrow Energy Ltd, proposes to develop a pipeline to deliver coal seam gas (CSG) from a point adjacent to the Kogan North Central Gas Processing Facility near Dalby to a proposed Liquefied Natural Gas (LNG) facility at Fishermans Landing near Gladstone. The LNG facility was subject to a separate assessment process under the EP Act. The 660mm diameter high pressure buried steel gas pipeline would be approximately 467km long. The pipeline would have a minimum technical design life of 40 years. Above ground facilities would be required at intervals along the pipeline, including: mainline valves; cathodic protection systems and marker signs.

## 1.2 Approvals

**Table 1, the following approvals are required for the Surat to Gladstone Pipeline:**

<b>Approvals</b>	<b>Legislation (Responsible authority)</b>
Environmental authority (petroleum activities)	<i>Environmental Protection Act 1994</i> – Chapter 5A Environmental Authority (Department of Environment and Resource Management)
Petroleum pipeline licence	<i>Petroleum and Gas (Production and Safety) Act 2004</i> (Queensland Mines and Energy, Department of Employment, Economic Development and Innovation)
Clearing permit	<i>Nature Conservation Act 1992</i> (Department of Environment and Resource Management)
Rehabilitation permit (Spotter Catcher)	<i>Nature Conservation Act 1992</i> (Department of Environment and Resource Management)
Development approvals (DAs):	<i>Sustainable Planning Act 2009</i> (Assessment manager: the relevant local government authority)
– Development approval for Construction Camps	<i>Sustainable Planning Act 2009</i> (The relevant local government authority)
– Development approval for tidal works/development approval for works in a coastal management district.	<i>Coastal Protection and Management Act 1995</i> (concurrence agency: Department of Environment and Resource Management)
– Development approval for the removal and destruction of marine plants.	<i>Fisheries Act 1994</i> (concurrence agency: Fisheries Queensland, Department of Employment, Economic Development and Innovation)
Section 33 and 50 and 62 approvals	<i>Transport Infrastructure Act 1994</i> (Department of Transport and Main Roads)

## 1.3 Impact assessment process

### 1.3.1 The EIS process

The EIS for the Surat to Gladstone Pipeline Project was conducted under Chapter 3 of the EP Act. The EIS process was initiated by SGP on 24 February 2009 by application to the former EPA to prepare a voluntary EIS under section 70 of the EP Act. The EPA approved the application to undertake a Voluntary EIS on 17 March 2009.

The now Department of Environment and Resource Management (DERM) issued a notice of publication of the draft TOR to SGP on 17 April 2009. DERM placed a public notice on its website on 17 April 2009 and advertised in the Courier-Mail, Toowoomba Chronicle and Gladstone Observer on 18 April 2009 and in the Central Telegraph on 22 April 2009. The draft TOR was available for public comment from 20 April 2009 to 1 June 2009. SGP issued copies of the public notice to affected and interested persons.

Seven submissions were received by DERM on the draft TOR within the comment period and five submissions were also received after the comment period. These comments, together with one from DERM, were forwarded to SGP on 5 June 2009. Another submission was received on 10 June 2009 and was forwarded to SGP on 12 June 2009. SGP responded to the submissions on 17 June 2009. DERM considered all comments received on the draft TOR and SGP's response prior to issuing the final TOR on 10 July 2009.

SGP submitted the draft EIS on 17 July 2009 to DERM for review prior to public notification. DERM compared the draft EIS to the final TOR. On 31 July 2009, DERM issued to SGP a notice of decision to proceed with the draft EIS. The public notification and submission period was set at 30 business days.

A public notice was placed on DERM's website on 31 July 2009 and advertised in: The Biloela Central Telegraph and Dalby Herald on 31 July 2009; The Courier-Mail and Gladstone Observer on 1 August 2009; and Chinchilla News on 6 August 2009. The draft EIS was available for public comment from 3 August 2009 to 14 September 2009. SGP also issued copies of the public notice and executive summaries of the draft EIS to affected and interested persons.

Twelve submissions were received by DERM on the draft EIS within the submission period and ten submissions following the submission period. The submissions comprised thirteen from State and local government departments and agencies, and nine from non-government organisations and land holders. All submissions were accepted in accordance with section 55 of the EP Act. The submissions, together with a submission from the DERM were forwarded to SGP, on 25 September 2009, for consideration and response. SGP provided a response to submissions on 26 October 2009. Copies of the response to submissions were distributed for their review to those stakeholders who had made a submission on the draft EIS.

DERM decided under s56A of the EP Act on 20 November 2009 that the submitted EIS should proceed under Division 5 (EIS assessment report) and Division 6 (Completion of process) of the EP Act. A notice of the decision to allow the submitted EIS to proceed was issued to SGP on 20 November 2009.

DERM, in the preparation of this EIS assessment report, considered submissions and comments from members of the advisory body (see section 1.3.2 for advisory body constituents) and other interested parties made at all stages of the EIS process. This EIS assessment report will be available on DERM's website ([www.derm.qld.gov.au](http://www.derm.qld.gov.au)).

### 1.3.2 Consultation program

#### ***Public consultation***

In addition to the statutory requirements for public notification of the TOR and draft EIS and identification of interested and affected parties, the proponent undertook community consultation with affected landowners and government agencies during the public submission period of the draft EIS. The proponent also circulated information on the Surat to Gladstone Pipeline Project and the EIS process to the community.

#### ***Advisory Body***

DERM invited the following organisations to assist in the assessment of the TOR and EIS by participating as members of the advisory body for the Surat to Gladstone Pipeline Project:

- Department of Employment, Economic Development and Innovation (DEEDI)
- Department of Communities (DOC);
- Department of Community Safety (DCS);
- Queensland Treasury (QT);
- Queensland Police Service (QPS);
- Gladstone Regional Council (GRC);
- Western Downs Regional Council (WDRC);
- Banana Shire Council (BSC);
- Queensland Health (QH);
- Department of Transport and Main Roads (DTMR);
- Department of Infrastructure and Planning (DIP); and
- Fitzroy Basin Association (FBA).

An advisory body briefing was held in Brisbane for the project during the EIS public submission period.

### **Public notification**

In accordance with the statutory requirements, advertisements were placed in The Courier-Mail, Toowoomba Chronicle, Gladstone Observer, Biloela Central Telegraph, Dalby Herald, Chinchilla News to notify the availability of the draft TOR and draft EIS for review and public comment as stated in Section 1.3.1 above. In addition, notices advising the availability of the draft TOR and the draft EIS for public comment were displayed on the DERM website.

The draft TOR and draft EIS were placed on public display at the following locations during their respective public comment and submission periods:

- DERM Website (draft TOR and IAS only);
- DERM Customer Service Centre, 160 Ann Street, Brisbane;
- DERM Toowoomba Office, 173 Hume Street, Toowoomba;
- DERM Gladstone Office, 136 Goondoon Street, Gladstone;
- Surat Gladstone Pipeline Pty Ltd, Level 13, AMP Place, 10 Eagle Street, Brisbane
- Dalby Regional Council Library (Wandoan), 6 Henderson Road, Wandoan;
- Banana Shire Council Library (Biloela), Corner Grevillea and Milton Streets, Biloela;
- Banana Shire Council Library (Taroom), 24 Yaldwyn Street, Taroom; and
- Gladstone Regional Council Library, 39 Goondoon Street, Gladstone;

### **1.3.3 Environment Protection and Biodiversity Conservation Act 1999**

On 23 July 2009, the proposal to construct and operate the Surat to Gladstone Pipeline was referred (EPBC referral 2009/5029) under section 68 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) to the Commonwealth Department of the Environment, Water, Heritage and the Arts. On 15 October 2009, it was declared to be a controlled action under section 75 and 87 of the EPBC Act. The Bilateral Agreement could not apply in this instance because the EIS process had progressed too far by the time the EPBC Act declaration was made. The project will be assessed by preliminary documentation under the EPBC Act by the Commonwealth.

## **2 Matters considered in the EIS assessment report**

Section 58 of the EP Act requires, when preparing this EIS assessment report, the consideration of the following matters:

- (a) the final TOR for the EIS;
- (b) the submitted EIS;
- (c) all properly made submissions and any other submissions accepted by the chief executive;
- (d) the standard criteria;
- (e) another matter prescribed under a regulation.

These matters are addressed in the following subsections.

### **2.1 The final TOR**

The final TOR document, issued on 10 July 2009, was considered when preparing this EIS assessment report. While the TOR were written to include all the major issues associated with the project that were required to be addressed in the EIS, they were not exhaustive, nor were they to be interpreted as excluding all other matters from consideration.

Where matters outside of those listed in the final TOR were addressed in the EIS, those matters have been considered when preparing this EIS assessment report.

## 2.2 The submitted EIS

The “submitted EIS” was considered when preparing this EIS assessment report. The “submitted EIS” comprised the:

- (i) draft EIS that was publicly released on 31 July 2009;
- (ii) the response to submissions received by the DERM on 26 October 2009 that was provided to relevant advisory body members; and
- (iii) updated statements of commitments received on 24 November 2009.

## 2.3 Properly made submissions

The DERM received a total of twenty-two submissions on the submitted EIS, twelve of which were received after the submission period and accepted under section 55 of the EP Act. There has been other correspondence from stakeholders regarding the response to submissions, supplementary information and updated statements of commitments. All submissions and other comments made by stakeholders on the EIS documents were considered when preparing this EIS assessment report.

## 2.4 The standard criteria

Section 58 of the EP Act requires that, among other matters, the standard criteria listed in Schedule 3 of the EP Act must be considered when preparing the EIS assessment report. The standard criteria are:

- (a) *the principles of ecologically sustainable development as set out in the National Strategy for Ecologically Sustainable Development*; and
- (b) *any applicable environmental protection policy*; and
- (c) *any applicable Commonwealth, State or local government plans, standards, agreements or requirements*; and
- (d) *any applicable environmental impact study, assessment or report*; and
- (e) *the character, resilience and values of the receiving environment*; and
- (f) *all submissions made by the applicant and submitters*; and
- (g) *the best practice environmental management for activities under any relevant instrument, or proposed instrument, as follows—*
  - (i) *an environmental authority*;
  - (ii) *a transitional environmental program*;
  - (iii) *an environmental protection order*;
  - (iv) *a disposal permit*;
  - (v) *a development approval*; and
- (h) *the financial implications of the requirements under an instrument, or proposed instrument, mentioned in paragraph (g) as they would relate to the type of activity or industry carried out, or proposed to be carried out, under the instrument*; and
- (i) *the public interest*; and
- (j) *any applicable site management plan*; and
- (k) *any relevant integrated environmental management system or proposed integrated environmental management system*; and
- (l) *any other matter prescribed under a regulation*.

The DERM has considered the standard criteria when assessing the project.

### 3 Adequacy of the EIS in addressing the TOR

The submitted EIS adequately addresses the TOR. This section of the EIS assessment report discusses the main issues and associated commitments by the proponent, and makes recommendations about conditions to be included in approvals for the project. Draft conditions are provided in section 4 of this report.

#### 3.1 Air quality

The proponent has identified dust as a potential impact to air quality for the construction and operation of the pipeline. Dust impacts have been identified to be greatest during the construction the pipeline. The proponent has identified six potential sites within 200 metres of the pipeline alignment that may be affected by dust.

