ENVIRONMENT PLAN
EXECUTIVE SUMMARY

VIC/P44 STAGE 2 GAS FIELD DEVELOPMENT

Prepared for:

Santos Limited

Prepared by:

Coffey Natural Systems

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Santos

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1 EXECUTIVE SUMMARY

1.1 The Proponent

Santos Limited (Santos) is the proponent for the proposed Vic/P44 Stage 2 Gas Field Development.

Santos is a major Australian energy company with its headquarters in Adelaide, and is the largest producer of natural gas for the Australian market, supplying all mainland States and Territories. Santos has been actively producing hydrocarbons for the last 44 years. The core business of the company is oil and gas exploration and production with interests in every major Australian petroleum province as well as in Indonesia, Papua New Guinea, Vietnam, India, Bangladesh, Kyrgyzstan and Egypt.

Specifically, Santos has been operating in the Otway Basin offshore of Western Victoria where it has been producing Casino gas since start-up in 2006.

1.2 The Proposal

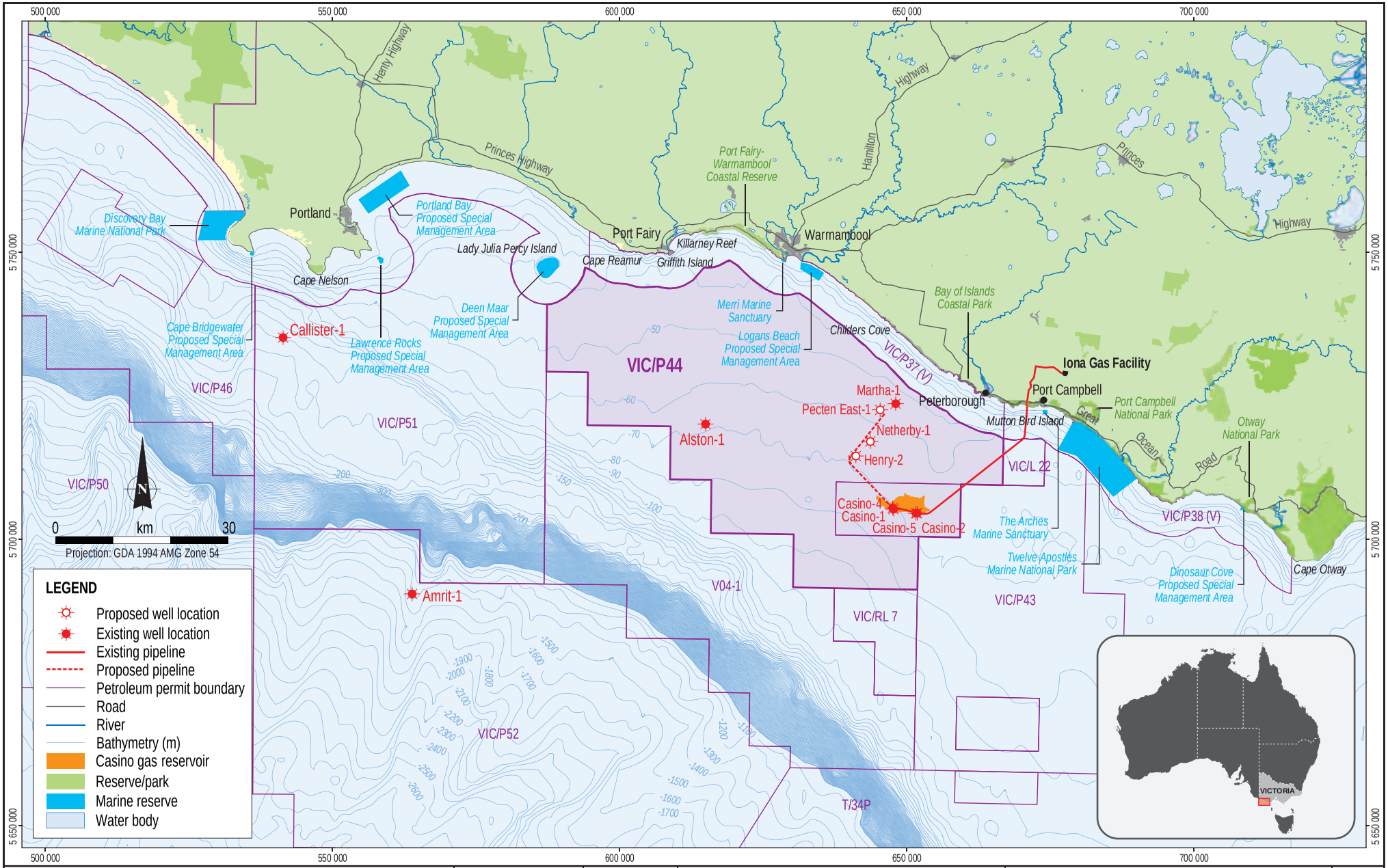
The Stage 2 Development is situated in the Otway Basin within Petroleum Permit area Vic/P44. The Stage 2 Development is situated 12 km offshore from the western Victorian Coast (at the closest point), in water depths ranging between 65 to 70 m (Figure ES1, Figure ES2). The Santos Stage 2 Development consists of:

