7

EIS Gas Transmission Pipeline Environmental Values and Management of Impacts

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Section 7 EIS Gas Transmission Pipeline Environmental Values and Management of Impacts

The respondent comments provided in this section have been collated from all stakeholder submission comments relating to EIS Section 7 Gas Transmission Pipeline Environmental Values and Management of Impacts. Please refer to **Attachment A** for copies of all submissions received.

7.1 Overall Assessment Methodology

Respondent Comment

Department of Environment and Resource Management states that the corridor crosses the restricted area of the Castle Hope Dam site, and the pipeline route should be changed to avoid this area.

Santos Response

Several years ago Gladstone Area Water Board (GAWB) conducted a feasibility study on the various options available to increase the water supply to the Gladstone Region, and of the ten options considered, Castle Hope Dam was ninth. Based on this result, GAWB decided not to proceed any further with this proposal, and in 2006 sold off properties that had been acquired for this proposal.

Santos has contact GAWB who confirmed that this site is no longer being considered as a feasible dam site; as such Santos will not plan to avoid this area.

Respondent Comment

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

Santos Response

Refer to **Attachment B2** for a copy of the Gas Transmission Pipeline EMP. This gives examples of mitigation strategies that will be included once the on-ground route has been finalised. The terrain analysis and mapping along the gas transmission pipeline alignment has identified areas where varying levels of constraints for pipeline construction have been identified together with a range of management strategies proposed for each of the types of constraints identified. The basis for the constraints assessment and management strategies is addressed in detail in EIS Appendix L2 and summarised in EIS Section 7.3.1.4.

As part of the EMP process, geotechnical investigations are being undertaken at intervals along the gas transmission pipeline alignment and additional field investigations including soil sampling and testing will be undertaken prior to construction to supplement the geotechnical investigations to ground truth the specific areas identified as being high constraint areas with respect to problem soil conditions. This in turn will provide the basis for the implementation of the specific mitigation measures for each of the soil types and topographical constraints. As required by DERM, information on proposed construction methods in problem soil areas, in areas of shallow strong rock and/or in topographically difficult areas, will be provided after consultation with the Santos gas transmission pipeline project engineers.

Respondent Comment

Department of Environment and Resource Management requested a detailed account of the process used to derive the preferred alignment for the gas pipeline. Specific details of measures and decisions

taken to avoid and minimise impacts on the natural environment should be provided. Particular attention should be made to remnant vegetation, wildlife habitat and watercourses and wetlands.

Santos Response

As the EIS process typically precedes detailed design and construction, the EIS established several potential routes as outlined in EIS Section 2.2.1.1. Santos ultised an Infrastructure Corridor Assessment (INCA) methodology, which combined a multi-criteria assessment (MCA) approach with desktop geographic information systems (GIS) analysis to optimise route selection against a range of criteria including those listed in the APIA Code of Environmental Practice (APIA, 2005). As the gas transmission pipeline route is still being finalised any alterations to the route will trigger an internal route change process. Santos' Environmental Route Change Procedure utilises the APIA code of environmental practice route selection criteria to be applied to any proposed route change.

Environmental criteria to be considered when approving route changes are:

- Avoiding sites of known cultural heritage significance;
- Protection of landscape values;
- Minimise impacts on regional ecosystems, by avoiding endangered dominant ecosystems;
- Avoiding ecosystems of conservation significance and essential habitats;
- Minimising impact of vegetation clearing where avoidable;
- Crossing watercourses at 90^0 to flow;
- Avoiding crossing watercourses at bends, to prevent erosion of disturbed land;
- Minimising impacts on riparian vegetation, by crossing at disturbed areas;
- Avoiding wetlands; and
- Minimising impact on wetlands by avoiding watercourses running into catchments.

In addition to this the original route selection study will also be utilised. The criteria of concern in response to DERM's submission are:

- Regional Ecosystem:
  - Avoid Endangered Ecosystem (ERE); and
  - Minimise disturbances to (in order of priority) Of Concern, Not of Concern and remnant vegetation.
- Fish Habitat Area (FHA):
  - Avoid FHA.
- Conservation Estate:
  - Avoid National Park and Conservation Parks.
- Watercourses and Waterbodies:
  - Minimise areas within 200 m of mapped bodies and watercourses.
- Wetland:
  - Avoid areas within 200 m of a wetland of national significance (from Directory of Important Wetlands).

Assessment of alternative gas transmission pipeline route options identified by Santos and the Queensland Government since submission of the GLNG EIS is provided in Part 1, Section 2 of the EIS Supplement.

7.2 Climate

No submissions have been received on this section.

7.3 Land

Respondent Comment

Department of Environment and Resource Management states that an assessment is required to support the difference of Agricultural Land Classes and Good Quality Agricultural Land datasets and the findings of the EIS.

Santos Response

For consistency of mapping, agricultural land classes for the EIS Supplement were assessed on a terrain unit basis consistent with the EIS gas transmission pipeline (March 2009) at a mapping scale of 1:50,000. The agricultural land classes were determined using a gas transmission pipeline alignment overlay superimposed on the regional compilation and mapping (1:250,000) of Good Quality Agricultural Lands (GQAL) in the Central West Region of Queensland – NRW (2004) which encompasses the majority of the gas transmission pipeline Assessed Alignment. The DPI mapping of the Land Systems of the Capricornia Coast (Forster *et. al.*,1995) was used as a basis for the assessment of agricultural land classes for the eastern end of the alignment.