To mitigate the impacts from dust from construction of the pipeline, the proponent has made commitments in the EIS including:

- conducting consultation with affected parties to ensure any special needs are met; and
- watering of construction site and access tracks will be undertaken as required, particularly on dry and windy days, and especially near residences.

DERM is satisfied that dust impacts will be localised and of short duration as the work on the pipeline progresses. DERM considers that the environmental protection commitments made in the EIS will adequately manage the impacts of dust.

It is recommended that condition B1 in section 4 be included in the draft environmental authority. This condition covers the prevention of nuisance from air emissions.

#### 3.2 Soils

The EIS identified that considerable lengths of the pipeline route traverse soils with potentially high and medium estimated soil loss rates through erosion. The information presented in the EIS is adequate for the project to progress the approvals process. The proponent has made commitments to mitigate the potential impacts, including:

- to control and minimise soil erosion and sedimentation of land throughout key construction activities (including clear and grade, trenching, pipe stringing and welding; and pipe laying and backfill);
- to preserve topsoil quality for future landuse by minimising soil inversion, mixing or burial of topsoil;
- to preserve the quality of root stock and seedstock;
- to minimise modification to drainage patterns and prevent (as far as practical) sediment transport to adjacent watercourses;
- to minimise impacts to landholder and community values (e.g. visual amenity and landuse potential);
- to avoid long-term adverse impact on good quality agricultural land; and
- to manage dangerous goods in a manner that maintains safety and minimises risks of land and soil contamination.

Further detailed soils information will be required prior to the construction of the pipeline. This will allow the proponent to design location specific sediment and erosion controls. It is recommended that the conditions E1 to E10 in section 4 be included in the draft environmental authority. These conditions require further identification and assessment of soils prior to construction. Additionally, the conditions require an Erosion and Sediment Control Plan to be developed and implemented for all stages of the petroleum activities. The Plan must be certified by a Certified Professional in Sediment and Erosion Control.

DERM considers that the implementation of these recommendations will achieve acceptable sediment and erosion control practices for the construction and operation of the pipeline.



### 3.3 Land use (Good Quality Agricultural Land)

The EIS has identified that the pipeline route will intersect land classified as good quality agricultural land in multiple locations between kilometre point (KP) 34 and KP86. The pipeline has been located across good quality agricultural land to avoid vegetation communities of high conservation value, including State Forests, and areas of higher density population.

The EIS has identified that the potential impacts on good quality agricultural land would be limited to the period of the construction of the pipeline. Therefore, the impacts would be considered to be limited and of short duration. There will be no residual loss of good quality agricultural land.

To minimise the potential construction impacts on good quality agricultural land, the proponent has made the following commitments:

- advice from an independent agronomist or soil scientist will be sought where the pipeline traverses good quality agricultural land. The independent agronomist or soil scientist would determine the following information:
  - the specific depth of topsoil to be removed;
  - techniques for the removal and segregation of topsoil;
  - techniques for soil handling to prevent and or minimise compaction of the subsoil;
  - the methods to reinstate the excavated trench to ensure the suitability of the land is maintained to enable continued crop production;
  - monitoring of the above practices during construction; and
  - annual audits for two years following construction; and
- burial of the pipeline to a depth that allows agricultural activities to be re-established over the route;
- minimising the duration of disturbance to reduce impacts; and
- the location of pipeline marker signs at fence lines.

The constructed pipeline is expected to have minimal impact on good quality agriculture land because normal agricultural activities will be able to continue following construction and rehabilitation of the pipeline right of way. Once pipeline construction is completed all inspections will be undertaken in consultation with the land owner using existing farm access tracks to avoid any further compaction impacts to good quality agricultural land.

Although the presence of the pipeline would restrict the future use of land for aboriculture, no part of the route is presently used for growing deep rooted species such as trees and shrubs. Consequently, DERM considers that the proposed environmental protection commitments are adequate and that areas of good quality agricultural land will be protected by the conditions previously recommended in section 3.2 above.

### 3.4 Rehabilitation

The proponent has provided a rehabilitation procedure to stabilise and revegetate the right of way. This information adequately addresses the requirements of the TOR. Rehabilitation will include: surface contouring; respreading topsoil; respreading cleared and or mulched vegetation; and revegetation. The proponent will ensure that:

- land is returned as close as possible to its previous productivity;
- stable landforms are re-established to original topographic contours;
- natural drainage patterns are reinstated;
- erosion control measures (e.g. contour banks, filter strips) are installed in erosion-prone areas; and
- the pre-construction environment is reinstated (including fences and gates) and disturbed habitats recreated.



The proponent's commitments include post-construction audits conducted six monthly for two years to evaluate revegetation, erosion control, weed control, watercourse integrity and success of bed and bank reprofiling. A third party audit will also occur every two years post construction.

DERM considers that the environmental protection commitments made in the EIS will achieve suitable rehabilitation outcomes for the land traversed by the pipeline.

It is recommended that the conditions E27 to E33 in section 4 be included in the draft environmental authority. These conditions will enforce the commitments made in the EIS.

### 3.5 Nature conservation

The pipeline has been aligned to avoid the majority of conservation areas that occur in the study area. During the route selection process the environmental considerations included:

- regional ecosystems: a 100m buffer was applied to all endangered and 'of concern' regional ecosystems which were excluded from consideration;
- essential habitat: areas identified by the DERM as providing essential habitat; and
- wetlands: water bodies and wetlands were excluded from consideration.

The majority of the proposed pipeline passes through cleared land, primarily used for cropping and grazing. However, of the 463km pipeline alignment approximately 88.2km traverses remnant vegetation. Based on a 30m wide right of way, the total disturbance area of remnant vegetation would be approximately 276ha.

The pipeline route transects the following environmentally sensitive areas:

- endangered regional ecosystems (11.4.3, 11.9.5, 12.3.3 and 12.3.1);
- declared Catchment Areas (Callide and Castlehope Dams); and
- essential habitat for Cycads (*Cycas megacarpa*) – KP388.2 to KP388.5 and KP400.1 to KP 400.6.

#### 3.5.1 Flora

The proponent has provided sufficient information to demonstrate that the potential impacts can be managed adequately. The potential impacts of the proposed pipeline have been expected to be limited to:

- clearing of no more than 276ha of remnant vegetation, which represents approximately 88.2km of the 463km long pipeline;
- clearing of no more than 2.04ha Endangered regional ecosystems;
- clearing of no more than 7.55ha of Of Concern regional ecosystems;
- clearing of 266.2ha of Not of Concern regional ecosystems; and
- clearing of populations of two endangered, vulnerable or rare species (*Cycas megacarpa* and *Philothea sporadica*) identified in the immediate vicinity of the right of way. However, targeted surveys have not identified *Philothea sporadica* in the proposed pipeline ROW and an offset proposal for the *Cycas megacarpa* will be implemented.

The proponent's commitments to avoid, mitigate and offset impacts from the proposed pipeline include:

- minor realignments of the proposed pipeline route to avoid, or minimise clearing of, areas of high environmental value (e.g. Endangered and Of Concern regional ecosystems, habitat for endangered, vulnerable or rare flora species, riparian areas) and areas of remnant vegetation;
- use of the minimum clearing width of 20m in areas of remnant vegetation;
- effective sediment and erosion control systems to minimise impacts on surrounding areas;

- development and implementation of a weed management program, including effective weed hygiene procedures, regular weed monitoring during and after construction, and weed control works;
- investigation of horizontal directional drilling techniques to avoid impacts associated with crossing the Condamine River (see section 3.4 for more detail);
- investigation of horizontal directional drilling techniques to avoid impacts on salt marsh and mangrove communities in identified marine environments from KP 459.1 to KP 459.7; and
- development of offset strategies to compensate for any residual impacts on ‘Endangered’ and ‘Of Concern’ regional ecosystems and marine plants.

The loss of Endangered and Of Concern regional ecosystems is considered small in comparison to the scale of the development. DERM is satisfied that the environmental protection commitments, including an offsets commitment to compensate any residual impacts to Endangered and Of Concern regional ecosystems, are suitable.

A permit under the NC Act is required to clear a protected plant.

The proposal to translocate the Endangered *Cycas megacarpa* is considered an acceptable mitigation strategy. This species is listed as an endangered under both the NCA and the EPBC Acts. As such, this plan is subject to a permit under the *Nature Conservation Act 1992* (NC Act) and approval under the EPBC Act. Under the NC Act an offset will be required for the clearing of *Cycas megacarpa* to achieve a net conservation gain. The following principles apply to offsets:

- the offset must provide a net benefit for species of conservation concern;
- the offset must provide environmental values as similar as possible to those lost;
- the offset provision should minimise the time-lag between the impact and delivery of the offset; and
- offsets must be secured for the duration of the offset requirement.

DERM considers that the environmental protection commitments made in the EIS will adequately manage the potential impacts to flora.

It is recommended that conditions E11 to E22 in section 4 be included in the draft environmental authority. These conditions cover vegetation management throughout construction and operation of the pipeline. Additional conditions would be required for a clearing permit.

### 3.5.2 Fauna

The potential, short-term, construction-related impacts associated with the project include:

- erosion and sedimentation arising from clearing of vegetation and from stockpiles;
- disturbance to riparian habitats and or water quality;
- trenchfall impacts: fauna being captured or injured as a result of falling into the open trench;
- unearthing, injury or death of burrowing and or nocturnal fauna species such as frogs, lizards, snakes and small mammals;
- injury and or mortality of hollow-dependent fauna during vegetation clearing; and
- disturbance to fauna breeding during vegetation clearing activities.

Potential long-term impacts that may arise as a result of the Project include:

- loss of fauna habitat through vegetation removal (potential loss of hollow-bearing trees, fallen timber, habitat fragmentation);
- weed and feral animal invasion;

- limited edge effects on vegetation through additional light, weed invasion, changes in hydrology and runoff, sediment and erosion;
- limited hydrological changes to adjacent springs, creek lines and rivers as a result of creek crossings;
- creation of a movement barrier for some small fauna or those that are not tolerant of open habitats as represented by the cleared easement; and
- cleared easement may also increase the predation risk for fauna.

To minimise the construction impacts on fauna, the proponent has made the following commitments:

- minimise the clearing of mature and hollow-bearing trees along the alignment, by ensuring that only the 30m right of way is cleared and by retaining mature and hollow-bearing trees that occur on the edge of the ROW where feasible;
- branches along the edge of the right of way will be trimmed in preference to the removal of entire trees;
- an appropriately qualified ecologist will undertake a pre-clearing inspection to clearly identify and mark hollow-bearing trees or other ecologically sensitive areas with a GPS. Trees to be retained will be marked with spray paint and flagging tape. Equipment operators will be made aware of these ecologically sensitive areas;
- a preconstruction survey will be undertaken by a suitably qualified and experienced botanist, assisted by the “clear and grade” supervisor and the construction manager, to define the boundary of clearing and to identify vegetation that is to be retained. This will ensure that only the minimum amount of habitat will be removed during “clear and grade” activities;
- a suitably qualified and experienced fauna spotter will be present during the “clear and grade” activities to relocate fauna or recover any injured fauna;
- vegetation will not be removed to install temporary buildings;
- felled timber will be put into small piles along the edge of the right of way to provide habitat for fauna species;
- effective erosion and sediment control measures will be implemented in conjunction with vegetation clearing, with particular attention paid to areas adjacent to creek lines;
- clearing and disturbance will be minimised in riparian areas along the proposed alignment;
- drainage in riparian areas will be reinstated immediately after construction. Furthermore, the watercourse profile will be returned to preconstruction status unless stabilisation is required to be installed to reduce scouring;
- temporary fencing (such as flagging tape stretched along the boundary) will be used to mark the edge of vegetation clearing within riparian areas to ensure that machinery does not encroach on these sensitive areas;
- the length of time that the trench is open will be minimised through staging of trenching activities to minimise the potential for the pipeline to impact on fauna;
- ramps and trench plugs with slopes no greater than 50% will be located at least every 1000m to assist fauna to leave the trench. Branches and other material will be used to facilitate fauna escape along the trench. Shelters should also be installed in the trench to minimise the risk of heat stress and drowning of fauna trapped in the trench. The placing of sawdust-filled hessian sacks soaked in water in pairs every 250 m along the trench would also be acceptable; and
- the proponent will employ a qualified and experienced fauna spotted catcher to check the trench for captured fauna along the entire route. Searches should be conducted at least daily, preferably in the morning to remove animals prior to the heat of the day.

