



Appendix G
EPBC Act Report



EIS Appendix G

The respondent comments provided in this section have been collated from all stakeholder submission comments relating to EIS Appendix G EPBC Report. Please refer to **Attachment A** for copies of all submissions received

Respondent Comment

Department of Environment Water Heritage and the Arts state to DEWHA has requested that Santos include reference to offsets in EIS Appendix G Section 1.3.2.1.

Santos Response

Further to the detail provided in the EIS outlining the objectives of the biodiversity offsets strategy (EIS Sections 6.4.5.5, 7.4.5.1 and 8.4.5.1; EIS Appendices N1, N2, and N3), Santos has committed to the development of, the development of an Environmental Offset Management Plan for the GLNG Project. The Biodiversity Offset Management Plan will be prepared in consultation with DEWHA, DERM and DEEDI and in accordance with:

- (a) The Draft Policy Statement: "Use of Environmental Offsets under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth); and
- (b) The Queensland Government *Environmental Offset Policy 2008* (QGEOP).

An outline of the Biodiversity Offset Management Plan proposed by Santos is contained in Appendix D5. The plan includes:

- (a) Details of the areas of national environmental significance which are likely to be impacted by the GLNG Project. The details include the type of areas and extent of areas likely to be impacted and which are proposed to form the basis of the offset calculations;
- (b) A commitment to the establishment of "direct offsets" for areas of national environmental significance which are likely to be impacted by the GLNG Project. These include long term protection of existing habitat through acquisition and inclusion of land in the conservation estate and potentially covenanting arrangements on private land;
- (c) An outline of two alternate approaches to establishing direct offsets, namely:
 - (i) Traditional approach – whereby each offset policy is addressed individually and ratios of impact to offset are applied where policies refer to them; and
 - (ii) Strategic approach – proposes an offsets package which will deliver a large strategically located offset to be incorporated into the conservation estate to deliver greater conservation outcomes.
- (d) A description of how the proposed actions relate to the eight principles of use of environmental offsets under the EPBC Act set out in the Draft Policy Statement including:
 - (i) Targeting proposed offsets to identified MNES that are potentially impacted;
 - (ii) Employing offsetting as an impact solution in the last instance following exhaustion of options for avoidance, mitigation and minimisation of impacts;
 - (iii) Designing offsets to deliver a measurable conservation outcome that would not otherwise be achieved;
 - (iv) Delivering a package of measures under either a 'traditional' or 'strategic' approach that in order to increase the scope of possible conservation outcomes;
 - (v) Deliver outcomes that ensure impacted MNES values are maintained or enhanced;

EIS Appendix G

- (vi) Propose offset options within the within the same sub-region or bioregion as the development;
- (vii) Deliver an offset package in a timely manner with outcomes that are viable in the long term; and
- (viii) Detail a monitoring and auditing program to ensure the long-term viability of the final offsets package.

Appendix G EPBC Act Report

Table 2.1 Potential Impacts and Mitigation Measures to World Heritage/National Heritage Places for the LNG facility

Respondent Comment

Department of Environment and Resource Management requested information on the effectiveness of proposed mitigation measures to minimise impacts on marine mammals from increased shipping movement from other cases.

Santos Response

Varying boats of different speeds are anticipated to be used for the GLNG Project. The final boats to be utilised during the GLNG Project will be dependent upon boat and contractor availability. This issue is recognised to be much broader than the GLNG Project alone, given that most boat strikes occur from faster boats i.e. smaller fishing vessels within Port Curtis. Santos will contribute to any process to assess improvements to speed management of vessels in the Gladstone Harbour. This may target areas of speed restrictions to minimise the potential impact of boat strike to dolphins in the Gladstone Harbour. Further mitigation measures include the implementation of an education program for the construction workforce regarding the risks to dolphins, turtles and dugongs. This program will include instructions on avoiding interaction with these species.

Additionally, a Draft Turtle and Dugong Management Plan is included in **Attachment F5** of the EIS Supplement. This Plan contains measures designed to protect turtles and dugongs from GLNG Project activities. This plan will also apply to inshore dolphins. An assessment of dolphins within Port Curtis has been conducted for the expansion of Fishermans Landing (refer to Part 2 Section 8.4.3.8 of the EIS Supplement).