The GQAL – NRW (2004) mapping was based in part on the CSIRO Land Research Series Nos. 18 and 19 (1967) and Series 21 (1968) Land Systems datasets compiled at a mapping scale of 1:500,000. Adopting the mapping scale of 1:50,000 for the gas transmission pipeline alignment, together with the additional benefits of high resolution digital imagery coupled with topographic mapping based on 5 m contour interval data, it has been possible to identify local areas not otherwise mappable at a scale of 1:500,000. Accordingly, using the more detailed (1:50,000) datasets, in places it was possible to re-interpret and refine the regional agricultural land classes to some extent. Typically the changes have involved the identification of occurrences of Land Class C3 that occur within areas identified either as Land Classes C1 or C2 in the regional mapping, This was mainly due to the occurrence of some local steep hilly areas and/or in places in areas with severe accelerated surface erosion evident, which potentially limits the productivity of these areas. Elsewhere, terrain units comprising streamlines and adjacent flood terraces or drainage ways mappable at a scale of 1:50,000 were identified either as Land Class D or Land Class C2 or C3 as appropriate. Some local occurrences along the gas transmission pipeline alignment of areas identified as Land Class A in the regional mapping, were also subject to some modification and in places extended to some extent on the basis of the more detailed terrain unit mapping undertaken.

7.3.1 Topography, Geomorphology, Geology, and Soils

Respondent Comment

Department of Environment and Resource Management requested a detailed description, characterisation, location, method for the import of suitable material, and the disposal of excess rock and other waste material together with information on the potential impacts and suitable mitigation measures.

Santos Response

Importation of any building material such as quarry or sand pit products will come from sites that have extraction permits or licenses.

Disposal of most surplus rock (and clay) excavated from trenches is not likely have a significant impact because the majority will be excavated by rock saw. The grading curve on the spoil is likely to be 75 to

100 mm minus. This small rock will be placed in the trench above the pipe. The volume of finer material displaced by the pipe in this case is approximately 72 m^3 including a bulking allowance. This equates to 36 mm when graded/ spread over about 20 m of the ROW before it is covered over by topsoil.

Where surplus larger rock is generated from trenches by excavator, hydraulic hammer or blasting, it will be used as an erosion control product for example as a diversion bank on a slope.

Refer to **Attachment B2** for examples of mitigation measures that will be implemented to mitigate the import of suitable material, and the disposal of excess rock and other waste material. In particular Section 12.16.1, Section 12.16.3 and Section 12.16.14.

Respondent Comment

Department of Environment and Resource Management sought an evidence-based assessment, considering alternatives, of the proposal to clear vegetation outside of the ROW. A detailed description of the vegetation should also be included.

Santos Response

Any vegetation clearance will be undertaken within the area of the pipeline licence granted under the *Petroleum and Gas (Production and Safety) Act 2004*. This will be managed in accordance with the conditions of the pipeline licence and the complementary environmental authority granted under the *Environmental Protection Act 1994.*

Additional clearing activities outside of the ROW will be minimal and will be limited to incidental activities such as TAFs or laydown areas. Please refer to Section 12.16.3 of **Attachment B2** for proposed clearing and grading mitigation measures.

7.3.1.4 Existing Environmental Values

Respondent Comment

Department of Environment and Resource Management requested provision of the site-specific Acid Sulfate Management Plan as requested by the TOR (also include in EIS Section 8.3.1.5).

Santos Response

A site specific ASSMP is being developed as part of the final route design process. This document will include full analyses of all ASS testing along the route and will provide mitigation strategies for the management of ASS and PASS during the construction process. This ASSMP will comply with the QASSIT guidelines and all other statutory requirements and Australian Standards (Appendix C, **Attachment E5**). It should be noted that final route selection is dependant on the subject of detailed discussion with DIP regarding shared corridors.

Respondent Comment

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

Santos Response

A current copy of the GIS shape file of the terrain units identified (explaining the geology, landforms and soils information) has been provided to DERM for reference purposes (30 July 2009). Each of the digital datasets referred to below with the pipeline superimposed are available for DERM reference purposes together with the Terrain Unit shape file cross-referenced to the various land systems intersected along the gas transmission pipeline alignment corridor. The soil groups and soil types identified in EIS Section 7.3.1.4 can also be correlated and cross-referenced with the CSIRO and DPI Soil Group and Family datasets used for the EIS study.

The main land resources background datasets used for the terrain analysis and as the basis for the assessment of engineering/environmental factors included the CSIRO Land Research Series Nos. 19 and 21 – Land Systems of the Isaac Comet Area, Queensland and Lands of the Dawson-Fitzroy Area Queensland for the south-western and central sectors of the alignment respectively. The DPI mapping of the Land Systems of the Capricornia Coast - Forster et al. (1995) was used for the mapping of the eastern sector of the alignment.

A detailed description of the terrain unit mapping methodology has been provided in EIS Appendix L2 and further summarised in EIS Section 7.3.1.4. In summary, as a basis for the mapping and description of terrain units, digital datasets of the above Land Systems information were obtained together with digital datasets of GSQ regional geological mapping at a scale (1:250,000) and in the eastern sector of the gas transmission pipeline alignment where more detailed (1:100,000) geological mapping was available covering the area. These datasets were analysed in association with 5m contour interval topographic mapping along the designated gas transmission pipeline corridor as well as high resolution image basemap overlays. This was done in order to identify the occurrence of specific Land Units and by association, the Soil Groups and Soil Families likely to be present, based on the surface slope and form and topographic position in the landscape. These soil landscape units were then re-defined as Terrain Units in accordance with the Key to the Identification of Terrain Units shown in the EIS Figure 7.3.31.

7.4 Nature Conservation

Respondent Comment

Department of Environment and Resource Management requested a detailed investigation and identification of the plants to be cleared for the construction of the gas transmission pipeline. Mitigation measures should also be identified.

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

Santos Response

Detailed vegetation assessments of the gas transmission pipeline ROW were undertaken for the GLNG EIS and EIS Supplement using methodology employed by the Queensland Herbarium for the survey of REs and vegetation communities. Vegetation mapping based on field studies and aerial photo analysis was undertaken. Areas of vegetation proposed for clearing along the gas transmission pipeline ROW were calculated. Detailed management strategies for the mitigation of impacts to flora and vegetation communities have been described within EIS Appendix N2 and **Attachment E3**. Since the submission of the EIS, design refinements have resulted in a reduction in impacts to REs.

