BMG Non-Production Phase
Summary Environment Plan

Oceaneering Services Australia Controlled Document
No. 09/HSEQ/ENV/PL16
Revision 0
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1 Introduction

Roc Oil (VIC) Pty Limited, a fully-owned subsidiary of Roc Oil Company Limited (‘ROC’), holds a 30% interest and is the operator on behalf of the Basker-Manta-Gummy (BMG) Joint Venture Partners (JVP) in Production Licence Areas VIC/L26, VIC/L27 & VIC/L28 in eastern Bass Strait. The BMG JVP comprises of:

- Roc Oil (VIC) Pty Limited (Operator) 30%
- Beach Energy Limited 30%
- CIECO Exploration & Production (Australia) Pty Ltd 20%
- Sojitz Energy Australia Pty Limited 10%
- Pertamina Hulu Energi Australia Pty Limited 10%

The BMG Field (Phase 1 Oil Development) was developed in 2005 utilising a leased Floating Production Storage Offloading (FPSO) vessel, Crystal Ocean. This allowed for recovery of hydrocarbons through a series of subsea wells connected back to the vessel. In 2010, the Phase 1 operation was deemed non-economic. The Crystal Ocean, prior to leaving the field in 2011, depressured, flushed and preserved with inhibited water the BMG subsea equipment which previously contained hydrocarbons. Further deconstruction activity undertaken in 1Q 2012 removed mooring systems and all mid-water equipment; and undertook trenching activities on the Basker-6 flowline. The residual subsea infrastructure will now be left under ‘care and maintenance’ pending a development decision on the BMG Phase 2 (Gas) Development. This phase, post Phase 1 Oil Development and before Phase 2, is deemed the BMG Non-Production Phase (NPP).

2 Activity Location

The BMG oil and gas fields, located in Production Licence areas VIC/L26, VIC/L27 and VIC/L28, are situated in the Commonwealth waters of Bass Strait approximately 55km from the Victorian Coast and 15km east of the Flounder oil and gas field (refer Figure 1).

Figure 1: Regional Location of the BMG Field
The coordinates and layout of the remaining BMG infrastructure is provided in Table 1 and diagrammatically in Figure 2. All remaining BMG subsea equipment is located within a gazetted BMG Petroleum Safety Zone (PSZ).

Table 1: BMG Infrastructure Coordinates

<table>
<thead>
<tr>
<th>Locations</th>
<th>Longitude (E)</th>
<th>Latitude (S)</th>
<th>Water Depth (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basker-2 Well</td>
<td>148° 42’ 24.81”</td>
<td>38° 17’ 58.54”</td>
<td>155</td>
</tr>
<tr>
<td>Basker-3 Well</td>
<td>148° 42’ 24.92”</td>
<td>38° 17’ 58.98”</td>
<td>155</td>
</tr>
<tr>
<td>Basker-4 Well</td>
<td>148° 42’ 23.63”</td>
<td>38° 17’ 58.81”</td>
<td>155</td>
</tr>
<tr>
<td>Basker-5 Well</td>
<td>148° 42’ 23.83”</td>
<td>38° 17’ 59.26”</td>
<td>155</td>
</tr>
<tr>
<td>Basker-6 Well</td>
<td>148° 43’ 54.70”</td>
<td>38° 19’ 17.54”</td>
<td>263</td>
</tr>
<tr>
<td>Basker-7 Well</td>
<td>148° 42’ 22.31”</td>
<td>38° 17’ 58.79”</td>
<td>155</td>
</tr>
<tr>
<td>Manta-2A Well</td>
<td>148° 42’ 58.00”</td>
<td>38° 16’ 39.42”</td>
<td>135</td>
</tr>
<tr>
<td>Basker-A Manifold</td>
<td>148° 42’ 24.32”</td>
<td>38° 17’ 58.74”</td>
<td>155</td>
</tr>
</tbody>
</table>

Figure 2: Current BMG Development Layout (June 2012)
3 NPP Activity Description

3.1 Equipment Status
The BMG NPP equipment which remains in the field has been left as follows:

- All BMG wells have been left with at least two confirmed and tested mechanical well barriers and one down-hole barrier between the petroleum reservoir and marine environment;
- Flowlines have been flushed of hydrocarbons and displaced with inhibited water to protect against internal corrosion. Flowline sections where the dynamic section has been removed (i.e. flowlines previously connected to the FPSO) have had blinds fitted to the static flowline sections which have been tested and confirmed leak tight. Some re-pressurisation (gas) of the flowline system has occurred as a result of the work scope completed in 1Q 2012 and further small amounts of gas ingress may occur over time due to valve passing; and
- Down-hole control lines (umbilicals) have been left filled with TransquaHT2™ with the control line isolation valves closed.