- Drilling one exploration (Pecten East-1) and two development wells (Henry 2 and Netherby 1) using the Ocean Patriot semi submersible drilling rig.
- Subsea wellhead installation at Henry-2 and Netherby-1 for tie-back to existing Casino subsea facilities.
- Installation of a pipeline and umbilical, using a pipeline reel-ship, from the Casino subsea facilities to the Pecten East-1 location taking-in Henry-2 and Netherby-1.

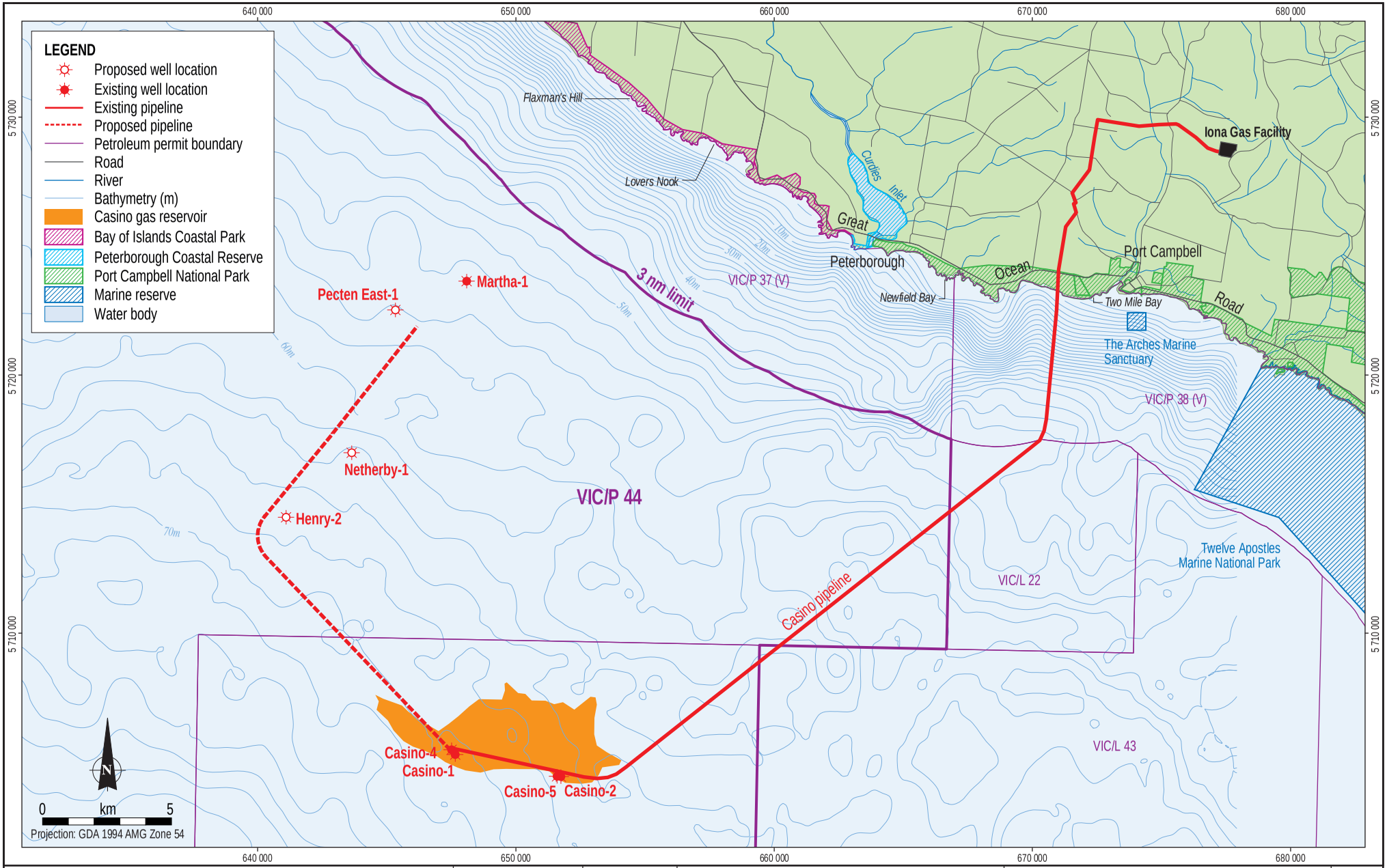
Gas from the wells will be transported to shore via the existing Casino gas pipeline and processed at the TRUenergy Iona gas processing plant. The gas will then be exported to the Victorian and South Australian gas distribution network. All processing is within existing Iona plant capacity and no additional or upgrade of facilities is required.