A commitment exists in EIS Section 12.16.8 to ensure that: "A pre-construction vegetation survey will be completed in targeted areas of the ROW to identify EVR species". Further to this, a commitment has been included in the gas transmission pipeline EMP (**Attachment B2**) for professionals with an appropriate level of experience and qualifications to be engaged to undertake specialist environmental investigations such as field ecological assessments for the identification of legislatively significant species, vegetation and habitat within the bioregion.

In addition to this, a further commitment has been added to the gas transmission pipeline EMP (**Attachment B2,** Section 12.16.3) for a Significant Species Management Plan to be developed prior to the disturbance of any EVR species. Specific measures for the mitigation of any disturbed *Cycas megacarpa* including potential options for propagation, translocation or environmental offsetting will be detailed in the Significant Species Management Plan. Results from a draft report detailing findings of targeted surveys for *Cycas megacarpa* along the proposed GTP alignment outline quantified densities of the species likely to be impacted (Aureccon, 2009). Results and recommendations from this report will feed into the specific mitigation actions to be undertaken as outlined above.

Respondent Comment

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

Santos Response

The proposed width for the ROW will be 40 m, however in all instances wherever 'Endangered' and 'Of Concern' REs (Vegetation Management Status) intersect with the ROW alignment it will be reduced to 30 m. Conservation significant REs within the proposed alignment are indicated by Figure 3 to Figure 21 Part 2, **Attachment E3**; Figure 1 to Figure 5 Part 3, **Attachment E3**; and Figure 1 Part 4, **Attachment E3**. A commitment has been added for clarity to the gas transmission pipeline EMP (**Attachment B2**) for all vegetation clearing within the gas transmission pipeline ROW to be restricted to a 30 m corridor wherever 'Endangered' or 'Of concern' REs are identified. Access tracks, laydown areas and other associated clearing will be placed outside of these areas wherever possible.

Respondent Comment

Department of Environment and Resource Management sought provision of the actual mitigation measures to be implemented that will protect environmental values from weed impacts.

Santos Response

A comprehensive EMP has been developed for the construction and operation phases of the gas transmission pipeline. The EMP includes a section on weed management that sets performance criteria and defines strategies with regard to minimising the impact of weeds. Such strategies include the preparation of a weed management plan, the use of weed risk analysis assessments, training of personnel, placement of designated washdown facilities and certifications of cleanliness following washdown. For full details of the Weed Management strategies proposed please refer to Section 12.16.10 of **Attachment B2**.

Respondent Comment

Department of Environment and Resource Management sought provision of information on the potential fire and pest risk from stock piled vegetation. Suitable mitigation measures should be provided to prevent and or minimise the potential impact to environmental values.

Santos Response

Stockpiled vegetation will not be located up against standing or existing vegetation. Santos' contractor will have a fire management plan and will work with local authorities to ensure that there is no increased risk of fire throughout these regions. Prior to and during the fire season Santos will liaise with QPWS to

ensure we coordinate work with their own fire regime and burning off activities. The gas transmission pipeline EMP contains detailed fire and pest mitigation measures (see **Attachment B2**).

As Santos will work within the Weed Management section of the EMP and will develop and implement a Weed Management Plan, it is envisaged that there will be minimal opportunity for exotic flora to proliferate. Where there are any declared plants identified in the Weed Management Plan within the work area, they will be controlled and the project area will be maintained free from these.

It may be possible for pest fauna species to utilise the stockpiles temporarily as habitat, however the impact on the overall populations of these species throughout the region will be negligible. As the stockpiles will be respread during the restoration process, any possible habitat will be destroyed and population levels would resume to the preconstruction levels.

Respondent Comment

Department of Environment and Resource Management states that a suitably qualified person should conduct appropriate nesting surveys at nesting times for the fresh water turtle species R. leukops and E. albagula. This information should be provided with appropriate mitigation measures to prevent and or minimise environmental harm to those values identified.

Santos Response

Aquatic ecological studies for the gas transmission pipeline and CSG fields reveal these areas to be generally of low biodiversity, with only fish and macro-invertebrate species inhabiting the study area that are tolerant of varying and often harsh conditions., In addition, no rare or threatened aquatic fauna were recorded from the water courses of the study area (EIS Appendix N4). However, the upper Dawson River does support potential nesting habitat for the Fitzroy River turtle (*Rheodytes leukops*) between Yebna crossing and Dawson's bend, and so potential presence of this species cannot be discounted in the catchment. As such, a commitment is made in the EMP for pre-construction surveys to be undertaken for nesting sites for the Fitzroy River turtle at any major waterways where the species is considered potentially present that may be impacted by proposed construction and operations (**Attachment B2**). Horizontal directional drilling (HDD) will be used on selected watercourses, where practicable, taking into account environmental, engineering, logistical and geotechnical issues and advice from the drilling operator. Thus, there may be a requirement for pre-construction surveys.

Respondent Comment

Queensland Primary Industries and Fisheries (Department of Employment, Economic Development and Innovation) requested that a Pest Animal Management Plan is developed for pest species of concern and potential pest animal species for each Section 11, 12, 13, 14 & 15 of the GLNG EIS. (Note Section 15.15.5 could be used in each Section for Red Imported Fire Ants).

Santos Response

The following text has been added to all relevant EMPs.

Fauna Management

Develop and implement a pest species management plan for terrestrial pest fauna species of concern. This will include a management plan for Red imported fire ants including information from the National Fire Ant Eradication Program.

Refer to **Attachment B** for all revised EMPs.

7.4.4.1 Regional Context

Respondent Comment

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

Santos Response

The Great Barrier Reef World Heritage Area is identified in EIS Section 8.4.4.5, with potential impacts and mitigation measures outlined in EIS Section 8.4.5.

7.4.4.3 Terrestrial Fauna

Respondent Comment

Capricorn Conservation Council sought retention of the RE Eucalyptus tereticornis for Koala habitat. It also sought development of an EMP that monitors and protects the platypus in creek crossings disturbed by construction of the gas pipeline.

Santos Response

Detailed protocols for the mitigation of impacts to fauna have been developed that include clearing restrictions, retention of habitat features, retention of fauna corridors and use of fauna spotters during clearing.