Further mitigation measures to reduce impacts on marine megafauna are included in the LNG facility EMP (Section 13.16.4, **Attachment B3**). It is anticipated that utilisation of these mitigation measures will reduce the potential of boat strike to a low level of impact.

Impact Assessment Process for Field Development

Respondent Comment

Department of Environment, Water, Heritage and the Arts requested Santos to explain action on how well sites will be selected in relation to sensitive areas. Department of Environment, Water, Heritage and the Arts also stated that as a result of the two phase approach in the EIS, and the subsequent lack of information regarding (Phase 2) development related impacts, it be unable to consider approval for the project as described in the referral until it has sufficient information to assess the impacts of the development phase of the project.

EIS Appendix G

Santos Response

Santos has undertaken a supplementary assessment of the potential impacts of the development on the ecological values of the CSG fields in response to this submission. The supplementary assessment is contained in Appendix D5 to the SEIS.

The supplementary assessment has comprised the following key elements:

- **Constraints mapping** – a detailed analysis of the ecological values of the Reasonably Foreseeable Development Area (RFDA) within the CSG fields having regard to augmented desktop and field datasets;
- **Constraints classes** – identification and mapping of five classes of land within the RFDA with graduated levels of ecological sensitivity based on the constraints mapping;
- **Field Management Protocol** – development of a field management protocol which describes the nature of development which may be undertaken within each of the constraints classes and the process to settle the specific location of the development within each constraints class having regard to the ecological values of the area and mitigation measures;
Field Development Plan – identification of a preliminary field development plan (FDP) for the RFDA with preliminary locations for the wells and associated infrastructure;
Supplementary Impact Assessment - an evaluation of potential impacts on ecological values of the development of the CSG fields based on three scenarios derived from application of the field management protocol to the field development plan;
Mitigation Measures – identification of mitigation measures additional to measures outlined in the EIS; and
Offset Strategy – outlining the basis of an Environmental Offset Management Strategy to offset ecological values impacted by the GLNG Project by offsite measures (such as property acquisition, covenants and reserve dedications).

Respondent Comment

Department of Environment, Water, Heritage and the Arts has requested Santos to explain why the loss of endangered ecological communities for the LNG facility cannot be avoided and how it may be mitigated or offset.

Santos Response

The location of the LNG facility proposed in the EIS would have resulted in the clearance of a remnant portion of littoral rainforest and coastal vine thicket which is listed as "critically endangered" under the EPBC Act. The proposed layout of the LNG facility has been adjusted such that the remnant portion of littoral rainforest and coastal vine thicket will be retained. The proposed location will not result in the clearing of any endangered ecological communities which are listed under the EPBC Act. The details of the proposed adjusted layout and assessment of impacts on flora and fauna are contained in **Attachment F2**.

Construction Techniques Alternatives

Respondent Comment

Department of Environment Water Heritage and the Arts states to provide more detail on impacts to threatened and migratory species, or threatened ecological communities. This is also a Phase 1 / Phase 2 issue because further surveys will be undertaken after final infrastructure locations are known, so the information given is based on a 'rough' idea of where things are going and may not be sufficient for assessment.

EIS Appendix G

Santos Response

Santos has undertaken a supplementary assessment of the potential impacts of the development on the ecological values of the CSG fields in response to this submission. The supplementary assessment is contained in Appendix D5 to the SEIS.

The supplementary assessment has comprised the following key elements:

- **Constraints mapping** – a detailed analysis of the ecological values of the Reasonably Foreseeable Development Area (RFDA) within the CSG fields having regard to augmented desktop and field datasets;
- **Constraints classes** – identification and mapping of five classes of land within the RFDA with graduated levels of ecological sensitivity based on the constraints mapping;
- **Field Management Protocol** – development of a field management protocol which describes the nature of development which may be undertaken within each of the constraints classes and the process to settle the specific location of the development within each constraints class having regard to the ecological values of the area and mitigation measures;
- **Field Development Plan** – development of a preliminary field development plan (FDP) for the RFDA with the locations of CSG wells and associated infrastructure;
- **Supplementary Impact Assessment** - an evaluation of potential impacts on ecological values of the development of the CSG fields based on three scenarios derived from application of the field management protocol to the FDP;
- **Mitigation Measures** – identification of mitigation measures additional to measures outlined in the EIS; and
- **Offset Strategy** – outlining the basis of an Environmental Offset Management Strategy to offset ecological values impacted by the GLNG Project by offsite measures (such as property acquisition, covenants and reserve dedications).