A seabed survey was conducted in March 2006 along the Stage 2 Development pipeline route to characterise any subsea features such as rock reefs that may be biologically significant or important to local fisheries. The final pipeline alignment is positioned based on these and other engineering studies ensuring minimal environmental and social impact.

The proposed Stage 2 Development is scheduled to commence in April 2008. The project environmental approvals have been granted. Drilling of exploration and development wells is predicted to continue until September 2008. The pipeline installation will commence in November 2008 with completion of the pipeline installation in January 2009. Initial estimates of the Stage 2 Development predict that gas reserves in the area will produce for approximately 15 years.



	coffey natural systems	Job No: 1235	Santos	Figure No: ES1
		File Name: 1235_05_FES1_KB	VIC/P44 Stage 2 Gas Field Development	Regional location of Stage 2 Development



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VIC/P44 Stage 2 Gas Field Development

Location of Stage 2 Development pipeline

Figure No: **ES2**

1.3 Stakeholder Consultation

In the course of planning the Stage 2 Development, Santos has to date undertaken consultation with relevant stakeholders in the region to identify regulatory processes, potential environmental issues and management requirements. Santos will undertake ongoing consultation to ensure the seismic survey management arrangements and communications are in place.

Stakeholders of relevance to the Vic/P44 Stage 2 Gas Field Development include:

- Commonwealth:
  - Department of Environment, Water, Heritage and Arts (DEWHA).
  - Australian Fisheries Management Authority (AFMA).
  - Australian Maritime Safety Authority (AMSA).
  - Border Protection Command.
  - Commonwealth Fisheries Association.
- Victoria:
  - Department of Primary Industries (DPI).
  - Department of Sustainability and Environment (Warrnambool) (DSE).
  - Seafood Industry Victoria (SIV).
  - Warrnambool Professional Fishermen's Association.
  - Portland Professional Fishermen's Association.
  - Port Campbell Professional Fishermen's Association.
  - Apollo Bay Professional Fishermen's Association.
  - Victorian Scallop Industry Association.
  - DPI Regional Fisheries Officer.
  - South East Trawl Fishing Industry Association.
  - South East Non-Trawl Fishing Industry Association.
  - Deakin University (Warrnambool) blue whale research group.

Consultation and information dissemination has been, and will continue to be, undertaken through a range of media including:

- Meetings with regulators.
- Meetings and correspondence with key stakeholders.
- Invitation for public comment on the EPBC referrals via the DEWHA website.
- Provision of detailed development activity maps.
- Vessel communication systems with maritime traffic.
- Project briefings which have been held with stakeholders at project milestone points.
- One-on-one technical discussions with stakeholders for information dissemination and obtaining stakeholder input to technical issues.