DERM considers that EIS has adequately addressed the potential, short-term and long-term, constructed-related impacts on fauna. The environmental protection commitments address all potential impacts identified and are considered acceptable.

It is recommended that conditions F1 to F3 in section 4 be included in the draft environmental authority. These conditions cover fauna management throughout the construction and operation periods of the pipeline.

A Rehabilitation Permit (Spotter Catcher) is required under the NC Act for individuals who catch fauna along the pipeline route during construction. The rehabilitation permit would include conditions, other than those recommended above, to ensure the appropriate handling of fauna.

### 3.6 Watercourse crossings

The proponent proposes to cross 41 watercourses during the construction of the pipeline. The majority of the watercourses are ephemeral with little to no flow during the drier months. The proponent has committed to investigating horizontal directional drilling for the Condamine River, Boat Creek and Sandy Creek to avoid the impacts associated with open trenching in flowing watercourses.

Additional commitments include:

- construction to occur only in the dry season;
- the crossings, including vehicular and maintenance tracks, will be at right angles to the direction of water flow to minimise the potential for scour;
- the crossing sites will be selected to avoid:
  - unstable banks;
  - bends in the channel;
  - deep pools;
  - rock basements or rock outcrops in the channel; and
  - confluences with other channels; and
- the dam and pump or flume diversion techniques will be used where flowing water is present during open cut crossings to minimise increase in turbidity;
- topsoil and bed material will be stripped and stored above the bank where it will not be buried or damaged. Topsoil and bed material will be stockpiled separately; and
- the watercourse profile will be returned to preconstruction status unless stabilisation is required to be installed to reduce scouring.

DERM is satisfied that the impacts on watercourses are likely be minor for each pipeline crossing, because the pipeline will be constructed only during the dry season. DERM considers that the environmental protection commitments made in the EIS will adequately manage the construction impacts across watercourses.

It is recommended that conditions E23 to E26 in section 4 be included in the draft environmental authority. These conditions cover riverine areas that would be impacted by the pipeline.

### 3.7 Noise

The proponent has identified construction noise as the greatest potential impact from noise emissions during the life of the pipeline. There are six sensitive receptors located along the 463km pipeline that would be potentially affected by the construction activities.

To mitigate the impacts from construction noise, the proponent has made commitments in the EIS including:

- liaison with the community to advise on the likely duration of noisy activities;

- limiting construction activities to between the hours of 6.00am and 6.00pm in close proximity to sensitive receptors; and
- ensure machinery and equipment are maintained in accordance with manufacturer's specifications.

DERM did not consider limiting the construction times to 6.00am to 6.00pm to be adequate to mitigate the potential construction noise impacts. DERM will apply noise conditions, including limits for sensitive receptors and commercial places, requiring a specific assessment to determine if any limits will be exceeded along the pipeline route prior to construction. The limits prevent impacts from construction noise on sensitive receptors from 6pm to 7am Monday to Saturday and 6pm to 9am on Sundays and public holidays. If the assessment identifies that the limits may be exceeded the proponent is required to implement specific mitigation measures prior to construction.

DERM is satisfied that construction noise impacts will be localised and of short duration as the work on the pipeline progresses. DERM considers that the environmental protection commitments made in the EIS and conditions applied will adequately manage the impacts of construction noise.

It is recommended that the noise conditions B2 to B12 in section 4 be included in the draft environmental authority. These conditions cover the prevention of nuisance from noise.

### 3.8 Waste

The pipeline construction and operation would produce the waste streams, and use the disposal methods, listed in Table 2.

**Table 2 Pipeline waste streams and disposal methods**

Waste stream	Source	Disposal method
Packaging	Construction materials	Removal by licensed waste disposal contractor
Used chemicals and oils (approximately 200 litres a week)	Construction equipment	Removal by licensed waste disposal contractor
Discharged abrasive blasting media (inert sand, gravel)	Construction activities	Spread over the right of way and covered with the intermediate soil and topsoil during rehabilitation
Scrap metal (welding rods, grinding disks)	Construction materials	Recycled if practicable or removal by licensed waste disposal contractor
Horizontal directional drilling cuttings and tailings	Drilling mud and cuttings from the hole	Drilling mud recycled or buried in pipeline trench or pit within right of way
Hydrotest water (first flush)	Commissioning waters maybe coal seam gas associated water or other raw water sources	Removal by licensed waste disposal contractor
Hydrotest water	Commissioning waters maybe coal seam gas associated water or other raw water sources	Treated, where required, and disposed to dams or land
Cleaning and drying sludge	Construction activities	Removal by licensed waste disposal contractor
Camp site wastes (putrescibles, paper, timber and plastic piping)	General camp waste	Removal by licensed waste disposal contractor

Camp site waste water	Sewage	Treated in packed sewage treatment plant and irrigated to land
	Solids	Removal by licensed waste disposal contractor
Sludge from pigging activities (from the process for cleaning pipelines. A “Pig” is a machine used to clean the insides of pipelines.)	Operation pigging of the pipeline	Removal by licensed waste disposal contractor

The hydrotest water poses the greatest potential impact from waste produced from the pipeline construction. Approximately 80ML of hydrotest water will be used during the commissioning of the pipeline. Hydrotest water will be re-used to minimise future water requirements and disposal volumes. The water will be sourced either from natural watercourses, where would be no significant impact on aquatic values, or coal seam gas water treated by reverse osmosis prior to use. Potential contaminants include biocides and oxygen scavengers that may be added to hydrotest water, if required, to remove biological organisms and reduce corrosion potential during testing.

The proponent has committed to treating the water where required. The water will be made available to land holders if requested and at a suitable quality. Where a discharge to the environment is required, the proponent has committed to discharge to land only, and the discharge will be managed to prevent environmental harm.

The proponent has made commitments in the EIS to mitigate the potential impacts of waste disposal, which include:

- development of a waste management plan based on the waste hierarchy; and
- appropriate management of hydrotest water, including:
  - the testing of hydrotest water prior to the discharge of the water to the environment;
  - the water then discharged in a way that prevents or minimises environmental harm;
  - if levels of potential contaminants are found to be above the required water quality parameters as set out in Schedule C, Table 1 of section 4, the following options may be adopted:
    - the water will not be discharged to surface waters;
    - oxygen scavengers and biocides (proven to biodegrade on aeration) will be added;
    - the water will be held in an approved holding area and allowed to evaporate with any residues collected for disposal; or
    - chemicals or other agents will be added to neutralise the environmental effects of the contaminants; and
  - hydrostatic test waters will not be directly discharged to natural watercourses; and
  - prior to discharge, hydrostatic test waters will be filtered through a geotextile fabric or retained in a temporary sediment retention basin to remove the majority of any solid materials.

DERM considers that the environmental protection commitments made in the EIS are consistent with the waste management hierarchy and will adequately manage the impacts of construction wastes.

It is recommended that the draft environmental authority contain the waste conditions D1 to D10 and C4 to C5 in section 4. These conditions cover the proper handling and disposal of all waste, the record keeping for regulated waste and ensuring all regulated waste is removed off site for proper disposal by a licensed waste contractor.

## 3.9 Transport impacts

### 3.9.1 Roads

The proponent provided information on expected volumes and composition of materials to be transported along the pipeline right of way and their potential contribution to traffic on the road network. The overall impact of the proposal on the surrounding road network is potentially substantial.

The proponent has made commitments in the EIS to mitigate impacts on traffic. The potential impacts will be mitigated through a traffic management plan developed in conjunction with the DTMR, QPS and local government.

Road assessments will be undertaken to provide both a road condition report and assess the predicted ability of roads to withstand the short-term usage by heavy vehicles identified for the distribution of line pipe.

The traffic management plan will address key safety and logistical issues that may arise due to:

- project vehicles crossing major and minor roads;
- safety risks brought about by increased heavy vehicle traffic;
- lane closures; and
- the use of single-lane local access roads.

Mitigation measures will be developed to address each of these issues. Where necessary, separate site-specific local traffic management plans will be prepared. In addition to the safety and logistical issues, the traffic management plan will include:

- mitigation measures to address the relative increase in traffic levels on affected sections road;
- require signposting of access roads with appropriate heavy vehicle and construction warning signs;
- a review of speed restrictions along the state controlled road network and, where necessary, additional signposting of speed limitations;
- distribution of warning notices to advise local residents of scheduled construction activities;
- advance notice of road and lane closures and advice on alternative routes;
- installation of appropriate traffic control and warning signs for areas where there are potential safety issues exist;
- management of the transportation of construction materials to maximise vehicle loads and minimise vehicle movements;
- construction vehicles using internal and haulage access roads, instead of public roads; and
- induction of truck and vehicle operators on the requirements of the traffic management plan.

The Project shall obtain approval under sections 33 and 50 of the *Transport Infrastructure Act (Qld) 1994* to enter and conduct works on the State controlled road network. The application for this approval shall include a road use management plan, scheduled delivery and detailed construction plans.

Prior to the construction of any new, or alterations to existing, private accesses, the Project shall obtain approval under section 62 of the *Transport Infrastructure Act (Qld) 1994*.

The proponent in conjunction with DTMR has identified the Port of Gladstone as the preferred port for the offloading of imported line pipe for the Project. The Port of Brisbane is also being considered. Line pipe may be distributed between the Port of Gladstone and the Port of Brisbane. The DTMR has no issues regarding the road pavements to these ports.



However, Port Alma is a possible alternative. SGP and other liquid natural gas project proponents are discussing with DTMR the possibility of upgrading Port Alma Road to ensure it could handle the proposed traffic. Should the upgrading occur before construction commences, then Port Alma will be used.

The traffic management plan will incorporate a provision that, prior to commencing any program of transportation movements associated with the construction of the pipeline, the proponent will consult with the DTMR and all relevant stakeholders including the local government.

During the EIS process a number of other projects (including those of the coal seam gas and liquid natural gas industry) have been announced and are progressing through separate EIS processes. A number of these projects will have similar impacts to the state controlled road network. To address these cumulative impacts, DIP and the DTMR will initiate a *Road Infrastructure Cumulative Impacts Study* to quantify road and transport impacts across the rapidly expanding coal seam gas and liquid natural gas industry to commence early in 2010. The objectives of the study will be to:

The specific objectives of the proposed work are:

- undertake a study of road transport cumulative impacts from all LNG projects and other specified significant projects planned for the Gladstone area;
- determine the critical impacts on the road infrastructure network from the transport tasks required to deliver the abovementioned projects (including both Gladstone and the Surat Basin);
- identify impact management strategies for a number of scenarios, considering significant project construction schedules, timing and transport tasks; and
- present proposals for impact mitigation road contribution strategies for a number of scenarios considering the numbers of proposed projects, construction schedules, timing and transport tasks.