Pipe Delivery

Respondent Comment

Department of Environment, Water, Heritage and the Arts has requested further discussion is required on lighting impacts on the turtles. For example:

- *Appendix G Table 2.3 Reptiles states that "Potential impacts from increased lighting caused by gas flaring for maintenance purposes will be mitigated using measures such as avoiding, wherever possible, flaring at night and avoiding turtle nesting season, where practicable. This is not auditable and should be rewritten".*
- *Potential interactions from increased shipping activities will be mitigated through reduced boat speeds, maintaining watch and adhering to all reporting requirements (lacks specifics). Appendix G 7.1.3.3 lists some additional measures to reduce impact during construction, dredging etc. EIS Section 8 has reasonable detail on impacts but poor detail on mitigation measures.*

Santos Response

The Turtle and Dugong Management Plan (**Attachment F5**) discusses potential impacts to nesting turtles from construction and operation of the LNG facility and associated infrastructure. Light pollution has been linked to disorientation in turtles, particularly during periods of nesting and hatching. Studies on orientation of hatchlings revealed the most disruptive wavelengths were in the range of 300-500 nanometres.

EIS Appendix G

The GLNG Project will use lighting on the ships, access roads, PLF, MOF, LNG facility, dredges and support vessels and gas flaring activities. The major light source with potential impacts on the turtle nesting areas will be light glow from the LNG facility and possible gas flaring activities. Flaring typically lasts for several hours at a time at irregular intervals throughout the year for maintenance purposes and in emergency situations. A flare pilot will remain on at all times. Light emitted from a natural gas flare has peaked spectral intensity of 750-900 nm.

Visual assessment (Section 8.12 of the EIS) estimated that the flare stack may be partially visible from Curtis Island South End and Facing island townships. As identified by Figures 8.12.1 of the EIS and Figure 2.1 of the Turtle and Dugong Management Plan (**Attachment F5** of the EIS Supplement), the turtle nesting beach on Curtis Island lies just outside of the range of direct line of sight of the flare stack and associated flaring activities. However, the potential for impacts to hatchling turtles from LNG facility flaring events are likely to be low based on the following:

- There is a recognised spectral intensity that lies outside of the recognised range of the most disruptive light waves for turtle hatchlings;
- The distance from the flare stack to the turtle nesting beach is greater than 8 km;
- There is currently no direct line of sight between the stack and turtle nesting beach; and
- Flaring events (estimated to be infrequent, two to three times a year) would have to occur at night and during the turtle hatchling season.

Following finalisation of the LNG facility design an assessment of light glow will be made with the view to assessing potential impacts to nesting turtles. Potential impacts to nesting turtles and hatchlings from gas flaring activities will only occur during flaring events at night time in the turtle nesting season (flatback turtles - early December to late March, with a peak in mid February). Scheduled maintenance flaring is estimated to occur for a three-hour period every three years. Emergency flaring is considered to be a rare event. It is considered that the combination of flaring at night and during turtle nesting season will be rare and extremely unlikely to coincide. However, in the event there is a direct line of sight from the flare to nesting turtle populations; or light glow from the LNG facility is considered to potentially impact nesting turtles and hatchling behaviour; or gas flaring occurs at night during turtle nesting season a turtle monitoring program will be initiated and implemented.

Attachment F5 of the EIS Supplement outlines mitigation measures proposed to be undertaken by Santos including:

- Ensuring that all lighting with the LNG facility is minimised during design phase by:
 - Reduction in the intensity of light glow using low pressure sodium (LPS) lights;
 - Using timers to reduce the amount of time the lights are used;
 - Installing movement sensor lights; and
 - Restricting the height of available light or applying shrouds to control direction.
- Following finalisation of the design, other mitigation measures may include the use of light hoods.
- Avoiding flaring where possible for maintenance purposes at night during the turtle nesting and hatchling season; and
- Monitoring the nesting beaches in consultation with DERM for disorientation if upset flaring occurs at night for extended periods during turtle hatchling season.