- Provision of information to the wider community, including:
  - Media releases (e.g., information updates in the local and regional newspapers).
  - Information and project updates on the Santos public website.
  - Information mail-outs (e.g., project brochures and notifications).

In addition, Santos will report on the Stage 2 Development in accordance with regulatory requirements to demonstrate that the environmental performance objectives and standards outlined in the Environment Plan have been met. In addition, Santos has advised and will continue to advise stakeholders of the Stage 2 Development progress (drilling, and pipeline and subsea equipment installation) and will respond to any concerns raised.

1.4 Environmental Impact Assessment, Management and Mitigation

The main environmental hazards associated with the Vic/P44 Stage 2 Gas Field Development include:

- Rig anchoring.
- Artificial lighting.
- Noise (vessel, drilling rig).
- Pipeline installation.
- Interference with other operators.
- Drilling cuttings and mud discharges.
- Waste discharges.
- Ballast water discharges.
- Hydrocarbon and/or chemical spills.
- Air emissions.

The Environment Plan provides a detailed assessment of potential impacts. The key points of the assessment, and management and mitigation measures are summarised in Table ES1 below. The summary risk ranking is shown in Table ES1. There are a total of 23 environmental risk assessments; all of these were assessed as having low risk.

Table ES1 Summary of environmental impact assessment results

Impact Assessment	Management and Mitigation	Risk Ranking
Pipeline Installation		
Subsea Well-head Equipment Installation: disturbance to seabed habitats Smothering of immobile epibenthic organisms, habitat loss.	Pipeline route survey undertaken pre-project (Coffey, 2007). Subsea equipment situated on sandy seabed, avoiding disturbance to sensitive benthic habitat. A survey will be undertaken following the installation to ensure no equipment or debris is left on the seabed.	Low
Pipeline/Umbilical installation: disturbance to seabed habitats through pipe lay Smothering of immobile epibenthic organisms, habitat loss.	Pipeline route survey undertaken pre-project (Coffey, 2007), the short offshore pipeline route avoids sensitive environments. Localised and short-term loss of epibenthic habitat. The pipe is likely to be colonised over time by sponges, hydrozoans, bryozoans and algae. Turbidity will be minimal as there will be no active burial of the pipeline along the route. A survey will be undertaken following the installation to ensure no equipment or debris is left on the seabed.	Low
Pipeline/Umbilical installation: seabed disturbance from anchor dragging Physical disturbance to benthic habitats and epibenthic organisms.	Dynamically positioned vessels being used. No anchors required during installation.	Low
Pipeline/Umbilical installation: impacts to fisheries Behavioural changes.	No exposure to harmful noise levels expected. Behavioural changes likely to be localised and temporary (alarm, avoidance, tighter schooling). Pipe lay is of short duration.	Low
Pipeline/Umbilical installation: noise or direct contact impacts to cetaceans Behavioural changes of cetacean, interference with breeding, feeding and migration.	The pipeline is located within known important feeding, breeding or migration habitat for whales. Pipe vessel will move slowly. May evoke avoidance response in whales, but unlikely to displace species from key habitat or migration paths. Support vessel speed reductions and/or detours will be taken around any whale sightings. Cetacean observation and avoidance procedures will be employed. Cetacean observations will be reported to DEWHA. The Santos Whale Interaction Management Plan (WIMP) implemented and DEWHA whale guidelines followed.	Low
Pipeline/Umbilical installation: direct contact impacts to pinnipeds	No known breeding colonies in the vicinity of the project area (Lady Julia Percy Island, 65 km to the west). Seals may be attracted to the drill rig subsea structure once stable on site and marine growth attracts sea life.	Low

Table ES1 Summary of environmental impact assessment results (cont'd)