The study will include the all liquid natural gas projects including the Surat to Gladstone Pipeline project.

### 3.10 Social

The EIS has identified that the social impacts of the Project will be of limited duration, with construction progressively moving from the Gladstone end of the pipeline to the Kogan end. Camps and construction crews would progress along the pipeline route, typically spending no more than three months in any one location.

The Project is expected to employ up to 450 people during the construction phase and up to 10 people when operational.

The short-term temporary social impacts of the Project may include:

- health and safety risks;
- temporary disruption to existing land uses;
- limited demand on local services and infrastructure;
- access and mobility;
- increased waste potentially burdening local facilities;
- short-term visual amenity limitations; and
- inflationary effect on the housing market.

The proponent has made commitments in the EIS to mitigating social impacts including:

- Implementation of the stakeholder consultation plan.
- Implementation of the social impact management plan.

- Implementation of the cultural heritage management plan. This will be developed in conjunction with traditional owner groups to address potential impacts to cultural heritage due to the Project.
- Implementation of the historical heritage management plan to address potential impact to historical heritage due to the Project.
- Commitment to adopting a training and employment strategy for indigenous people through its parent company, Arrow Energy.

The Department of Infrastructure and Planning (DIP) is the lead agency on the assessment of social impacts. DIP considers that the commitments made in the EIS will adequately manage the social impacts from the construction of the pipeline. DIP also requested that a community safety plan, including a code of conduct for temporary construction camps, be developed. The proponent has subsequently committed to the development of this plan prior to construction.

### 3.11 Construction Camps

The EIS has identified that a construction workforce of up to 450 people will be accommodated in temporary construction camps located near to the pipeline right of way (ROW), possibly near the following locations:

- Chinchilla (KP50);
- Wandoan (KP150);
- Cracow (KP250);
- Biloela (KP350); and
- Calliope (KP440).

The camp sites will be located near the construction corridor, on all-weather access roads and away from population centres. Such a location allows the workforce to access the ROW with minimal impact on the local road network, and facilitates the camp being provisioned with food, fuel, water and other necessities. Other aspects to be considered in determining camp site locations include:

- suitability of soil for sewage effluent disposal from a packaged sewage treatment plant;
- nearby water supply – both potable and non-potable for dust suppression;
- landholder agreement;
- local government authority indication to approve camp establishment;
- suitability of site – limited vegetation or cleared land, not flood prone, and high expectations for successful rehabilitation;
- no environmentally significant species present;
- no cultural heritage significance;
- located away from existing residences; and
- located near the ROW to minimise construction personnel travel times, but far enough away to minimise dust impacts on camp residents.

It is expected that five camp locations will be required to accommodate crews as the construction progresses along the alignment. The proposed pipeline construction plan will require the workforce to be split between two adjacent camps at any one time. Each camp will be capable of accommodating up to 300 workers.

Camp site effluent will be handled by an on-site packaged sewage treatment plant with the following features:

- sized to adequately treat wastewater produced by more than the maximum number of personnel expected to be accommodated at each camp at any time (e.g. 500 equivalent persons);

- biological activated sludge system (with return activated sludge);
- chlorine dosing at two disinfection points, effluent clarified prior to entering the chlorine contact tank and again prior to sand filtration;
- sand filtration of final effluent;
- capable of producing Class C level effluent; and
- discharge of treated effluent to ground in a fenced and signed area once suitable quality can be demonstrated.

DERM is satisfied that impacts expected from the construction camp will be localised and of short duration as the camps move from each location. DERM considers that the commitments made in the EIS will adequately manage the social impacts from the construction of the pipeline.

A development application under the *Sustainable Planning Act 2009* will be required for each construction camp. The construction camps will be located outside of the pipeline tenure.

## 4 Recommendations for conditions for any approval

It is recommended that the conditions, in Appendix 1, be included in the environmental authority for the project together with others the administering authority may decide are necessary or desirable in accordance with s309Z of the EP Act.

## 5 Adequacy of the EM plan for the project

A draft EM plan was included with the draft EIS released for public notification. The draft EM plan was subsequently amended in the Supplementary Report. The EM plan is considered adequate for the purposes of the statutory requirements.


## 6 Suitability of the project

DERM has considered the final TOR, the submitted EIS, all submissions on the submitted EIS and the standard criteria. The submitted EIS and supplementary information have not identified impacts of sufficient magnitude to prevent the project from proceeding. Therefore, the project is considered suitable to proceed to the next stage of the approval process. However, the recommendations of this EIS assessment report should be fully implemented.

### Disclaimer:

While this document has been prepared with care, it contains general information and does not profess to offer legal, professional or commercial advice. The Queensland Government accepts no liability for any external decisions or actions taken on the basis of this document. Persons external to the Department of Environment and Resource Management should satisfy themselves independently and by consulting their own professional advisors before embarking on any proposed course of action.

### Approved by



Signature

15 January 2010

Date

**Stuart Cameron**  
Director, Environmental Impact Assessments  
Department of Environment and Resource Management

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## 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 and / or minimise the likelihood of environmental harm being caused.

#### MAINTENANCE OF MEASURES, PLANT AND EQUIPMENT

- (A3) The holder of this authority must:
1. install all measures, plant and equipment necessary to ensure compliance with the conditions of this authority; and
  2. maintain such measures, plant and equipment in a proper and efficient condition; and
  3. 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**

<b>Sensitive place</b>						
<b>Noise level dB(A) measured as:</b>	<b>Monday to Saturday</b>			<b>Sundays and public holidays</b>		
	<b>7am to 6pm</b>	<b>6pm to 10pm</b>	<b>10pm to 7am</b>	<b>9am to 6pm</b>	<b>6pm to 10pm</b>	<b>10pm to 9am</b>
<b>L<sub>A90</sub>, adj, 15 mins</b>	lesser of bg+3 or 48	lesser of bg+0 or 40	bg+0	bg+0	bg+0	bg+0
<b>L<sub>A10</sub>, adj, 15 mins</b>	lesser of bg+5 or 50	lesser of bg+5 or 45	bg+0	lesser of bg+5 or 45	lesser of bg+5 or 40	bg+0
<b>L<sub>A1</sub>, adj, 15 mins</b>	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
<b>Commercial place</b>						
<b>Noise level dB(A) measured as:</b>	<b>Monday to Saturday</b>			<b>Sundays and public holidays</b>		
	<b>7am to 6pm</b>	<b>6pm to 10pm</b>	<b>10pm to 7am</b>	<b>9am to 6pm</b>	<b>6pm to 10pm</b>	<b>10pm to 9am</b>
<b>L<sub>A90</sub>, adj, 15 mins</b>	lesser of bg+5 or 50	bg+0	bg+0	lesser of bg+3 or 43	bg+0	bg+0
<b>L<sub>A10</sub>, adj, 15 mins</b>	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
<b>L<sub>A1</sub>, adj, 15 mins</b>	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) The holder of this authority must ensure that the petroleum activities do not result in the 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.

**CONTAMINANT RELEASES TO SURFACE WATER**

- (C7) There must be no release of contaminants to surface water.

**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 30 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 (E18).
- (E2) The holder of this authority must develop and implement a soils monitoring and management plan prior to commencement of petroleum activities. This plan must include but not be limited to:
  - 1. ground truthing of soils mapping in every mapped unit or every 2 to 5 km in large units;
  - 2. verification of the allocation of the Australian Soil Classification (ASC) for each mapping unit;
  - 3. develop soil descriptions that are relevant to assessment for agricultural suitability, topsoil assessment, erodibility and rehabilitation, for example:
    - (a) shallow cracking clay soils;
    - (b) deep cracking clay soils;
    - (c) deep saline and/or sodic cracking clay soils with melonholes;
    - (d) thin surface, sodic duplex soils;
    - (e) medium to thick surface (say >15 cm), sodic duplex soils; and
    - (f) non-sodic duplex soils;
  - 4. detail mitigation measures to manage adverse risks for the construction stage and for ongoing maintenance of the corridor during the operational stage; and
  - 5. map areas of good quality agricultural land and detail methods to be undertaken to minimise potential impacts.
- (E3) 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*.
- (E4) 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 (E3).
- (E5) 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**

- (E6) 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.
- (E7) Appropriate measures to achieve compliance with condition (E6) 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.
- (E8) Erosion protection measures and sediment control measures must be implemented and maintained to minimise erosion and the release of sediment and contamination of stormwater.
- (E9) 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.
- (E10) 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.

#### **VEGETATION MANAGEMENT**

- (E11) The holder of this authority must:
1. prevent or minimise disturbance to vegetation by petroleum activities; and
  2. manage the effects of clearing to prevent the loss of biodiversity, reduction of ecological processes and land degradation.
- (E12) The holder of this authority must ensure that:
1. petroleum activities are not conducted within category A or B environmentally sensitive areas (ESA's);
  2. petroleum activities do not cause a significant disturbance within 1km of a category A ESA or within 500m of a category B ESA;
  3. petroleum activities are not conducted in a category C ESA without the written agreement from the relevant administering authority;
  4. if the relevant administering authority gives written permission to conduct petroleum activities in a category C ESA with conditions that are in conflict with the conditions of this authority, the holder must as a minimum comply with the conditions of this authority; and
  5. staff, contractors or agents carrying out petroleum activities on a petroleum authority are aware of the location of any relevant category A, B or C ESA's within the petroleum authority.
- (E13) Despite conditions (E12)(1) and (2), where no reasonable alternative exists, petroleum activities may be undertaken within an endangered regional ecosystem (ERE) or the 500m buffer zone of an ERE, provided that those activities are located according to the following order of preference:
1. pre-existing areas of significant disturbance within the buffer zone;
  2. undisturbed areas more than 100m from the ESA within the buffer zone;
  3. undisturbed areas less than 100m from the ESA within the buffer zone;
  4. pre-existing areas of significant disturbance within the ESA;
  5. areas within the ESA of lower environmental value; then
  6. areas where clearing of an endangered regional ecosystem is unavoidable.
- (E14) The holder of this authority must ensure that any clearing in accordance with Condition (E13) complies with the following:
1. the clearing does not for the life of the project exceed 10% of the endangered regional ecosystem as ground truthed and mapped before any activity commences as per condition (E13) of this authority;

2. all reasonable and practical measures are made to minimize the area cleared and to avoid the clearing of mature trees;
  3. when requested by the administering authority the environmental authority holder enters into an agreement with the administering authority to provide an environmental offset to counterbalance the impacts of the activity on the ERE in accordance with the *Queensland Government Environmental Offsets Policy*;
  4. access tracks are not located in ERE;
  5. the right of way is limited to 20m in width except between kilometer point 372 to kilometer point 401 and in approaches to watercourses where the banks are higher than 3m;
  6. clearing of mature and hollow bearing trees is avoided where practicable; and
  7. a qualified ecologist is present during clearing activities to ensure impacts on flora and fauna are minimized.
- (E15) The condition and spatial extent of any remnant and regrowth “endangered” and “of concern” regional ecosystems must be assessed. This must include but not be limited to the carrying out of field surveys and observations and mapping, prior to carrying out of any petroleum activity within the regional ecosystems.
- (E16) A record of the regional ecosystem assessment required by condition (E13) must be kept and made available to the administering authority on request.
- (E17) The findings of the assessment must be used to implement minor route alignments to avoid disturbance to dense stands or large specimens of regionally significant species.
- (E18) The environmental authority holder must comply with any agreement made in accordance with condition (E14 (3)) of this authority.
- (E19) The holder of this authority must ensure that camps and lay down areas are located at least 20m from remnant regional ecosystems or high value regrowth regional ecosystems.
- (E20) Fallen timber must be moved as little as practicable, and where necessary to be moved replaced once construction has been completed unless otherwise required by the land holder.
- (E21) The clearing of native vegetation within road reserves or watercourses must not reduce the width of the vegetation community to less than 50m.
- (E22) Despite condition (E14 (3)), an overall biodiversity offset strategy must be developed for the project that complies with the requirements all relevant legislation and as a minimum mitigates any impacts on remnant and regrowth endangered and of concern regional ecosystems in accordance with the *Queensland Government Environmental Offsets Policy*.