Hutton Creek at Fairview is known to support platypus (EIS Appendix N2). The Calliope River (EIS Appendix N2) may also act as habitat. Horizontal directional drilling (HDD) will be used on selected watercourses, where practicable, taking into account environmental, engineering, logistical and geotechnical issues and advice from the drilling operator. Where applied, HDD will mitigate impacts to habitat and fauna. Clearing of riparian vegetation at these sites will also be minimised (refer to revised EMPs in **Attachment B**).

A Fauna Management Plan will be developed in consultation with DERM which will investigate the appropriate management of platypus, koala, Fitzroy River turtle and other identified species. Mitigation measures for the identified risks to these will be detailed within the Fauna Management Plan.

Offsetting of Regional Ecosystem 12.3.3 identified as koala habitat along the gas transmission pipeline will be undertaken in accordance with the objectives of the CSG field Offsets Management Strategy (**Attachment D5**).

7.4.5 Potential Impacts and Mitigation Measures

Respondent Comment

Department of Environment and Resource Management requested further information on the mitigation of weeds, particularly monitoring and mitigation measures used during the operation of the pipeline; and

Queensland Callide Valley Land Care Group is generally concerned about the spread of weeds along the pipeline route. As long as the wash down of vehicles is maintained to a high standard as described at a community consultation meeting in Biloela, where vehicle wash downs occur before and after weed free and known weed areas then this should minimalise weed spread. Possibly washdown could occur at

every property boundary along the route, as sometimes there are species of plant that possibly could be undesirable to a neighbour even though they are not a weed species, and have not been spread due to the shape of the landscape, but with the movement of vehicles along the pipeline route, these species are spread from property to property.

Santos Response

The EIS and EIS Supplement (refer **Attachment E3**) determined the presence of 45 exotic plants along the gas transmission pipeline alignments, of which ten are declared under the *Land Protection (Pest and Stock Route Management) Act 2002* or are listed as Weeds of National Significance (WONS).

The EMP for the gas transmission pipeline incorporates comprehensive strategies to prevent the introduction and spread of weed species in association with the construction and operation of the pipeline. Such strategies include monitoring and auditing, a pre-construction weed survey of the ROW, regular surveys of potential weeds by qualified personnel and regular inspections of the ROW, work areas and access tracks. Particular attention will be paid to access to and travel along the ROW, washdown activities and records and restoration activities. A commitment to managing the spread of weeds has been undertaken. This will be implemented through strategies such as weed risk analysis assessments, training of personnel, placement of designated washdown facilities and certifications of cleanliness following washdown. To reduce the opportunities of weed spread from property to property, weed control of the ROW and relevant access tracks will be undertaken prior to construction. For full details of the Weed Management strategies proposed please refer to Section 12.16.10 of **Attachment B2.**

7.4.5.1 Terrestrial Flora

Respondent Comment

Department of Environment and Resource Management requested information detailing the location and extent of native vegetation proposed to be cleared. This should include all vegetation on state land (road reserves), whether mapped as remnant or not. This should include mature regrowth vegetation. A determination of whether it would be assessable under the VMA should be included.

Santos Response

A calculation of the native vegetation to be cleared for each of the Santos components has been undertaken for the EIS and EIS Supplement. The EIS Supplement addresses the impacts to vegetation for other sections of the gas transmission pipeline (additional route options) not identified in the EIS. The lists below state the location of the specific table and section where these details can be found within these documents.

EIS - native vegetation to be cleared

- CSG field: EIS Section 6.4 and EIS Appendix N1 (Appendix A). This section describes the total area for each RE within the CSG field as the amount of vegetation to be cleared is unknown at this stage;
- GTP: EIS Section 7.4 and EIS Appendix N2 (Section 4.1.2 and Table 4-1); and
- LNG facility: EIS Section 8.4 and EIS Appendix N3 (Section 3.1.1 and Table 3-1).

EIS Supplement- native vegetation to be cleared

- GTP West of Bruce Highway: Part 2, **Attachment E3** (Section 3.1.2 and Tables 3-1 to 3-4);
- GTP GSDA: Part 3, **Attachment E3** (Section 3.1.2, Table 3-1 and Section 3.1.3, Table 3-2); and
- GTP Curtis Island: Part 4, **Attachment E3** (Section 3.1.2, Tables 3-1 and 3-2).

Significant vegetation requiring a VM clearing permit has also been identified for both the EIS and the EIS Supplement. The lists below state the location of the specific table and sections where these details can be found within these documents.

EIS - Information on VMA assessed clearing

- CSG field: EIS Section 6.4 and EIS Appendix N1 (Appendix A). This section describes the total area for each RE within the CSG field as the amount of vegetation to be cleared is unknown at this stage;
- GTP: EIS Section 7.4 and EIS Appendix N2 (Section 4.1.2 and Table 4-1); and
- LNG facility: EIS Section 8.4 and EIS Appendix N3.

EIS Supplement - Information on VMA assessed clearing

- GTP West of Bruce Highway: Part 2, **Attachment E3** (Section 3.1.3 and Table 3-6);
- GTP GSDA: Part 3, **Attachment E3** (Section 3.1.2, Table 3-1 and Section 3.1.3, Table 3-2); and
- GTP Curtis Island: Part 4, **Attachment E3** (Section 3.1.2, Table 3-2).

Vegetation is mapped for the 200 m survey corridor at a scale of 1:25,000 to inform construction planning (Figures 3 to 21 Part 2, **Attachment E3** and Figures 1 to 5, Part 2 **Attachment E3**). At this scale of mapping presentation of the 40/30 m ROW does not indicate exact locations of potential impact. Presentation of the vegetation mapping for the full alignment at a greater scale is impractical as it would generate an unwieldy number of maps. However this information will be viewed in a data layer at a larger scale electronically in a GIS system for gas transmission pipeline construction planning.

Woodland along these alignments was found to be either immature shrubby regrowth (in which case it was not mapped for the purpose of impact assessment for this study), or regrowth vegetation mature enough that it meets the classification under the requirements of the *Vegetation Management Act, 1999* and as such is mapped as remnant vegetation.