Respondent Comment

*Department of Environment, Water, Heritage and the Arts has stated that further discussion is required on avoiding *Cycas megacarpa*. The current proposal is not satisfactory as it's only mitigation / offset plan is to translocate if necessary. It is stated that the gas transmission pipeline route will be determined in consultation with Qld Parks and Wildlife but what if translocation doesn't work? Translocate to where?*

EIS Appendix G

Monitoring of translocation? Backup plan if translocation fails? etc Translocation is a poor mitigation method with high risk of failure.

Santos Response

Wherever possible the alignment of the gas transmission pipeline alignment has been specifically adopted and refined to avoid the majority of communities of *Cycas megacarpa*. The route has been assessed in conjunction with ecologists through localities containing this species and the final alignment has been subject to the ecologist's findings. It has been observed that the larger colonies of *Cycas megacarpa* tend to exist on the side of hills as opposed to ridgelines where gas transmission pipeline construction tends to follow to avoid cross slope. The preferred route of the gas transmission pipeline avoids the majority of individuals and communities by natural design.

The proposed route of the gas transmission pipeline has been adjusted in consultation with DERM to minimise impact on threatened species and, in particular, *Cycas megacarpa* where possible. The ecological impact assessments for the adjusted routes are contained in **Attachment E3**, Part 2 and indicate the likely impact on *Cycas megacarpa*.

Santos proposes to undertake the following mitigation measures when constructing the gas transmission pipeline to minimise any residual impact to particular specimens of *Cycas megacarpa* which are on the current alignment:

- (a) Undertake a pre-clearance survey with a suitably qualified person to confirm, map and flag specimens of *Cycas megacarpa* within the area proposed to be disturbed by the construction of the pipeline. A pre-clearance field survey is currently being undertaken to confirm the specific extent and numbers of *Cycas megacarpa* along the GTP. Data from these surveys will be used to align the GTP in areas of least impact;
- (b) Adjust the location of the gas transmission pipeline within the corridor or the width of the ROW to avoid or minimise impact on identified specimens of *Cycas megacarpa*. Map and flag the identified specimens which are near the gas transmission pipeline alignment so as to avoid potential impact on the specimens; and
- (c) Where adjustment is not feasible and clearing must occur that will impact on *Cycas megacarpa*, Santos will investigate options for translocation of individual specimens and propagation of species in accordance with a Significant Species Management Plan. The plan will use the National Multi-species Recovery Plan for Cycads as the primary document guiding recovery actions (Queensland Herbarium, 2007) and include relocation siting, monitoring and back-up actions through propagation. The Significant Species Management Plan will also refer to the actions to address major threats to of *Cycas megacarpa* within the Draft Fitzroy Basin Region 'Back on Track' Biodiversity Action Plan (*in press* DERM, 2008).

LNG Facility

Respondent Comment

Department of Environment, Water, Heritage and the Arts requested Santos to provide further assessment of impacts of the project to dugong and turtles.

Santos Response

Santos has been undertaking a supplementary assessment of the potential impacts of the GLNG Project to dugongs and turtles and has prepared a Dugong and Turtle Management Plan for the dredging for the GLNG Project and disposal of the dredge material at Laird Point (**Attachment F5** of the EIS Supplement). Information from further studies and information for dugongs and turtles within Port Curtis have been

EIS Appendix G

undertaken for GPC for its Western Basin Dredging and Disposal Project (WBDD Project) and is included in **Attachment F5**.

The dredging proposed by Santos for the GLNG Project involves the disposal of dredge material at Laird Point on Curtis Island unless the GPC proceeds with the WBDD Project. It is also possible that Santos may not be able to secure tenure for the disposal of dredge material at Laird Point. The WBDD Project is proposed by GPC and involves the dredging and dredged material placement to allow for the cumulative industrial and port development of Port Curtis. The WBDD Project has been declared to be a "significant project" under the *State Development and Public Works Organisation Act 1971 (Qld)*. It has also been declared to be a "controlled action" under the EPBC Act and requires approval from the Minister for Environment, Water Heritage and the Arts. An EIS has been prepared by GPC for the WBDD Project and commenced public exhibition on 14 November 2009.