#### **PROTECTION OF RIVERINE AREAS**

- (E23) The holder of this authority must not:
1. undertake activities within a wetland or spring;
  2. 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;
  3. undertake activities that take water from a watercourse, wetland or spring; or
  4. undertake activities that take overland flow water using works that are mentioned as assessable development in a water resource plan under the *Water Act 2000*.
- (E24) Activities resulting in significant disturbance to the bed or banks of a watercourse must:
1. 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; and



2. be no greater than the minimum area necessary for the purpose of the significant disturbance; and
  3. be designed and undertaken by a competent person; and
  4. have rehabilitation commence immediately upon cessation of the authorised petroleum activities.
- (E25) 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 in accordance with condition (E6).
- (E26) Routine visual monitoring must be undertaken while carrying out petroleum activities 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 before activities recommence.

### REHABILITATION REQUIREMENTS

- (E27) 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.
- (E28) For areas of native vegetation, revegetation must use seed sourced from local provenance native species.
- (E29) 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.
- (E30) 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 (E33);
  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.
- (E31) Notwithstanding Condition (E30) any planned rehabilitation outcome that does not fulfil the rehabilitation requirements listed in Condition (E30) approval must be sought from the administering authority, prior to the rehabilitation being carried out.
- (E32) 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.
- (E33) 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**

- (E34) 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**

- (E35) All explosives, hazardous chemicals, corrosive substances, toxic substances, gases and dangerous goods must be stored and handled in accordance with the relevant Australian Standard.
- (E36) 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*.
- (E37) 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 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
  2. 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.
- (E38) 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 PPL144 Licence 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.

**APPENDIX 1            DEFINITIONS**

<b>TERM</b>	<b>MEANING</b>
<b>Administering authority</b>	Administering authority means - (a) for a matter, the administration and enforcement of which has been devolved to a local government under section 514 of the <i>Environmental Protection Act 1994</i> – the local government; or (b) for all other matters – the Chief Executive of the Environmental Protection Agency; or (c) another State Government Department, Authority, Storage Operator, Board or Trust, whose role is to administer provisions under other enacted legislation.
<b>Authority</b>	Means an environmental authority granted in relation to an environmentally relevant activity under the <i>Environmental Protection Act 1994</i> .
<b>Associated water</b>	Underground water taken from or interfered with from a petroleum well during the course of or resulting from carrying out petroleum activities. Associated water may be potable or suitable for stock purposes, or saline, high in fluoride, contain hydrocarbons, and/or is otherwise contaminated by a hazardous contaminant. It may be classified as a hazardous waste.
<b>AS 2885</b>	Australian Standard Pipelines – Gas and Liquid Petroleum (2007 or subsequent versions thereof).
<b>Background noise level</b>	Background noise level $L_{A90,15min}$ means the A-weighted sound pressure level of the residual noise exceeded for 90% of a representative time period of not less than 15 minutes, using time weighting, 'F'.
<b>Competent person</b>	A person with the demonstrated skill and knowledge required to carry out the task to a standard necessary for the reliance upon collected data or protection of the environment.
<b>Commercial place</b>	A work place used as an office or for business or commercial purposes, which is not part of the petroleum activity and does not include employees' accommodation or public roads.
<b>Construction</b>	Includes building a new dam or pipeline and modifying or lifting an existing dam or pipeline.
<b>Dam</b>	Means a structure that is designed to contain, divert or control flowable substances - including any substances that are thereby contained, diverted or controlled by that structure; but does <i>not</i> mean a fabricated or manufactured tank or container designed to a recognised standard. The flowable substances referred to in this context may have been, are, or could be flowable under any perceivable conditions; and thereby present a hazard as defined in this authority. In case there is any doubt, a levee or a bund is a dam.
<b>Design plan</b>	The design plan is the documentation required to describe the physical dimensions of the pipeline and the materials and standards to be used for construction of the pipeline. It will also include the decommissioning and rehabilitation objectives in terms of procedures, works and outcomes at the end of pipeline life. The documents must include design and investigation reports, specifications and certifications.
<b>Contaminant</b>	The <i>Environmental Protection Act 1994</i> defines, under Section 11, a contaminant



TERM	MEANING
	as: <ul style="list-style-type: none"> <li>(a) a gas, liquid or solid; or</li> <li>(b) an odour; or</li> <li>(c) an organism (whether alive or dead), including a virus; or</li> <li>(d) energy, including noise, heat, radioactivity and electromagnetic radiation; or</li> <li>(e) a combination of contaminants.</li> </ul>
<b>Discharge area</b>	Discharge area is: <ul style="list-style-type: none"> <li>(a) that part of the land surface where groundwater discharge produces a net movement of water out of the groundwater; and</li> <li>(b) identified by an assessment process consistent with the document: Salinity Management Handbook, Queensland Department of Natural Resources, 1997; or</li> <li>(c) identified by an approved salinity hazard map held by the Department of Natural Resources, Mines and Water.</li> </ul>
<b>Dispersible soils</b>	Soils in which clay material disintegrates into particles less than 2 microns across. This can be observed within 24 hours when soil crumbs are submerged in distilled water.
<b>Dissects corridors</b>	Dissects corridors of vegetation means clearing vegetation that results in a break more than 50 metres wide, across a corridor.
<b>Environmental Management Plan (EM plan)</b>	The EM plan is an environmental management document to be submitted during the application process for a level 1 environmental authority (petroleum activities).
<b>Environmental nuisance</b>	Environmental nuisance is unreasonable interference or likely interference with an environmental value caused by: <ul style="list-style-type: none"> <li>(a) noise, dust, odour, light; or</li> <li>(b) an unhealthy, offensive or unsightly condition because of contamination; or</li> <li>(c) another way prescribed by regulation.</li> </ul>
<b>Environmentally sensitive area</b>	Environmentally sensitive area (as determined from the EPA GIS data base) means a location, however large or small, that has environmental values that contribute to maintaining biological diversity and integrity, have intrinsic or attributed scientific, historical or cultural heritage value, or are important in providing amenity, harmony or sense of community. Appendix 2 contains the definitions of category A, B and C environmentally sensitive areas.
<b>Financial assurance</b>	A security deposit, either cash or a bank guarantee, held by the administering authority to cover the potential costs of rehabilitating areas significantly disturbed by the petroleum activities.
<b>Groundwater</b>	Groundwater means subsurface water, generally saturating the soil or rock in which it occurs.
<b>Hazard</b>	In relation to a dam as defined in this authority, 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.

<b>TERM</b>	<b>MEANING</b>
<b>Hazardous contaminant</b>	A contaminant that, if improperly treated, stored, disposed of or otherwise managed, is likely to cause serious or material environmental harm because of: <ul style="list-style-type: none"> <li>(a) its quantity, concentration, acute or chronic toxic effects, carcinogenicity, teratogenicity, mutagenicity, corrosiveness, explosiveness, radioactivity or flammability; or</li> <li>(b) its physical, chemical or infectious characteristics.</li> </ul>
<b>High hazard category</b>	In relation to a dam is one that, as a result of a hazard assessment using Table 1 Appendix 4, would be assessed as being in the high hazard category.
<b>Infrastructure</b>	Means water storage dams, well sites, pipelines, roads and tracks, buildings and other structures built for the purpose of petroleum activities.
<b>Licensed waste disposal facility</b>	A facility approved under a development approval and operated by a holder of a registration certificate for environmentally relevant activity item number 75 under Schedule 1 of the <i>Environmental Protection Regulation 1998</i> .
<b>LA max, adj, T</b>	$L_{A \text{ max, adj, T}}$ is the adjusted average maximum A-weighted sound pressure level measured over a time period T. The maxima must be measured on a sound level meter with a frequency-weighting that corresponds to perceived loudness (“A” weighting) and the meter must be set to the “fast” response time-weighting. The measured values are to be adjusted upwards by 2 dB(A) to 5 dB(A) if the noise source has tonal characteristics. The measuring period must be in excess of five minutes. The arithmetic average of the adjusted maxima, after eliminating any extraneous noise peaks, is the measure used to characterise the noise environment. (This measure will generally be similar to a percent exceedance of 10% or less. Refer to Australian Standard AS1055.)
<b>Lake</b>	A natural or artificial body of water, either permanent or intermittent.
<b>Land degradation</b>	Land degradation includes the following: <ul style="list-style-type: none"> <li>(a) soil erosion;</li> <li>(b) rising water tables;</li> <li>(c) the expression of salinity;</li> <li>(d) mass movement by gravity of soil or rock;</li> <li>(e) stream bank instability; and</li> <li>(f) a process that results in declining water quality.</li> </ul>
<b>Land use</b>	Term to describe the selected final use of the land, which is planned to occur after the cessation of petroleum operations.
<b>Level 2 petroleum activity</b>	A Level 2 petroleum activity is a petroleum activity that, under section 20(1) of the EP Act is prescribed as a level 2 environmentally relevant activity.
<b>Level 1 petroleum activity</b>	A Level 1 petroleum activity is a petroleum activity that, under section 20(1) of the EP Act is prescribed as a Level 1 environmentally relevant activity.
<b>Low hazard category</b>	In relation to a dam means a dam that, as a result of an hazard assessment using the Table 1 Appendix 4; would be assessed as being in the low hazard category.