Any vegetation clearance will be undertaken within the area of the pipeline licence granted under the *Petroleum and Gas (Production and Safety) Act 2004*. This will be managed in accordance with the conditions of the pipeline licence and the complementary environmental authority granted under the *Environmental Protection Act 1994*.

Additional clearing activities outside of the ROW will be minimal and will be limited to incidental activities such as TAFs or laydown areas. Please refer to Section 12.16.3 of **Attachment B2** for proposed clearing and grading mitigation measures.

Respondent Comment

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

Santos Response

Ecological studies for the EIS and EIS Supplement included desktop and field components. DERM Essential Habitat mapping, utilised as part of the desktop studies, identified Essential Habitat mapped for koalas on Curtis Island. Fauna surveys conducted as part of the EIS did not locate koalas or signs of their presence. However, targeted surveys for the koala as part of the EIS Supplement (refer **Attachment E3**) observed scratch marks on tree trunks within Essential Habitat adjacent to Graham Creek indicating extremely low densities of koalas in this area.

Ecological desktop and field studies did not determine the presence of koalas or mapped Essential Habitat for koalas along the gas transmission pipeline on the mainland. There is a possibility that the gas transmission pipeline ROW will traverse woodland that acts as habitat for koalas.

Mitigation of any potential koala habitat disturbed along the 40/30 m ROW includes pre-clearing surveys and presence of fauna spotters to be present during clearing operations of any significant habitat (**Attachment B2**, Section 12.16.3).

Any potential disturbance to koala habitat on the Pipeline ROW that cannot be mitigated will be offset according to the offset management strategy being developed with Ecofund Queensland.

Respondent Comment

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

Santos Response

A commitment is made in the EMPs for each component (**Attachments B1**, **B2** and **B3**) for a specific rehabilitation plan to be developed for different components of the project. This will include reference site comparisons where practicable.

7.5 Surface Water

Respondent Comment

Department of Environment and Resource Management requested a detailed description and assessment of potential impacts for water course crossings required for "other buried services" if applicable.

Santos Response

In the event it is not possible to include other services in the pipeline corridor at the time of construction, any required watercourse crossing will be designed and constructed using mitigation measures similar to those described for pipeline watercourse crossings.

Respondent Comment

Department of Environment and Resource Management requested clear identification of any potential impacts on water quality from works near drainage lines or watercourse and any mitigation measures that will be undertaken to reduce the potential impacts.

Santos Response

Please refer to **Attachment B2**, Section 12.8.2.

7.5.5.1 Construction Phase

Respondent Comment

Queensland Department of Community Safety states regarding flood hazard Nomenclature, the proponent should note that AEP 0.01 % is equivalent to a 10,000 yr ARI. Therefore, the equivalence given in the second dot point ("AEP 0.01 or ARI 100 yr") is incorrect. It is assumed the intended statement is AEP 1 % or ARI 100 yr. The proponent should confirm this.

Santos Response

AEP 0.01 or AEP 1 % are both equivalent to ARI 100 yr.

7.6 Groundwater

No submissions have been received on this section.

7.7 Coastal Environment

No submissions have been received on this section.

7.8 Air Quality

Respondent Comment

Queensland Health states that during the construction phase that dust emissions could pose a potential health risk to workers and sensitive receptors in the vicinity of the construction site. Queensland Health acknowledges that the proposed mitigation measures of minimising clearance areas, revegetation, and water haul roads will minimise potential health impacts.

Santos Response

Santos appreciates your support for the mitigation measures proposed by Santos to minimise dust emissions.

7.9 Greenhouse Gas Emissions

No submissions have been received on this section.

7.10 Noise and Vibration

No submissions have been received on this section.

7.11 Land Use and Infrastructure

Respondent Comment

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

Santos Response

The State Coastal Management Plan policies applicable to the GLNG Project are listed within the EIS in Table 7.11.13 with the relevant policies provided for within the Plan under the Curtis Coast Plan. This Plan describes the Curtis Coast region as containing "*relatively undisturbed terrestrial and marine environments along its length*" and makes the following reference to the industrial character of the city of Gladstone; "*areas within Gladstone are allocated for substantial industrial development of state and national economic significance. Gladstone has urban and industrial infrastructure and port facilities that are available in few other locations on the Queensland coast*".

The Gladstone region is a significant contributor to the Queensland economy and is one of the most important industrial centres along the eastern seaboard. The estimates provided within the Plan will require some adjustment to account for the growth in industrial development and export in the Gladstone region, with this growth expected to increase significantly with the development of several LNG storage, processing and export facilities proposed.

As the project lies within the Gladstone State Development Area (GSDA) on Curtis Island and several components (including the pipeline and maritime infrastructure) interact with areas outside the GSDA it is appropriate to review the Coastal Management Plan's policies to assess possible impacts. The Curtis Coast Plan acknowledges that many of the policies have greater degree of application where the land is in its natural state as "*urban areas often represent a highly modified natural environment where past decisions and approvals constrain the ability of agencies involved in coastal management to fully achieve the principles put forward in the State Coastal Plan*". With this in mind for those areas of the project already developed for industrial purposes our review will focus on Curtis Island although the area proposed has been declared a SDA, at present the site is to a large degree undeveloped.

Relevant Regional Policies

Coastal Use and Development:

Areas of state significance (social and economic):

> The site proposed for the GLNG Project is included within the definition of 'areas of state significance (social and economic)' for the purposes of coastal management as it is located within a state development area as declared under the *State Development and Public Works Organization Act 1971*.

This policy states:

> The integrity and functioning of 'areas of state significance (social and economic)' are maintained and protected from incompatible land uses and activities that may adversely affect the continued use of these areas. In developing plans for coastal locations that include 'areas of state significance (social and economic)', in particular planning schemes, planning agencies must undertake the following:
>
> (a) Appropriately identify 'areas of state significance (social and economic)';
>
> (b) Identify land uses and activities that are compatible with these areas and may be located in neighbouring areas; and
>
> (c) Minimise any adverse impacts on the functioning of 'areas of state significance (social and economic)' from future adjoining land uses.