The WBDD Project includes the dredging which would be required for the GLNG Project and the QCG LNG Project as Stage 1A. The WBDDP includes proposed disposal of the dredge material at the Western Basin Reclamation Area which is located at Fisherman's Landing.

If the WBDD Project is approved, then Santos may elect not to proceed with the dredging for the GLNG Project under its EIS and approvals and but may rely on the dredging to be undertaken by GPC as part of Stage 1A of the WBDD Project. GPC would undertake the dredging required for the GLNG Project together with other projects and dispose of the dredge material at the Western Basin Reclamation Area at Fisherman's Landing. The material from the dredging required for the GLNG Project would not be disposed of at Laird Point.

If this occurs, the potential impacts to dugongs, turtles and other marine fauna arising will largely arise from GPC's actions of dredging and placement of material in the Western Basin Reclamation Area under the WBDD Project. An explanation of these potential impacts in the context of the GLNG Project is set out in the cumulative impact assessment in Appendix J of the EIS Supplement. The full detail of potential impacts to dugongs, turtles and other marine fauna for the WBDD Project (including Stage 1A) are set out in the EIS for the WBDD Project.

Marine Dredge and Material Placement Facility

Respondent Comment

Department of Environment, Water, Heritage and the Arts has requested that the assessment of wading birds at the Dredge Material Placement Facility needs further clarification.

Santos Response

Three separate seasonal surveys have been undertaken for migratory wader birds at the LNG facility and DMPF sites within representative intertidal habitat along the western shoreline of Curtis Island south of Graham Creek. Results of the seasonal surveys are discussed in EIS Section 8.4.4.4; EIS Appendix N3 (Section 3.4.7); EIS Appendix G (Sections 2.3.3 and 7.1.6); and EIS Appendix DD. A summarised discussion of results is provided below (as per EIS Appendix G Section 2.3.3).

Migratory wader bird surveys were undertaken during three independent periods in April, June and December 2008. These surveys covered migratory and non-migratory periods to ensure seasonality was considered. The BAAM study was undertaken within the wader bird migration season and included the DMPF area (BAAM, 2008). Wader and shoreline birds of the Curtis Island LNG facility and surrounds were surveyed over two days between 15th and 17th December 2008. Targeted surveys for wader birds were carried out at 12 coastal sand/mudflat and mangrove sites on the south-west coast of Curtis Island. Study sites were surveyed for waders using binoculars upon arrival at each site. Survey effort at each site was dependent on the height of the tide at the time of arrival. When tides were low, exposed sand and mudflat areas were inspected for feeding waders and mangrove areas were inspected for wader

EIS Appendix G

roost habitat. Opportunistic observations of waders (visual or from calls) were also recorded during the concurrent water mouse surveys, as well as from habitat that was adjacent to the target survey area.

A total of 22 wader and shorebird species were identified within or near the study area during the December 2008 survey. Eleven of these species are considered as migratory species under the EPBC Act and three species are considered to be conservation significant under state legislation. The BAAM (2008) study determined that habitat values for wader birds throughout the study area appeared to be relatively poor. Migratory species such as eastern curlew (*Numenius madagascariensis*), whimbrel (*Numenius phaeopus*) and eastern reef egret (*Egretta sacra*) were observed in the study area in low numbers. Whimbrels were also heard calling from some mangrove areas indicating that whilst this habitat was being used, it was in low usage as roost habitat.

Very few wader birds were observed foraging at the study sites at low tide during the field survey period. There was a high abundance and diversity of wader bird species observed foraging on sand/mudflats at low tide on the south-east of the island adjacent to the township of South End (approximately 9 km to the east of the study area). From these observations it is considered that habitat values in the study area are relatively low for wader species. It is likely that the study area is irregularly used at times for foraging/roosting by some wader species in low numbers. The BAAM (2008) study concluded that the south-west coast of Curtis Island contains marine habitat of limited value to wader and shoreline birds.