<b>TERM</b>	<b>MEANING</b>
<b>Noise</b>	Noise means a sound or vibration of any frequency, whether transmitted through air or any other physical medium.
<b>Operational land</b>	Means the land associated with the petroleum activities for which this authority has been issued.
<b>Petroleum activities</b>	Petroleum activities means activities authorised to take place on land subject to a petroleum authority, including rehabilitation and decommissioning activities.
<b>Petroleum authority</b>	A petroleum authority is— (a) a 1923 Act petroleum tenure granted under the <i>Petroleum Act 1923</i> ; or (b) a petroleum authority granted under the <i>Petroleum and Gas (Production and Safety) Act 2004</i> ; or (c) a licence, permit, pipeline licence, primary licence, secondary licence or special prospecting authority granted under the <i>Petroleum (Submerged Lands) Act 1982</i> .
<b>Petroleum project</b>	A petroleum project is all activities carried out, or proposed to be carried out, under 1 or more of the following, in any combination, as a single integrated operation— (a) a 1923 Act petroleum tenure granted under the <i>Petroleum Act 1923</i> ; (b) a petroleum authority granted under the <i>Petroleum and Gas (Production and Safety) Act 2004</i> ; (c) a licence, permit, pipeline licence, primary licence, secondary licence or special prospecting authority granted under the <i>Petroleum (Submerged Lands) Act 1982</i>
<b>Petroleum works site</b>	A separate location on the area subject to a petroleum authority where petroleum activities are undertaken (e.g. a well site, seismic survey line, camp site, compressor site, evaporation pond etc).
<b>Potential discharge area</b>	Low lying parts of the landscape (relative to adjacent terrain) where groundwater movements are within 2-5m of the land surface and the landscape may be subject to upward movement of groundwater in the future.
<b>Protected area</b>	A protected area under the <i>Nature Conservation Act 1992</i> ; or <ul style="list-style-type: none"> <li>• a marine park under the <i>Marine Parks Act 1992</i>; or</li> <li>• a World Heritage Area.</li> </ul>
<b>Progressive rehabilitation</b>	Rehabilitation (defined below) undertaken progressively or as a staged approach to rehabilitation as petroleum operations are ongoing.
<b>Rehabilitation</b>	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.
<b>Representative</b>	A sample set which covers the variance in monitoring or other data either due to natural changes or operational phases of the petroleum activities.
<b>Regulated dam</b>	Means any dam in the significant or high hazard category as defined above.
<b>Riverine area</b>	Refers to the land confined to the flood flow channel of a watercourse.

TERM	MEANING
<b>Sedimentation pond</b>	A bunded or excavated structure used to contain and settle waterborne sediment running off disturbed areas.
<b>Self sustaining</b>	An area of land that has been rehabilitated and has maintained the required acceptance criteria without human intervention for a period nominated by the administering authority.
<b>Sensitive place</b>	<p>Sensitive place means any of the following places –</p> <ul style="list-style-type: none"> <li>(a) a dwelling;</li> <li>(b) a library, childcare centre, kindergarten, school, college, university or other educational institution;</li> <li>(c) a hospital, surgery or other medical institution;</li> <li>(d) a protected area or an area identified under a conservation plan as a critical habitat or an area of major interest, under the <i>Nature Conservation Act 1992</i>;</li> <li>(e) a marine park under the <i>Marine Parks Act 1982</i>; and</li> <li>(f) a park or garden that is open to the public (whether or not on payment of money) for use other than for sport or organised entertainment).</li> </ul>
<b>Sewage</b>	Sewage is the effluent discharged from a sanitary appliance (i.e. sewage treatment works).
<b>Significantly disturbed land</b>	<p>Significantly disturbed land and significant disturbance means land if:</p> <ul style="list-style-type: none"> <li>(a) it is contaminated land caused by petroleum activities under this authority; or</li> <li>(b) it has been disturbed by petroleum activities under this authority and human intervention is needed to rehabilitate it: <ul style="list-style-type: none"> <li>i. to a state required under the relevant environmental authority; or</li> <li>ii. if the environmental authority does not require the land to be rehabilitated to a particular state – to its state immediately before the disturbance.</li> </ul> </li> </ul> <p>Examples of a disturbance to land caused by petroleum activities authorised under this authority include:</p> <ul style="list-style-type: none"> <li>(a) areas where soil has been compacted, removed, covered, exposed or stockpiled;</li> <li>(b) areas where vegetation has been removed or destroyed to an extent where the land has been made susceptible to erosion;</li> <li>(c) areas where land use suitability or capability has been diminished;</li> <li>(d) areas within a watercourse, waterway, wetland or lake where petroleum activities occur and human intervention is necessary to restore or stabilise the disturbed area;</li> <li>(e) areas submerged by hazardous waste storage and dam walls in all cases;</li> <li>(f) areas under temporary infrastructure. Temporary infrastructure includes any infrastructure (roads, tracks, bridges, culverts, dams, bores, buildings, fixed machinery, hardstand areas, airstrips, helipads etc) which is to be removed after petroleum activities have ceased; or</li> <li>(g) areas where land has become contaminated land and a suitability statement has not been issued.</li> </ul> <p>However, the following areas are not significantly disturbed:</p> <ul style="list-style-type: none"> <li>(a) areas off the petroleum authority (e.g. roads or tracks which provide access to</li> </ul>

TERM	MEANING
	<p>the petroleum authority);</p> <p>(b) areas previously significantly disturbed which have been rehabilitated to the administering authority's satisfaction;</p> <p>(c) areas under permanent infrastructure (e.g. existing tracks and roads within the petroleum authority area);</p> <p>(d) areas that were significantly disturbed prior to the grant of the environmental authority, unless those areas are disturbed to a greater extent than their current condition by the holder of the environmental authority during the term of the authority;</p> <p>(e) minor disturbances such as drill sumps and minor respreading of soil on GPS located seismic lines.</p>
<b>Significant hazard category</b>	In relation to a dam is one that, as a result of a hazard assessment using Table 1 Appendix 4, would be assessed as being in the significant hazard category.
<b>Stable</b>	Means land form 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.
<b>Suitably qualified and experienced person for dams</b>	<p>Means one who is a Registered Professional Engineer of Queensland (RPEQ) under the provisions of the <i>Professional Engineers Act 1988</i>, 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, in these 'relevant fields':</p> <p>(a) knowledge of engineering principles related to the structures, geomechanics, hydrology, hydraulics, chemistry and environmental impact of dams; and</p> <p>(b) at least a total of five years of suitable experience and demonstrated expertise in at least four of the following areas:</p> <ul style="list-style-type: none"> <li>• investigation, design or construction of dams;</li> <li>• operation and maintenance of dams;</li> <li>• geomechanics with particular emphasis stability, geology and geochemistry;</li> <li>• hydrology with particular reference to flooding, estimation of extreme storms, water management or meteorology;</li> <li>• hydraulics with particular reference to sediment transport and deposition, erosion control, beach processes; and</li> <li>• hydrogeology with particular reference to seepage, groundwater, solute transport processes and monitoring thereof; and</li> <li>• dam safety</li> </ul>
<b>Suitably qualified and experienced person for pipelines</b>	Means one who is a Registered Professional Engineer of Queensland (RPEQ) under the provisions of the <i>Professional Engineers Act 1988</i> , 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, in the 'relevant fields' of designing, constructing, operating and decommissioning high pressure petroleum pipelines.
<b>Top layer</b>	The surface layer of a soil profile, which is usually 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

TERM	MEANING
	material, location and slope, but generally is not greater than about 300mm in depth from natural surface.
<b>Void</b>	Means any man-made, open excavation in the ground.
<b>Watercourse</b>	Watercourse means a river, creek or stream in which water flows permanently or intermittently in a visibly defined channel (natural, artificial or artificially improved) with: <ul style="list-style-type: none"> <li>(a) continuous bed and banks;</li> <li>(b) an extended period of flow for some months after rain ceases, and</li> <li>(c) an adequacy of flow that sustains basic ecological processes and maintains biodiversity.</li> </ul>
<b>Waters</b>	Waters includes river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined water natural or artificial watercourse, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea) or any part thereof, stormwater channel, stormwater drain, roadside gutter, stormwater run-off, and groundwater and any part thereof.
<b>Waterway</b>	A naturally occurring feature where surface water runoff normally collects, such as a clearly defined swale or gully, but only flows in response to a local rainfall event.
<b>Wetland</b>	An area of permanent or periodic/intermittent inundation, whether natural or artificial, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed 6m. Wetlands typically include areas such as lakes, swamps, marshes, estuaries or mudflats.
<b>Wild river areas</b>	Wild river areas are defined in the <i>Wild Rivers Act 2005</i> and may include the following– <ul style="list-style-type: none"> <li>(a) high preservation areas;</li> <li>(b) preservation areas;</li> <li>(c) floodplain management areas;</li> <li>(d) subartesian management areas.</li> </ul>

## APPENDIX 2 Environmentally sensitive areas

### Category A and B environmentally sensitive areas

Category A and B environmentally sensitive areas are listed in Section 25 and 26 respectively of the Environmental Protection Regulation 2008.

### Category C environmentally sensitive areas

LAND AREA CLASSIFICATION	ADMINISTERING LEGISLATION	ADMINISTERING AUTHORITY
Nature Refuges and Resource Reserves	<i>Nature Conservation Act 1992</i>	Department of Environment and Resource Management
Koala Habitat Area	<i>Nature Conservation (Koala) Conservation Plan 2006</i>	Department of Environment and Resource Management
An area identified as essential habitat by the EPA for a species of wildlife listed as endangered, vulnerable, near threatened or rare under the Nature Conservation Act 1992	<i>Nature Conservation Act 1992</i>	Department of Environment and Resource Management
Declared Catchment Areas	<i>Water Act 2000</i>	Department of Environment and Resource Management and/or Relevant Storage Operator or Board
River Improvement Areas	<i>River Improvement Trust Act 1940</i>	Department of Environment and Resource Management and the Relevant River Trust
Former Designated Landscape Area - Stanbroke Pastoral Holding	<i>Aboriginal Cultural Heritage Act 2003</i>	Department of Environment and Resource Management
Areas under Part 5 Division 2 of the Aboriginal Cultural Heritage Act 2003 and Torres Strait Islander Cultural Heritage Act 2003	<i>Aboriginal Cultural Heritage Act 2003</i> <i>Torres Strait Islander Cultural Heritage Act 2003</i>	Department of Environment and Resource Management
State Forest or Timber Reserves	<i>Forestry Act 1959</i>	Department of Environment and Resource Management
DPI Research Sites	Nil	Department of Employment, Economic Development and Innovation
Areas of land occupied by the Bureau of Sugar Experiment Stations.	<i>Sugar Industry Act 1999</i>	Department of Employment, Economic Development and Innovation
Coastal Management Districts	<i>Coastal Protection and</i>	Department of Environment



LAND AREA CLASSIFICATION	ADMINISTERING LEGISLATION	ADMINISTERING AUTHORITY
	<i>Management Act 1995</i>	and Resource Management
Declared Areas	<i>Sections 17, 18 and 19a of the Vegetation Management Act 1999</i>	Department of Environment and Resource Management
An area shown as a wetland on a 'map of referable wetlands'	<i>Environmental Protection Act 1994</i>	Department of Environment and Resource Management
Reserves under the Land Act 1994	<i>Land Act 1994</i>	Department of Environment and Resource Management
An 'of concern' regional ecosystem identified in the database maintained by the EPA called 'Regional ecosystem description database' containing regional ecosystem numbers and descriptions.	Nil	Department of Environment and Resource Management

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

## APPENDIX 3 DETERMINING HAZARD CATEGORIES FOR REGULATED DAMS

### Manual for Assessing Hazard Categories and Hydraulic Performance of Dams Version 1.0

#### Scope of Manual

The Chief Executive of the Environmental Protection Agency, under the *Environmental Protection Act 1994* (the Act) regulates dams associated with environmentally relevant activities to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.

This manual is designed to ensure that the standards used for the design, construction, operation, modification and decommissioning of dams are appropriate for the hazards associated with each dam. This is consistent with the requirement under the Act to take all reasonable and practicable steps to protect the environmental values present, and to minimise environmental harm.

#### Background to Manual

Good practice requires that all dams must be assessed for “dam break” and “failure to contain” hazard potential. Those dams that could have significant or high impacts need to be carefully designed and operated. Hazards are situations where:

- Something exists that could cause environmental harm, and
- An environmental value is present which could be harmed.