The GLNG Project will utilise this "strategic gateway" in accordance with the intent of this policy and further development benefits from exports of state resources to the local and regional economy. The social benefits within the Gladstone region are provided in EIS Section 8.14; however, the expected generation of employment from this project within Gladstone will be significant. It is envisaged that the declaration of this portion of Curtis Island (including the Calliope Infrastructure Corridor) as a SDA land by the state government will be supported by social infrastructure programs that

will assist in developing essential services within the community to take advantage of the improved economic and employment factors.

Maritime infrastructure:

This policy states:

> Maritime infrastructure has an important role in the state's economy and is appropriate where there is a demonstrated public need, no net loss of public access to the coast (in accordance with policy 2.3.1) and adverse impacts on coastal resources and their values are avoided where practicable, or minimised. Unless otherwise demonstrated, a public facility would be the most appropriate arrangement for a jetty, pontoon or ramp required on or connected to State land on the coast. New private jetties, pontoons and ramps are not supported on or connected to State land on the coast (refer to policy 2.9.3) above high water mark, except where it is major private infrastructure of state economic importance or:
>
> (a) There are no public landing facilities serving the same part of the coast;
>
> (b) There is a demonstrated need and public support for the facility;
>
> (c) The provision of private facilities in that location would not cause significant adverse impacts (either in isolation or cumulatively) on coastal resources;
>
> (d) There is no conflict with an approved management plan for the land; and
>
> (e) Such facilities were clearly identified as being intended as part of an assessment for new urban development on adjacent land and the facilities are connected to that land.

New private jetties, pontoons and ramps on or connected to freehold land (used for existing or future residential and tourist purposes) on the coast are not supported in largely undeveloped tidal waterways or largely undeveloped sections of tidal waterways. These structures may only be supported in tidal waterways where they are major private infrastructure of state economic importance or:

> (a) There are existing private jetties, pontoons and ramps on or connected to neighbouring freehold land and the proposal is infill (located between the neighbouring existing structures); and
>
> (b) The new structure does not result in the need for the construction of revetment walls or hardening of the river bank.

The GLNG Project will develop maritime infrastructure within the Curtis Coast Plan area providing the economic benefits ascribed to these activities within this policy, however its contribution to tourism is as yet unknown. There will be impacts associated with the functioning of the terminal facilities for loading of material and during the construction phase of the project for offloading of materials and workforce movements. These impacts when considered in isolation should not have a significant impact on the recreational activities within the region as a whole, however if the cumulative impacts associated with the continuing development of LNG facilities along this coastal fringe are considered then the impacts to these types of activities are greater in degrees depending on the time frames for construction should other projects be approved. The impacts to the ecological stability of the island where facilities are proposed have been discussed in detail within EIS Section 8.4, as has the expected disturbance to the marine environment. It is considered though, that having regard to the expected impacts of the GLNG Project there is "a demonstrated public need" for this project to proceed and the location of the maritime infrastructure has undergone extensive investigations outside and as a precursor to the EIS process. The locations proposed have been decided through a collaborative approach with the port authority and all key stakeholders and it is believed to be the best site within the region for these facilities.

Mining and petroleum activities

This policy states:

> When assessing mining and petroleum activities (including exploration activities) in the coastal zone under the *Environmental Protection Act 1994*, the relevant decision-maker is to consider the State Coastal Plan and any relevant regional coastal plan.

Through undertaking the EIS for the GLNG Project, Santos is providing the regulatory authorities and all stakeholders with a detailed assessment of their proposed activities (including the petroleum activities) and responding to any concerns that the proposed activities may cause.

Dredging

This policy states:

> Dredging from land below highest astronomical tide (e.g. within coastal waters) provides navigational and economic benefits to Queensland, and is to be appropriately located and sustainably managed to avoid or minimise adverse impacts on coastal resources and their values. Dredging activities within coastal waters will be undertaken so as to:
>
> (a) Maintain the ability of the site or adjoining land to function as a barrier protecting lands from coastal waters;
>
> (b) Maintain beach or foreshore stability;
>
> (c) Maintain natural coastal processes that supply sand to beaches;
>
> (d) Maintain the stability of the dredging area;
>
> (e) Maintain:
>
> (i) Water quality (in accordance with policy 2.4.1);
>
> (ii) Groundwater levels of underlying aquifers and coastal wetlands; and
>
> (iii) The local drainage regime on the site and adjoining areas;
>
> (f) Have no significant adverse impacts on fisheries (commercial, Indigenous Traditional Owner and recreational), fishing grounds, or spawning and nursery areas;
>
> (g) Maintain coastal habitats (including their protection from potential adverse impacts from the disturbance of acid sulfate soils);
>
> (h) Not cause unacceptable risk to existing land uses from coastal hazards (in accordance with policy 2.2.4); and
>
> (j) Not adversely impact on any cultural resources of Indigenous Traditional Owners (in accordance with policy 2.5.1).

When deciding where dredged material comprising muds, clays and silts will be placed, the choice of site is to provide the best coastal management outcome, having regard to the nature of the spoil, the cost of alternative sites, and potential impacts on coastal resources and their values. Disposal of dredge spoil should be located so as not to adversely affect 'areas of state significance (natural resources)' (refer to policy 2.8.1). If placed at sea, the ANZECC Interim Ocean Disposal Guidelines are to be followed. A dredge management plan should be prepared and implemented for maintenance dredging. Dredged material comprising clean sand will generally be kept within the active beach system. Dredging operations will, where appropriate, use fauna-excluding devices.

For any dredging operations, consideration will be given to:

> (a) Whether the sediment contains toxicants (listed under the Australian Water Quality Guidelines for Fresh Water and Marine Waters);

(b) The level and nature of the toxicant; and

(c) Whether disturbance of the contaminated sediment is likely to result in unacceptable impacts on coastal resources and their values.