Further to this, results from similar targeted wader bird surveys undertaken for the QCLNG yielded similar conclusions. A comparison study was undertaken by an ecological consultancy specialising in ornithology and shorebird ecology of populations of wader birds within similar habitat on the mainland, at South End on Curtis Island and within the QCLNG study site (adjacent the LNG facility study area). Results of this study demonstrated that shorebird populations on Curtis Island were significantly lower than those found in similar habitat on the mainland, and populations at the QCLNG study site were significantly lower than those found on the eastern side of the island at South End; thereby demonstrating that shorebird habitat on the western side of Curtis Island south of Graham Creek has been determined to be relatively marginal by several autonomous targeted studies.

Respondent Comment

Department of Environment Water Heritage and the Arts state that a Dredge Material Placement Facility water management study/model is required.

Santos Response

GLNG has undertaken further investigations for the DMPF and are provided in **Attachments G1 to G9**. These studies include water quality modelling and impact assessment.

Respondent Comment

Department of Environment Water Heritage and the Arts requested GLNG to quantify the amount of loss of soft coral and impact on sedimentation (Table 3.1).

Santos Response

The capital dredging works are not anticipated to require the removal of any identified soft coral and accordingly any impacts arising from dredging are anticipated to be indirect. Additional investigations have been undertaken as part of the EIS Supplement to provide further information on any impacts on soft corals that may arise from dredging and sedimentation.

Additional field studies have been conducted to assess sub-tidal communities potentially impacted by dredging activities (refer **Attachment F5**). Seven sub-tidal sites were selected for this survey based on previous observations of the sub-tidal communities in the vicinity of the LNG facility (refer Figure 2.1;

EIS Appendix G

Attachment F5). Cover categories recorded included soft corals (gorgonians and *Dendronephthya* sp.), *Tubastrea faulkneri*, sponges (branching, clumping and encrusting), macroalgae (red, green and brown), bryozoans (including lace corals), echinoderms (feather stars, sea stars and brittle stars), zoanths, hydroids and non-living cover (silt, shell grit, rubble, sand and rock).

Total live cover of benthic communities averaged over all sites and depths was 43.8 ± 3.73 % (mean \pm SE), ranging from 16.5 ± 4.69 % at Site RR-1 through to 67.1 ± 5.49 % at Site RR-6.

Total live cover of benthic communities averaged over all shallow sites was 50.8 ± 5.30 %, ranging from 19.0 % at Site RR-1¹ through to 76.5 ± 1.50 % at Site RR-6. Total live cover of benthic communities averaged over all deep sites was 37.3 ± 4.77 %, ranging from 13.9 ± 7.57 % at Site RR-1 through to 61.8 ± 3.25 % at Site RR-5.

Overall, percentage cover of soft coral was higher at the deeper transects (7.1 ± 1.26 %) than at shallow transects (4.7 ± 1.36 %).

Hydrodynamic and deposition modelling has been undertaken to predict the total suspended solids concentrations and deposition rates above background that may arise during capital dredging works at sensitive receptor locations (**Attachment G5**). Santos proposes to use of a Cutter Suction Dredge (CSD) for the capital dredging works.

The potential impacts on sub-tidal communities were assessed through the generation of time series plots of predicted TSS concentrations and deposition rates above background at a surveyed soft coral sub-tidal community location (denoted PT9 in **Attachment G5** and RR-5 in **Attachment F5**).

The modelling results for TSS showed that the predicted 95th percentile TSS concentration at PT9 is 3 mg/L above background. This concentration is below the anticipated impact threshold and suggests impacts of sub-tidal communities around Hamilton Point would be marginal, if any. However, the modelling results were based on dredging within the swing basin. Whilst the vast majority of dredging activity (5.7 Mm^3) will occur in this location, dredging will also be required for the approach channel (1.1 Mm^3) which will require operation of the CSD in closer proximity to the intertidal communities for a period of approximately eight weeks. During this period sub-tidal communities surrounding Hamilton Point may experience elevated TSS concentrations and slight to moderate impacts are considered possible.