Impact Assessment	Management and Mitigation	Risk Ranking
Commissioning		
Hydrostatic pressure testing of installed pipeline: disposal of test water Reduce water quality and impact benthic and planktonic organisms.	Hydrostatic test water will be discharged offshore as a once-off activity. Test water discharged offshore will disperse through the water column making extended exposure unlikely. Additives will be selected with environmental considerations assessed and reviewed. Chemical additive dose rates will be selected to ensure that the chemicals are effectively diluted at the time of discharge. Discharge offshore will be directed to avoid scouring of the seabed.	Low
Drilling		
Presence of drilling rig and support vessels: rig positioning and anchoring Disturbance to seafloor and benthic fauna.	Localised and short-term loss of benthic habitat. Drilling activities are a short term operation (about a month per well). Adherence to anchoring procedures to minimise chain and anchor drag.	Low
Presence of drilling rig and support vessels: artificial lighting Attract seabirds and other marine life.	Standard maritime safety procedures will be adopted (AMSA). Lighting selected to meet safety requirements. Minimise unnecessary lights directed toward water. Crew to record observations of whales and other megafauna. These will be passed on to the DEWHA.	Low
Drilling discharges: discharge of drilling cuttings and muds to sea Smothering of benthic communities, increased turbidity in water and toxicity of drilling muds.	Drill cuttings are processed prior to disposal to remove excess drill mud. Impact will be very localised (100 to 200 m from the drill site) and short-lived (less than 24 months). Water based muds (WBM) almost non-toxic. Impact is localised and transient.	Low
Well testing: local air emissions Impact to air quality.	Well testing and flaring from the drill rig once wells drilled will be short duration (2 to 3 days).	Low
Installation Vessels		
Vessels presence in project area: collision with vessel and hydrocarbon/chemical spill Impacts on marine environment.	Ensure that senior personnel on vessels are familiar with the contents of the Emergency Response Manual and OSCP such that the initial response to a spill is carried out efficiently. Any spill will quickly disperse in the marine environment. Strict refuelling and operations procedures in place. All spills recorded in a wastes and emissions log, reported to Santos and regulatory authorities advised in accordance with regulatory requirements.	Low

Table ES1 Summary of environmental impact assessment results (cont'd)

Impact Assessment	Management and Mitigation	Risk Ranking
Vessels presence in project area: collision with vessel and hydrocarbon/chemical spill (cont'd) Impacts on marine environment.	Communications will be maintained with other vessels operating in the area to advise of the location of the pipeline reel-ship and avoid collision. Vessel Master will cease operating and seek safe harbour (or deep water) where extreme conditions make it unsafe to continue pipelay operations.	
Discharge of sewage and putrescible wastes from all project vessels: waste discharge to sea Changes in planktonic or benthic communities and injury to marine life.	Sewage will be treated prior to disposal in accordance with MARPOL regulations (Annex IV). Sewage will be treated through an on-board effluent treatment plant prior to being discharged to sea. Sewage and putrescible wastes will be macerated prior to being discharged to sea.	Low
Discharge of solid and hazardous materials and waste from all project vessels: waste discharge to sea Pollution to marine environment.	All vessels will comply with State and Commonwealth legislation for the control of pollution and dumping at sea. No incineration of waste will be allowed onboard the vessels during installation. Solids will be returned to shore for disposal. All hazardous materials will be stored in appropriately bunded areas and MSDS for these materials will be stored on the vessel. Hazardous wastes will be segregated and stored in storage areas and transferred to onshore licensed hazardous materials handlers for disposal to a licensed depot. Waste register will be maintained to record waste management practices and audited to verify compliance.	Low
Ballast water discharge from all project vessels: introduction of marine pests Competition for food and habitat.	Ballast water management plan will be in place for the vessels. 'Code of Practice for Antifouling and In-water Hull Cleaning and Maintenance' will be applied. Verify vessel's recent locations of activity, since last anti-fouling (with reference to known areas where exotic species have become established). Vessel masters will be made aware of the AQIS 'Maritime Awareness Kit'. Avoid transfer of abalone virus by operating in > 20 m water depth and avoiding virus locations. Check compliance to the International Convention on the Control of Harmful Anti-Fouling Systems on Ships 2001 (AFS Convention comes into force 17 September 2008).	Low
Deck drainage discharge from all project vessels: waste discharge Pollution to marine environment.	In the event of a chemical or oil spill, absorbent materials will be used to remove spill material prior to any washing activities. The absorbent material will be containerised and sent to shore as hazardous waste to ensure that no contaminated waste streams are routinely discharged from the deck drainage system.	Low

Table ES1 Summary of environmental impact assessment results (cont'd)