The early identification of the hazard potential of a dam is important as this determines the standard of reliability required for construction and operation of the dam. In this manual, the hazard assessment will determine those dams that require documentation of basic design performance and monitoring. Detailed design of a dam may not need to be done prior to the issue of an authority or approval.

#### Purpose of Manual

This manual is a regulatory document designed to be called up by model conditions for environmental authorities and development approvals and any other relevant regulatory provisions. Together these provisions will regulate dams associated with environmentally relevant activities.

The purpose of this manual is to guide the assessment of the hazard category of all dams, and thereby determine those dams that require documentation of basic design performance and monitoring. This manual does *not* utilise risk (level) or risk (cost) assessment. Dams include levees, bunds and voids, but *not* any bunds designed for spill containment to an Australian Standard, for example AS1940.

Dams may be assessed using this manual into one of three hazard categories: low, significant or high. A suitably qualified and experienced person should review all available information on a dam, including a site inspection if necessary; and determine the appropriate hazard category for each dam. Lodgement of documentation of hazard assessments with the EPA is *only* required as set out in paragraphs below. Site inspection of a dam is at the discretion of the suitably qualified and experienced person conducting the hazard assessment, provided that all relevant aspects have been researched and documented.

While all dams subject to this manual must be assessed by a suitably qualified and experienced person for “dam break” and “failure to contain” hazard potential, dams with man-made embankments over a specified height or minimum volume and contaminant concentrations, cannot be assessed as low hazard.

For dams that are assessed as being in the low hazard category, basic conditions only are provided in model conditions, requiring dam owners to ensure that all their dams are designed and operated in accordance with accepted engineering standards and have an annual hazard assessment.

Dams that are assessed as being in the significant or high hazard category are referred to as 'regulated dams' because certification of design to performance standards by suitably qualified and experienced persons is normally required to be lodged, and certified annual inspections and reports must be provided.

This Manual replaces and supersedes the previously used information sheets 'Determining Dams Containing Hazardous Waste' and 'Managing Dams Containing Hazardous Waste'.

## **Background to Hazard Assessment based on Failure Event Scenarios**

### **Failure to Contain Hazard**

"Failure to contain" hazards are those potential dam failures that are non-flood producing, but the release of contaminants would endanger environmental values including human life. Examples of events include:

- Release of contaminated waters from a spillway during stormwater inflow events,
- Punctured membrane discharging contaminated process water or tailings,
- Releases due to pipe bursts in tailings or process water circuits associated with the dam,
- Piping (localised failure) of containment banks or bunds,
- Excessive foundation seepage,
- Overtopping of tailings dams by superelevation of tailings beaches or blockage of drainage,
- Erosion of containment structures around mining waste (decommissioned tailings dams, waste heaps etc.), and
- Dust and gas emissions.

Evaluation of the hazard potential on release requires information on the probable chemical nature of the stored material, including rates, volume and concentrations at the time of a possible release. Acidity and metal ions in solutions due to prolonged contact with ore bodies or stored material must also be considered.

Contaminant concentrations in an unplanned release must be estimated based on the contaminant concentration in the dam, basic design parameters such as storage volume, and resulting dilution in the stormwater. A range of less frequent rainfall events of short duration on contributing catchments must be checked. The hazard assessment must consider the interaction of any failure of a dam with all other dams, on project sites having multiple dams.

### **Dam Break Flood Hazard**

The prerequisites for a dam break hazard are the existence, either permanently or temporarily, of a large body of water or other flowable substances (slimes, tailings etc); and environmental values, including stock, human life or property, that are susceptible to harm should a dam break occur.

A flood generally attenuates over time and ceases to be considered a flood once it is totally contained between the bed and banks of a stream. A high hazard for stock or animals on a flood plain or elsewhere is associated with water depths occurring in excess of 300 millimetres (0.3 metre). The estimated extent of the flood at a particular probability level is called the 'flood footprint'.

If the flood footprint is contaminated by the dam break flood, the environmental harm and potential for consequent harm from contaminants including access by stock or humans to the contaminants, must be fully considered. While environmental values include the ecology, if no significant environmental values exist within the flood footprint, then a conclusion of minimal consequent harm may be justified.

Where tailings or contaminated waters are associated with a dam break flood, environmental harm can also arise from the residual effects of the material deposited. The consequences of a clean up in the general environment can involve substantial costs that would fall within the meaning of 'environmental harm' in the Act.

### **Basic Hazard Evaluation Data**

Applications that involve the construction and operation of any containment structure, must include relevant information on which an initial hazard assessment by the applicant has been undertaken.

Dam owners are likely to have much of the information already available. The minimum information is:

- specification by map/s of the location of the proposed project in relation to surrounding land use and watercourses – including the general topography and contours at a suitable scale,
- details of environmentally sensitive areas, rare and endangered species and human habitation and infrastructure developments in the near vicinity or general area and particularly downstream,
- details of watercourses and groundwater aquifers that are or might be used as water resources,
- engineering sketch drawings, in accordance with good professional practice and sufficient to fully define the layout, structure, volume and proposed means of construction of all aspects of operations associated with the proposal,
- details of quantities and concentrations of all raw materials, products, by-products and waste products produced in operations associated with the proposal, and
- details of all studies conducted to assess requirements for storage and strength of all structures associated with the project – such as hydrological and geotechnical data.

### Inspection of Site or Desktop Analysis

Whether or not a site inspection is required for a particular dam as part of a hazard assessment is a matter for consideration by the suitably qualified and experienced person concerned. Relevant factors to consider might be previous assessments, known changes, dams that are located remote from the main project site, and the likely outcomes. However, that person must be satisfied that all relevant aspects have been otherwise researched and documented to enable a reliable hazard assessment in each case.

Any assessment must include areas in the potential failure path or downstream of the dam that could be impacted by collapse or failure of the dam. Relevant matters to be observed include (but are not limited to):

- environmentally significant sites and species located in potential impact areas
- infrastructure including human habitation, worker accommodation and site offices, road crossings
- recreation facilities (bush camping etc.) along watercourses
- raw (fresh water) storages on the same watercourse
- presence of stock, irrigation and domestic water supply pumps, and water holes
- downstream storage containments – such as tailings dams and process water dams
- mine adits (entrances to underground mining) and/or open cuts (voids) – current or proposed
- catchment modification works (diversion drains, bunds etc) – current or proposed

In the case of tailings dams and other waste disposal facilities, a site inspection should also note points of impact above the level of the dam. Typical impacts from such facilities include:

- dusting potential (eg. heavy metals, arsenic)
- gas emissions (eg. cyanide, hydrogen fluoride, hydrogen sulphide, sulphur dioxide)
- spray mist (acid evaporation ponds etc)
- offensive odours
- smoke and heat (including spontaneous combustion of stored material)
- visual amenity

### Collation and Assessment of Data

A hazard category based on 'dam break' or 'failure to contain' scenarios, must be determined based on the most adverse environmental harm that can arise from the range of all possible scenarios. The hazard category is based on the consequences of failure, not on the perceived probability of the failure occurring.

The following aspects of possible adverse scenarios should be carefully considered:

Depending on its severity and duration, a rainfall event may give rise to a spill from a dam that does not result in collapse of the dam structure but nevertheless causes some harm.

Rainfall events may be of sufficient intensity and duration to lead to a collapse of the dam structure with consequent increase in harm.

Where potential harm is by release of a contaminant, account should be taken of the potential dilution by clean runoff entering the dam prior to release and potential dilution in receiving waters.

A suitable range of rainfall events will need to be considered in order to cover all potential harm scenarios and the range of performance contained in Tables 4 and 5.

For an earth dam or bund wall, a ‘sunny day’ failure can also occur due to loss of structural integrity of the wall, such as piping failure or weakness in zones of the wall due to various causes. The probability of such failure mechanisms occurring are reduced by good design and construction practices, and regular inspections by informed operators and qualified professionals.

### **Hazard Category Assessment Criteria for this Manual**

This manual is a regulatory document designed to ensure that appropriate standards are applied to dams. In certain cases, it is reasonable to expect applicable standards to be documented (ie. a ‘regulated dam’).

All dams as defined must have their hazard category assessed based on the potential harm resulting from failure event scenarios as set out in Tables 1 and 2 as guided by this text. For dams with a volume in excess of 250 megalitres, specific guidance is provided on the following page for assessing the dam break hazard.

However, as set out in the subsequent sections ‘Hazard Category based on Height’ or ‘Hazard Category based on Contaminant Concentration and Minimum Volume’, dams that meet the criteria in those sections must be assessed as regulated dams – either in the significant or high hazard category.

### **Hazard Category - Based on Assessment of Hazard Potential (Failure Event Scenarios)**

The two basic possible “failure” sets of scenarios to be applied in any assessment are:

1. “**Failure to contain**” – spills or unplanned releases from the dam due to any cause, and
2. “**Dam break**” - collapses of the dam structure due to any possible cause.

In assessing the hazard category of a dam based on possible failure event scenarios, it is to be assumed that a failure event of each type specified has occurred ie ‘failure to contain’ and ‘dam break’, and then the potential environmental harm (ie. the consequences) resulting from each such assumed failure event is to be assessed using Table 1. The hazard category for the dam overall, will be the highest hazard category produced in any category of harm, generated by any failure event scenario.

Failure to contain must consider potential adverse effects due to release to any groundwater systems.

### **Table 1 Failure to Contain Scenarios**

ENVIRONMENTAL HARM	FAILURE TO CONTAIN HAZARD CATEGORY		
	High	Significant	Low
<b>Categories of Harm</b>			
General environmental	Location such that harm to a significant environmental value is likely, or serious environmental harm is possible. Such a value might include the presence of protected or endangered flora or fauna.	The environmental value is of lesser significance and harm is possible but not likely, or material environmental harm is possible.	No environmental values of significance, or only trivial environmental harm is possible.
Loss or harm to humans	Consumption of contaminated waters by humans with consequent loss or harm is likely.	Consumption of contaminated waters by humans with consequent loss or harm is possible.	No contamination of waters used for human consumption expected.
Loss of stock	Consumption of contaminated waters by stock with consequent loss or harm is likely.	Consumption of contaminated waters by stock with consequent loss or harm is possible.	Contaminated water not available to stock or no harm expected from consumption.
General economic loss	Serious harm to communities, industrial, commercial or agricultural facilities, important utilities, the dam itself or other water resources in the failure path.	Material harm to industry, secondary roads, minor railways, public utilities, the dam itself or other water resources in the failure path.	Trivial harm to environmental values such as environmental nuisance arising from minor spills.

The hazard category of a dam can be changed by redesigning the proposal to isolate the dam from the environmental value. However, a hazard category cannot be changed by reliance on another structure, man-made or otherwise (eg. bunds) to control the risk of a failure of the dam, where the bund/s could also be subject to failure under a possible scenario.

In relation to a dam break scenario, consideration must always be given to downstream consequences including failure of other storages that may be affected by the flood wave. The consequences of such sequential failure of other storages must be considered as part of the harm caused.

Where the contained volume of a dam at imminent failure is greater than 250 megalitres, the hazard assessment must fully address the hazard associated with consequent failure of other dams, containments or on-site infrastructure downstream of the dam being considered in the assessment.