The modelling results for deposition rates showed that there was no predicted increase in deposition rates at PT9. However, as for the TSS results, this was based on modelling of the impacts of dredging within the swing basin which is the location where the vast majority of dredging (84 %) will occur. The remainder of the dredging will occur within the approach channel which will involve operation of the CSD in close proximity to the sub-tidal communities. Dredging in the approach channel is anticipated to take eight weeks to complete. During this period higher deposition rates are likely, however based on predicted deposition rates in proximity to the dredger the impacts are expected to be slight.

From the information presented above, it is considered possible that slight to moderate impacts on soft coral and sponge communities around Hamilton Point may occur during capital dredging works in the approach channel (eight weeks). Impacts are anticipated to be minor for the remainder of the dredging programme (41 weeks). The review of the scientific literature shows that there is a wide range of TSS and sediment deposition rates that have been reported to cause impacts (mostly on hard corals). Accurate predictions of the extent of potential impacts to soft coral and sponge communities resulting from the dredging activities are not possible from the field survey results and desktop study. The potential for adverse impacts to arise will be minimised by limiting periods of continuous dredging within the approach channel. Specific mitigations measures for the capital dredging programme are provided in the Draft Dredge Management Plan (**Attachment G9**). Recommendations for further monitoring of subtidal communities have been made (refer **Attachment F5**).

¹ There is no SE associated with this number as only one transect was surveyed.

EIS Appendix G

Respondent Comment

Department of Environment Water Heritage and the Arts requested further information for entries in Table 3.3. The current information lacks depth or detail of how conclusions were drawn.

Santos Response

Table 3.3 is a summary table of the potential impacts on EPBC listed terrestrial and marine species for the proposed marine facilities. Further detail on this assessment is included in the EIS technical reports for the LNG facility and DMPF facility on Curtis Island (Appendix N3 and Appendix DD), and is also summarised within EIS Section 8. Assessment is based on known ecological requirements for species, likelihood of occurrence and potential for impacts based on knowledge of future operations as set out in the EIS. Impacts to EPBC species are also expanded upon within Appendix G.

Table 4.1 EPBC Listed Threatened Species for the CSG Field

Respondent Comment

Department of Environment Water Heritage and the Arts requested further detail regarding EPBC Listed Threatened Species for the CSG field (Table 4.1). For example, at the moment it states in the Impacts / Mitigations column things like "Australian Painted Snipe - species may be present in suitable habitat. Unlikely to be significantly impacted." without much clarification as to how that decision was arrived at. Will need specific information for assessment to be made.

Santos Response

Santos has undertaken a supplementary assessment of the potential impacts of the development on the ecological values of the CSG fields in response to this submission. The supplementary assessment is contained in Appendix D5. As a component of the supplementary assessment, a series of distribution maps showing likely and potential habitat for EPBC listed species within the CSG field have been developed to provide further information on potential impacts. Table 4.1 of Appendix G of the EIS makes an assessment of potential for EPBC listed species to be present in the CSG fields based on known ecological requirements, and assesses potential for impacts based on knowledge of future operations. It is consistent with the knowledge and the developed field mitigation protocols that have now been detailed in the supplementary assessment.

Respondent Comment

Department of Environment Water Heritage and the Arts states that further information on avoidance or offsetting of the vine thicket community is required.

Santos Response

A re-design of the materials offloading facility haul road at the LNG facility on Curtis Island has relocated the road so that the 0.4 ha of Microphyll/notophyll vine forest on beach ridges (RE 12.2.2) is no longer in the development footprint which removes the direct potential impact to this community (**Attachment F2**).

Respondent Comment

Department of Environment Water Heritage and the Arts requested specific mitigation measures for sediment loads on seagrass in Section 3.3.1.3.

EIS Appendix G

Santos Response

The Draft Dredge Management Plan is provided in **Attachment G9**. Dredge type selection is the most important means of mitigating these impacts and Santos plans to utilise a Cutter Suction Dredge (CSD). Modelling for this scenario shows minimal impact likely (see **Attachments G5, G7 and G9**).