Impact Assessment	Management and Mitigation	Risk Ranking
Exhaust and incinerator emissions from all project vessels: emissions to atmosphere Pollution to atmosphere.	Emissions will be minimised by ensuring that all engines and generators are serviced to manufacturer's specifications.	Low
Interaction with commercial fishing activity: interference with commercial fishing vessels Risk to fishing vessels and fishing grounds during drilling and pipe laying.	Project is located in area of low to medium trawl fishing activity. No exposure to harmful noise levels for fish species expected. The planned movement of the pipeline reel-ship and support vessels will be communicated to AMSA and ongoing to all fishers. Location of drilling locations and subsea pipeline and equipment will be communicated to AMSA and all fishers upon completion.	Low
Pipeline Operations		
Subsea infrastructure operations: release of hydraulic fluid Toxicity effects of hydraulic fluid to marine environment.	Occasional small volumes (< 1litre/day) of discharged hydraulic fluid (Oceanic HW-525) water soluble and will rapidly disperse in the water column. Water based glycol hydraulic fluid is biodegradable. Hydraulic fluid loss monitored.	Low
Subsea infrastructure operations: Pipeline rupture Damage to marine environment.	Wellhead chokes will regulate gas flow to minimise the potential for over-pressuring of the pipeline. HIPPS will protect the TRUenergy pipeline from over-pressure. Design of Vic/P44 Stage 2 Development pipeline and trenching of control umbilical to protect the infrastructure from trawl fishing activities.	Low
Produced formation water and condensation water: Disposal of formation water and condensation water Pollution of environment.	Virtually no produced formation water or condensation water is expected. Produced formation water and condensation water will be treated onshore and disposed of in accordance with the TRUenergy and regulatory requirements.	Low
Accidental hydrocarbon spills: leakage of gas Pollution of marine environment.	Location of wellhead is remote from shore. Low potential of spills reaching the coast and unlikely to pose a significant environmental threat. Santos's oil spill contingency response plan for the Stage 2 Development will be updated to incorporate all field development and operation activities.	Low
Interaction with commercial fishing activity: interference with commercial fishing vessels Exclusion from fishing ground, damage to trawl gear.	Maintaining ongoing consultation with commercial fishing groups regarding final pipeline and wellhead locations. Providing digital information to fishers and the government hydrographer on pipeline and wellhead positions. Ensuring locations are known in advance to all fishermen by provision of notices to mariners, and declaration of exclusion zones around well heads. Providing navigation buoys to mark each installed wellhead location.	Low

Table ES1 Summary of environmental impact assessment results (cont'd)

Impact Assessment	Management and Mitigation	Risk Ranking
Interaction with commercial fishing activity: Interference with commercial fishing vessels (cont'd) Exclusion from fishing ground, damage to trawl gear.	Removing all equipment such as slings used to support the pipe and equipment during laying or tie-in following the completion of installation to reduce the risk of entanglement with fishing gear. Establishing a permanent 500 m exclusion zone around the wellheads and marking their location on marine charts. The pipeline may become partially or fully buried by natural bed sediment transport. Designing pipelines to withstand impacts of trawl gear and to minimise or eliminate features (e.g., weights) upon which trawl gear could become caught.	

In summary, the Vic/P44 Stage 2 Gas Field Development is located in Commonwealth waters, in the Otway Basin within Petroleum Permit area Vic/P44. The Stage 2 Development is scheduled to commence in April 2008. Environmental approvals are in place. Drilling of exploration and development wells is predicted to continue until September 2008. The pipeline installation will commence in November 2008 with completion of the pipeline installation in January 2009.

Stakeholders have been consulted, especially fishing groups, and mitigation measures have been put in place to manage interaction with whales that may be present at the time of the survey.

Detailed management and mitigation measures that will be followed during the project are provided in the Environment Plan. The implementation strategy for the Environment Plan specifically details the measures needed to ensure that the environmental performance objectives and standards are met, and identifies:

- Systems, practices and procedures.
- Specific roles and responsibilities.
- Employee training.
- Monitoring, auditing and recording requirements.
- Emergency response planning.
- Consultation with government and stakeholders.

1.5 Contact Details

Please direct all queries, comments or request for a copy of the approved VIC/P44 Stage 2 Gas Field Development Environment Plan to:

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