**Table 2 Dam Break Scenarios**

ENVIRONMENTAL HARM	DAM BREAK HAZARD CATEGORY		
	High	Significant	Low
<b>Categories of Harm</b>			
General environmental	Location such that harm to a significant environmental value is likely, or serious environmental harm is possible. Such a value might include the presence of protected or endangered flora or fauna.	The environmental value is of lesser significance and harm is possible but not likely, or material environmental harm is possible.	No environmental values of significance, or only trivial environmental harm is possible.
Loss or harm to humans	Location such that people are routinely present in the failure path and if present loss or harm is likely. Consumption of contaminated waters by humans with consequent loss or harm is likely.	Location such that people are routinely present in the failure path and if present loss or harm is possible. Consumption of contaminated waters by humans with consequent loss or harm is possible.	Location such that people are not routinely present in the failure path. No contamination of waters used for human consumption expected.
Loss of stock	Location of stock such that loss of stock likely. Consumption of contaminated waters by stock with consequent loss or harm is likely.	Location of stock such that loss of stock possible. Consumption of contaminated waters by stock with consequent loss or harm is possible.	Stock not in path of dam break flood. Contaminated water not available to stock or no harm expected from consumption.
General economic loss	Serious harm to communities, industrial, commercial or agricultural facilities, important utilities, the dam itself or other water resources in the failure path.	Material harm to industry, secondary roads, minor railways, public utilities, the dam itself or other water resources in the failure path.	Trivial harm to environmental values such as environmental nuisance arising from minor spills.

For the purposes of assessing the aspect of potential environmental harm in Tables 1 or 2, the cost of potential environmental harm within the meaning of the *Environmental Protection Act 1994* may be taken to be the cost of rehabilitation or restoration of the environmental value harmed.

### **Hazard Category Based on Height of a Man-made Embankment**

While all dams as defined are subject to assessment using Tables 1 and 2 of this document, a dam is a regulated dam if it incorporates a man-made embankment and the height of that embankment is greater than 8 metres as measured between the crest and the lowest point of the toe of that embankment.

That is, such a dam must be assessed as in the significant or high hazard category and not in the low hazard category, even though it could be argued that the dam is low hazard by merely applying Tables 1 and 2.

### **Hazard Category Based on Contaminant Concentrations and Minimum Volume**

While all dams are subject to assessment using Tables 1 and 2 of this document, a dam is a regulated dam if that dam:



- (a) is likely to contain contaminants at a greater concentration than that indicated in Table 3, or outside the range of pH indicated in Table 3, at any time when the volume contained within the dam is greater than 20% of the contained volume at imminent failure, AND
- (b) has a contained volume at imminent failure that is greater than that indicated in Table 3.

That is, such a dam must be assessed as in the significant or high hazard category and not in the low hazard category, even though it could be argued that the dam is low hazard by merely applying Tables 1 and 2.

**Table 3 - Contaminant Concentrations and Minimum Volumes**

<b>Contaminant <sup>1</sup></b>	<b>Liquor <sup>2</sup></b>	<b>Total Solids <sup>3</sup></b>	<b>Dam Volume</b>
Arsenic	1.0 mg/L	500 mg/kg	2.5 ML
Boron	5.0 mg/L	15,000 mg/kg	2.5 ML
Cadmium	10 µg/L	100 mg/kg	2.5 ML
Cobalt	1.0 mg/L	500 mg/kg	2.5 ML
Copper	1.0 mg/L	5,000 mg/kg	2.5 ML
Lead	0.5 mg/L	1,500 mg/kg	2.5 ML
Mercury	2 µg/L	75 mg/kg	2.5 ML
Nickel	1.0 mg/L	3,000 mg/kg	2.5 ML
Selenium	50 µg/L	150 mg/kg	2.5 ML
Zinc	20 mg/L	35,000 mg/kg	2.5 ML
Cyanide	10 mg/L	2,500 mg/kg	2.5 ML
pH	5 to 9 inclusive	Net acid generation pH < 4.5	2.5 ML
Chloride	2,500 mg/L	-	10 ML
Fluoride	2.0 mg/L	-	10 ML
Sulphate	1,000 mg/L	-	10 ML
Salinity (conductivity)	4,000 µs/cm	-	10 ML

**1** Metals should be analysed in accordance with recognised test methods by a NATA certified laboratory.

**2** These concentrations apply to contaminants in solution, and therefore all samples should be filtered using the techniques described in the Water Quality Sampling Manual (EPA 1994).

**3** Applies to the solids in a dam. Total solids include suspended and colloidal solids.

### **Hydraulic Performance Criteria for Regulated Dams**

Hydraulic performance criteria mean the capacity of a regulated dam (as defined) to divert, contain or safely pass flowable substances. The performance criteria addressed below are:

#### **For regulated dams that are NOT ‘levees’ as defined**

- Spillway capacities.
- Design Storage Allowance (DSA).
- Mandatory Reporting Level (MRL).

**For regulated dams that are 'levees' as defined**

- Design protection (or conveyance) rating.

**Application of Performance Criteria**

Estimates of quantities based on the performance criteria set out in Tables 4 and 5 of this manual for regulated dams, must be applied as set out below, and documented accordingly.

1. Except as specified below in the section 'Full Hydrologic Analysis for DSA or MRL', a runoff coefficient of 1.0 must be used for all watershed translation of rainfall into runoff and no deductions must be allowed for losses due to evaporation from the ponded area of a dam.
2. For each regulated dam that is not a levee, a spillway must be designed and maintained to pass the peak flow from a design storm of critical duration for the relevant contributing catchment, at the annual exceedance probability (AEP) specified in Table 4. In determining the spillway capacity, the assumption must be made that the dam commences full at the spillway crest level.
3. For each regulated dam that is not a levee, and at any time could contain contaminants whose release would cause material or serious environmental harm, a DSA and MRL must be estimated.
4. The DSA must be provided in the dam or in the flow path below the dam, and must be demonstrated or estimated from either:
  - (a) a 'full hydrologic analysis' as specified below and in table 5, OR
  - (b) the 'method of monthly deciles' as specified below using the AEP value in Table 5.

If a full hydrologic analysis cannot be conducted, then the 'method of monthly deciles' must be used.

5. For each regulated dam that is not a levee and requires an MRL, an MRL must be estimated as the lowest level (below spillway crest) that will allow either of the following to be retained within the dam:
  - (a) the runoff from a 72 hour duration storm at the AEP specified in the Table 5; OR
  - (b) a wave allowance at that AEP as estimated using a recognised engineering method.
6. Each levee must be designed and maintained to contain or divert the peak flow from either:
  - (a) a design storm of critical duration for the contributing catchment relevant to the zone to be protected by the levee, at an AEP specified in Table 4, OR
  - (b) the estimated volume and flow rate of a release of flowable materials resulting from a failure of relevant other works or infrastructure; AND such that
  - (c) in at least one place in the levee crest, there is a restricted length of low crest, due to limiting the freeboard at that point or otherwise, such that the flood just exceeding the imminent failure flood of the levee will be directed to a planned area or areas within the zone to be protected.

**Important NOTE**

Whatever hydrologic techniques are used for estimating required design parameters for a dam, the hazard assessor and dam designer must take into account the effect on hazard category that arises from changes in design of the dam. In particular, the impact on estimated concentrations of contaminants in releases resulting from unexpected and infrequent rainfall events contributing to dams or systems of dams, must be fully considered by the person assessing or designing the dam.

**Full Hydrologic Analysis for DSA, MRL or Levees**

A 'full hydrologic analysis' for DSA or MRL must use a model with a maximum daily timestep, and a calibrated watershed component based on soil moisture balance accounting, as set out below. All modelling must be conducted such that it obeys the law of conservation of matter (mass balanced).

The calibration of the watershed component of the model must be conducted using local rainfall data and consequent flows recorded at intervals the same as, or less than, the intervals to be used in analysis. The calibration must be conducted such that all of the following criteria are satisfied:

- at least five events must be used in the calibration, with each event resulting in 100% of the contributing catchment producing runoff at some time during the rainfall event;
- at least one event is estimated to be less frequent than ARI 5 when the real rainfall event is compared against design rainfall events of the same duration from AR&R or CRCFORGE;
- the simulated peak flow must agree with the recorded peak flow to within 30%, and the simulated total volume must agree with the recorded flow volume to within 10%; AND
- calibrations must be reviewed annually based on any additional qualifying events that have been recorded during the interim.

All hydrologic analyses with the calibrated model must use historical rainfall sequences representative of the site and sourced from either the Bureau of Meteorology daily rainfall stations or the Silo Data Drill.

Evaporative losses may be allowed in respect of lake evaporation based on accepted methods - such as Morton's method for shallow lakes. Daily data for Morton's method is available on the Silo Data Drill. No evaporative losses must be allowed for model time steps when rainfall is being applied.

A regulated dam shall be deemed to have sufficient design storage allowance (AEP 0.01) if the system of which it forms a part, does not spill during the continuous water balance simulation. For this condition to be met, a continuous simulation using at least 100 years of data is required (eg. Silo Data Drill). A spill may be acceptable within the simulation only if an outlier event is justified as indicated below.

Where the contributing catchment is less than or equal to 100 square kilometres, the AEP of an event in a 'full hydrologic analysis' and suspected of being an outlier, shall be estimated by matching the total depth of that 'real' rainfall event suspected of being an outlier, with an equivalent total depth for a design rainfall event (of the same duration and catchment area) from AR&R or CRCFORGE.

Where the contributing catchment is greater than 100 square kilometres, the AEP of an event in a 'full hydrologic analysis' and suspected of being an outlier, shall be estimated using frequency analyses of surface water flows from the application of real rainfall to the calibrated model, together with rainfall analyses of contributing catchments (and sub-catchments as relevant) as indicated above.

These methods of AEP estimation for real rainfall events may also be used when estimating volumes for MRL using a full hydrological analysis, as opposed to the default volume estimate method set out below.

### **Estimating Volume for MRL (Default Method)**

The default method for estimating the volume allowance for MRL is to apply a design rainfall event to the contributing catchment of the particular dam or sequence of dams, making conservative operational assumptions: eg. pumps are not operable during the event.

### **Method of Monthly Deciles for DSA (Default Method)**

The 'method of monthly deciles' is the use of a rainfall record of sufficient length, recorded at a location in close proximity to the site physically and in terms of relevant rainfall characteristics, to be acceptable for conservative estimation of rainfall input to a dam.

A critical wet period is determined from Figure 1 based on the physical location of the site relative to catchments in Queensland. The maximum rainfall for the critical wet period each year is then determined and a probability distribution fitted to the data points.

Rainfall depths for relevant AEPs are interpolated or extrapolated as necessary, and 100% runoff is assumed from the relevant contributing catchments to generate run-off volumes for combination with estimated other inputs to the dam over the critical wet period.

**Table 4 Performance Criteria - AEP – Spillway and Levee Design**

Operational Life of Dam	Design Event Probability (AEP) by Hazard Category	
	High	Significant
1 year	0.0001	0.001
2 to 5 years	0.00002	0.0002
6 to 10 years	0.00001	0.0001
11 to 30 years	0.000004 (or PMP)	0.00004
More than 30 years	0.000001 (or PMP)	0.00001

**Table 5 Performance Criteria - AEP – Design Storage Allowance and Mandatory Reporting Levels**

Hazard Category	Design Event Probability AEP		
	DSA Full Hydrologic Analysis	DSA Deciles Analysis	MRL 72 hour event
High	0.01	0.01	0.01
Significant	0.01	0.05	0.01

**Figure 1 – Critical Wet Periods for ‘Method of Monthly Deciles’**