In response to this policy, please refer to EIS Section 8.17 for a detailed assessment of the impacts of the proposed dredging activities on the environmental values of the Curtis Coast Plan area as well as EIS Supplement attachments:

- Nature Conservation (**Attachment G1**);
- Acid Sulfate Soils (**Attachment G2**);
- Groundwater (**Attachment G3**);
- Surface Water (**Attachment G4**);
- Port Curtis Water Quality (**Attachment G5**);
- Geotechnical Investigation (**Attachment G6**);
- Marine Ecology (**Attachment G7**); and
- Metes and Bounds (**Attachment G8**).

All dredging activities will be undertaken in consultation with the Gladstone Ports Corporation who are undertaking a dredging program independent of (and potentially complementary to) the Santos activities. A dredge management plan is being developed with Laird Point identified as the preferred site for dredge material placement in the event GPC's dredged material placement facility for Fisherman's Landing is delayed or does not proceed. This site is within the GSDA and as such the activities accord with the principles of the planning scheme for the GSDA, as being an ancillary activity to the development of the LNG export facilities.

Other relevant policies:

2.2 Physical coastal processes (Refer to EIS Section 8.4);

2.3 Public access to the coast (Refer to EIS Section 8.14);

2.4 Water quality (Refer to EIS Section 8.5); and

2.5 Indigenous Traditional Owner cultural resources.

Respondent Comment

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

Santos Response

The EIS provides figures outlining the stock routes applicable to the GLNG Project in Sections 6, and 7 (7.11.9 (a) and (b)), where grazing activities are a commonly occurring land use. The gas transmission pipeline will be left open for a minimal amount of time to minimise the possible hazards to stock within the pipeline alignment. Temporary provisions such as repairing of fencing the provision of ramps across trenches and access to water will be undertaken in consultation with landholders and where appropriate the relevant DERM officers.

Respondent Comment

Department of Environment and Resource Management requests the inclusion of information detailing the millable timber to be cleared for the construction of the pipeline.

Santos Response

Santos has held discussions with DERM, to discuss the removal of millable timber from the gas transmission pipeline ROW. Current options are:

1) Santos to provide contractors to identify and harvest commercial timber along the gas transmission pipeline ROW;
2) Santos to engage DERM/Forestry contractors to identify and harvest commercial timber along the gas transmission pipeline ROW; and
3) Santos to work with DERM/Forestry contractors. The DERM/Forestry contractors will work ahead of Santos, removing all commercial timber and Santos will remove the timber that is left behind (i.e. non-commercial timber) by the DERM/Forestry contractors.

Santos, in consultation with DERM, will implement appropriate practices to ensure that millable timber is utilised from the gas transmission pipeline ROW.

Respondent Comment

Gladstone Regional Council states that it is evident from a review of this EIS that there needs to be more land use planning for the GSDA prior to the identification of a site as being 'suitable' and even encouraged for LNG facilities. Strategically, the planning for the provision of services and infrastructure should be undertaken in much the same manner as is required for Council planning schemes and policies.

Santos Response

The Gladstone Regional Council's comments are noted. Planning decisions for the GSDA are the responsibility of the Queensland State Government.

7.11.3.2 State Planning Provisions

Respondent Comment

DEEDI (Mines and Energy) requests reference be made to State Planning Policy 2/07, and consider the potential impacts on the development of the Yarwun resource and mitigation measures.

The EIS should consider the potential impacts on the development of the Yarwun hard rock resources and mitigation measures.

Santos Response

State Planning Policy (SPP) 2/07 - Protection of Extractive Resources is applicable to the GLNG Project as the route for the proposed product pipeline enters the Yarwun area within close proximity to some existing extractive industries. The Yarwun resource is identified within the SPP as a key resource area (KRA) (# 20) within the Calliope local government area (now the Gladstone Regional Council area) and as such development application that may impact on the potential resources in this area require assessment under the policy (Part 4 Development Assessment).

The policy outcome is to:

> *Identify those extractive resources of State or regional significance where extractive industry development is appropriate in principle, and protect those resources from developments that might prevent or severely constrain current or future extraction when the need for the resource arises.*

The final gas transmission pipeline route through the GSDA is still to be determined, however where possible the pipeline will be located within the road reserve and will avoid where possible key resource areas and ancillary working areas (i.e. separation areas). There may be limited impacts to the transporting of material where the pipeline construction traverses access points for resource areas, however contingencies for alternate access will be arranged so that impacts are minimised and of a temporary nature only.

It is noted that the policy does provide for "acceptable circumstances for not achieving the Policy outcome" being:

(a) The development is a development commitment; or

(b) A material change of use—

> (i) Provides an overriding benefit to the State or regional community in social, economic or ecological terms that outweighs the community benefit of maintaining the long-term availability of the extractive resource; and
>
> (ii) Cannot reasonably be located elsewhere.

It is acknowledged that the GLNG Project is of state significance and will provide a national, state and regional long term economic benefit. However it should ideally not impinge upon the long term availability of the Yarwun resources. Consultation with all affected parties will be undertaken should the proposed alignment create any short or long term impact to the Yarwun Resource.

7.11.4.1 Current Land Use

Respondent Comment

Queensland Department of Transport and Main Roads requests that a new line in the railway section of table 7.11.5 is inserted, stating that the gas pipeline will cross the disused Dawson Valley Branch railway (between Moura and Baralaba) which is under the direct control of the Department of Transport and Main Roads. The specifications of crossing of this corridor should be the same as applied to the operational QR rail lines.

Santos Response

Santos notes your comment and will discuss the crossing of Dawson Valley Branch railway with DTMR.

7.11.5 Potential Impacts and Mitigation Measures

Respondent Comment

Department of Environment and Resource Management requests identification of the necessary permissions under the Queensland Heritage Act 1992 for the Santos GLNG Project.

Santos Response

The EIS identifies no sites of State Heritage significance impacted by the project and no permissions will be required. As stated in Section 12.16.18 of the gas transmission pipeline EMP where traditional non-indigenous heritage material may be likely to be disturbed, Santos will determine the significance of the site in consultation with DERM and undertake relocation or preservation of the material.