Table 5.4 EPBC Listed Migratory Species for the Bridge, Road and Services Corridor

Respondent Comment

Department of Environment Water Heritage and the Arts requested to clarify the following in Table 5.4:

- *Migratory Wetlands Birds section - Cattle Egret entry does not make sense.*
- *Migratory Marine Birds section - Great Egret entry does not make sense.*

Santos Response

A typographical error was present within Table 5.4, EIS Appendix G Section 5.3.3. The impacts/mitigation column for the cattle egret (*Ardea ibis*), in row 9 should read as follows: "Significant potential impacts from the proposed bridge, road and service corridor are unlikely as this species is widespread and its preferred habitat is unlikely to be impacted."

The entry for great egret (*Ardea alba*) in the migratory marine birds section of Table 5.4 (row 16) reads in the EIS as "Potential impacts from proposed bridge, road and service corridor are unlikely as this species is widespread and its preferred habitat is unlikely to be impacted."

Terrestrial Fauna

Respondent Comment

Department of Environment Water Heritage and the Arts requested that in Criterion VII reference should be changed to refer to Bridge and Road and services corridor.

Santos Response

Port Curtis is heavily industrialised, impacting directly on the aesthetic value of the area. Construction of the pipeline and the potential Bridge and Road services corridor will contribute to the anthropogenic impacts within Port Curtis. Direct impacts to the exceptional natural beauty and aesthetic importance of the World Heritage Area will be low in terms of the uniqueness of Friend Point and Laird Point. However, as recognised in Appendix G Table 6-2; some impact to the exceptional natural beauty and aesthetic importance of The Narrows may potentially be incurred.

Respondent Comment

Department of Environment Water Heritage and the Arts state further discussion of impacts of gas transmission pipeline on Great Barrier Reef World Heritage Area is required further. It is discussed in 6.3.1 (Appendix G, EPBC Report) however some of it makes no sense. For example:

- *"The surface layers of the areas to be dredged provide habitat for a range of benthic fauna....." and egg; and*

EIS Appendix G

- *"Introduction of a new habitat on the sand/rock backfill hard substrates and increase in habitat complexity.*
- *They also draw a long bow by stating that the sand/rock backfill will benefit many species e.g. sponges, corals, oysters, fish, crabs etc, by providing additional habitat.*
- *They also say that TSS present are "predicted to nearly always be" less than 5mg/L but make no mention of monitoring or triggers for intervention etc. Under "Examples of value/impacts/mitigation" some impact information is given but it is fairly generic. Presume specific details of mitigation measures will be elsewhere? If not, then this isn't really auditable.*

Santos Response

Pipeline dredging works are proposed to be undertaken using a backhoe hydraulic dredger (BHD). Based on a predicted backhoe productivity of 150 m³/h and a spillage rate of 10 kg/m³, it is anticipated that the BHD will generate a plume at the rate of 1500kg/h (0.42 kg/s). The predicted long-term fraction of the plume and its composition were derived based on data on the characteristics of the material to be dredged and monitoring undertaken during dredging works by the "Wombat" CSD. It is assumed that 100 % of the entrained fine sand and silt will remain suspended in the long term plume while 0 % of the gravels and coarse sand fractions will remain in suspension.

Hydrodynamic modelling was undertaken to assess the potential water quality impacts associated with pipeline laying across Port Curtis using the software package TUFLOW-FV (refer Port Curtis Water Quality Report - **Attachment G5**).

Two pipeline scenarios were modelled: one for pipeline laying on the eastern side of the channel and the other for pipeline laying in the western side of the channel.

The modelling results show that during pipeline laying operations 90th percentile TSS concentrations above background are anticipated to be below 2mg/L away from the dredger. The predicted increases in TSS concentrations are minor and are not anticipated to result in any detectable impact. These results are discussed further detail in the Port Curtis Water Quality Report (**Attachment G5** of the Supplementary EIS).

Potential impacts to benthic communities will include direct loss of benthic communities within the footprint of the gas pipeline. Subtidal surveys indicated sparse cover of invertebrate communities along the pipeline footprint, with much of the substrate consisting of soft silts, rubble, sand and shell. Some macroalgae were also present. Indirect impacts will include elevated levels of TSS however this is expected to be localised and short-term. Sediment level thresholds will be set for excavation and backfill operations as a management control to mitigate potential impacts to adjacent areas.