7.11.5.1 Impact on Existing Land Use

Respondent Comment

Queensland Energy Resources Limited and Related Entities is looking to develop oil shale deposits within the Stuart area and the routes proposed by Santos would sterilise significant additional expenditure (if the deposits were to be exploited) to facilitate future pipeline deviations which might make mining the deposits uneconomic. Further, the details of future deviations would need to be considered and designed for at this time. As the custodians of the State's Stuart oil shale tenements, QER strongly recommends that the pipeline corridor route be selected so that it causes no sterilization of the oil shale resource or, alternatively, any sterilisation is minimised so far as is practicable.

Queensland Department of Mines and Energy seeks to ensure that the pipeline route avoids or minimises sterilisation of oil shale resources.

Santos Response

The CPIC Route has been designed so as to minimise the sterilisation of oil shale reserves. Discussions with QER, DIP and other LNG proponents have identified a “land bridge” over which the corridor will follow. This land bridge traverses the least amount of oil shale reserve. Other pipeline routes are being considered by Santos to minimise sterilisation of the oil shale resource as far as is practicable.

Respondent Comment

Queensland Energy Resources Limited and Related Entities states, in regard to Landing Road Corridor Option 1 and Northern Alternative within the GSDA. Santos' preferred Option 1 pipeline alignment in the Landing Road corridor would sterilise high value oil shale yielding in excess of 15 million barrels of oil. As contemplated in EIS Section 2.2.1.4, EIS Appendix H and EIS Appendix AA, any of these alignments would sterilise high value oil shale yielding between some 16 million barrels of oil at a minimum and up to and possibly in excess of 100 million barrels of oil. Because of the significant material impact incurred to the oil shale project's economics should any of these alignments be retained, those segments of the pipeline located on top of the oil shale deposit will need to be re-routed to facilitate mining. The GLNG Project will need to engage with QER to plan for the future pipeline division and design for initial installation the appropriate future pipeline diversion infrastructure that will need to be incorporated in the design and construction of the project. This work will be required within the GLNG Project's FEED process.

Santos Response

The current CPIC Route has been designed so as to minimise the sterilisation of oil shale reserves. Discussions with QER, DIP and other LNG proponents have identified a “land bridge” over which the corridor will follow which will minimise the potential sterilisation of oil shale reserves. This land bridge traverses the least amount of oil shale reserve. Discussions will continue between all parties to ensure that all future decisions take into account the interest of all parties. Other pipeline routes are being considered by Santos to minimise sterilisation of the oil shale resource as far as is practicable.

Respondent Comment

DEEDI (Mines and Energy) sought assessment of the potential magnitude and economic significance of coal resource sterilisation, and consultation with the beneficial owner of this resource. DEEDI also sought amendment of the pipeline route to avoid sterilisation of coal resources.

Santos Response

Discussions have been held with Anglo Coal regarding reserves and the possible sterilisation of coal resources. The following points were discussed:

- Santos' alignment parallels the QGP. Anglo Coal is not able to work within 300 m of the QGP which will therefore minimise potential impact of the Santos alignment; and
- If access to these resources is required, negotiations will occur to discuss the various options identified.

In addition, Santos will enter into a pipeline crossing deed with Anglo Coal in accordance with the requirements of section 400 of the *Petroleum and Gas (Production and Safety) Act 2004*.

7.11.5.3 Impacts on Infrastructure and Services

Respondent Comment

Queensland Energy Resources Limited and Related Entities states given the potential for numerous and separate pipelines to service both the GLNG Project and other Curtis Island LNG proponent's projects, QER has strongly supported the State Government's endeavours to develop a common infrastructure corridor. The Department of Infrastructure and Planning (DIP) has separately provided to QER preliminary conceptual co-user Northern Infrastructure Corridor routes which would cross the northern or central areas of the oil shale deposit. QER has very serious concerns that the potential location for this Northern Infrastructure Corridor alignment might inadvertently sterilise a significant portion of the Stuart oil shale deposit. QER recommends that, should a common Northern Infrastructure Corridor across the oil shale deposits proceed, the alignment should follow the alignment provided.

Santos Response

The current CPIC Route has been designed so as to minimise the sterilisation of oil shale reserves. Discussions with QER, DIP and other LNG proponents have identified a "land bridge" over which the corridor will follow which will minimise the potential sterilisation of oil shale reserves. This land bridge traverses the least amount of oil shale reserve. Discussions will continue between all parties to ensure that all future decisions take into account the interest of all parties. Other pipeline routes are being considered by Santos to minimise sterilisation of the oil shale resource as far as is practicable.

7.12 Visual Amenity

No submissions have been received on this section.

7.13 Cultural Heritage

7.13.2 Non Indigenous Cultural Heritage

Respondent Comment

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

Santos Response

A non-Indigenous cultural heritage assessment will be undertaken by Santos cultural heritage field personnel prior to any construction works commencing. Final pipeline route selection will include consideration of potential non-indigenous cultural heritage significant sites. Santos cultural heritage personnel are responsible for recording non-Indigenous cultural heritage site details and reporting to DERM. Refer to Section 12.16.18 of **Attachment B2** for a list of mitigation measures proposed.

7.14 Social and Community

Respondent Comment

Queensland Department of Infrastructure and Planning states the EIS does not include the location of the accommodation camps along the pipeline route and that because these workers are likely to be fly in fly out (or drive in drive out) then the impacts on existing communities and infrastructure will be limited. The department needs to be satisfied that maintenance agreements are in place to ensure that transport infrastructure standards will not be adversely impacted and that other service providers are provided with information about the likely future demand for infrastructure and services.

Santos Response

Information pertaining to Santos transport and infrastructure arrangements is outlined in **Attachment C**, which indicates that Santos will seek to enter into an agreement with relevant road management entities.

Santos will maintain an open dialogue with local councils which will help local service providers understand the likely future demand for infrastructure and services. Based on Santos current strategy to house workers in TAF, provide reasonable amenities in the TAF, and restrict access to local communities, the potential impact on local service providers is anticipated to be low, and positive.

7.15 Economics

No submissions have been received on this section.

7.16 Rehabilitation and Decommissioning

No submissions have been received on this section.