3.2 NPP Activity
The following activities will be undertaken as part of the BMG Non-Production Phase:

- **Surveillance:** During the first 12 months of operation post FPSO leaving the field, a guard (surveillance) vessel has been located in the BMG Field. The purpose of the vessel has been to mark subsea equipment and monitor for third party vessel entry into the BMG Petroleum Safety Zone (PSZ). When at the BMG location, the surveillance vessel operates both inside and around the perimeter of the BMG PSZ. The use of the surveillance vessel is under assessment for replacement with an alternate device/system which can provide an equivalent level of protection.

- **Facility Inspection:** During the NPP, regular visual inspection and monitoring of wells and subsea equipment via ROV will occur. Minor interventions may also be required such as anode replacement or sandbag replacement. Inspection activities are expected to take 14-21 days per inspection at a frequency determined by the BMG Subsea Integrity, Maintenance and Repair (IMR) Engineering Assessment and Reporting Procedure (Ref: 09/SS/INT/PC02). This procedure conforms to DNV Recommended Practices for integrity management and cathodic protection design.

The NPP may last for a period of up to five (5) years.
4 Receiving Environment

The closest landfall to the BMG Development is Cape Conran, located 53km north, on the Ninety Mile Beach (Victoria). The Ninety Mile Beach is an extensive continuous NE-SW oriented sandy beach and dune system which provides a buffer zone to the wetlands and heathlands located of the inland Gippsland Lakes waterways.

Conservation Areas

While no areas of high conservation significance are present in the BMG Licence area itself, there are sensitive and important habitats in the region. The nearest sensitive areas to the BMG Development are (distances are approximate):

- Beware Reef Marine Sanctuary (VIC) located 55km north;
- Point Hicks State Marine National Park (VIC) located 65km NE;
- Ninety Mile Beach Marine National Park (VIC) located 130km west;
- Cape Howe Marine National Park (VIC) located 150km NE;
- Corner Inlet Marine and Coastal National Park (VIC) located 200km WSW;
- Nooramunga Inlet Marine and Coastal National Park (VIC) located 130km west;
- Wilsons Promontory Marine National Park, Marine Reserve and Marine Park (VIC) located 210km SW;
- Kent Group Marine Reserve (TAS) located 175km SW;
- East Gippsland Commonwealth Marine Reserve located 105km east;
- Flinders Commonwealth Marine Reserve located 230km south; and
- Beagle Commonwealth Marine Reserve located 165km SW.

Seabed Features

The BMG Production Licences include portions of the mid-outer continental shelf and the upper slopes of the Bass Canyon. The majority of the BMG Development lies on the mid-outer continental shelf north of the Bass Canyon shelf break. The seabed of the area is very slightly undulating but remains smooth with gradients no greater than 2° (1:30). Geophysical survey data shows that the seabed in this area is featureless and undisturbed with the seabed comprising of silty sand. The underlying geological structure is dipping and slightly irregular, grading from silty fine sand at the seabed to over-consolidated sandy, silty clay at 10m below seabed. The Basker-6(ST-1) wellhead lies over the Bass Canyon shelf break on the canyon’s upper slopes (263m depth). There have been no seabed anomalies identified in the BMG infrastructure area (including Basker-6 area).

The Basker-6 flowline located between the BAM and Basker-6 wellhead crosses the upper levels of the Bass Canyon scarp (decreasing from 155m to 216mbsl). Seabed sediments along the scarp face comprise predominantly clayey, silty fine sand, and have a relatively high gravel, cobble and shell fragment content. The flowline route also crosses a narrow zone of what has been interpreted as variably cemented silty sand and gravel, which corresponds with the area of steepest gradient along the scarp edge.

Benthic Communities

Seafloor habitats within eastern Bass Strait are similar to the habitat experienced at the Patricia-Baleen development (VIC/L21), located in water depths of 130m approximately 30km NE of the BMG fields. Seabed sediment in-fauna from these previous studies undertaken in east Gippsland have indicated that the in-fauna in the region is rich and
diverse with polychaetes, molluscs and crustaceans comprising the majority of individuals and species recorded. Substantial variation has been found in species composition between seasons, as well as between sites due to grain size, depth and sediment sorting.

*Marine Fauna*

Both resident and migratory fauna, including fish, sharks, fur seals, turtles and cetaceans have been observed in the vicinity of the BMG field. Up to sixteen (16) EPBC-listed migratory species, including four endangered species (Blue Whale, Southern Right Whale, Leatherback Turtle and Loggerhead Turtle) and three threatened species (Great White Shark, Whale Shark and Humpback Whale) may potentially migrate or temporarily forage in the Licence Areas during certain periods. However, the area is not recognized as an aggregation area for these species and there are no threatened ecological communities listed under the EPBC Act in the vicinity of the BMG infrastructure. Commercial species of fish (shark, ling, perch, and whiting) and squid also occur in the area.

Migratory seabirds listed under the EPBC Act are known to occupy on the islands of Bass Strait, the nearby coastline, and may pass through BMG field during the BMG NPP activities. However due to the lack of suitable roosting and breeding habitats for these species in the BMG area, they are not expected to be present for extended periods of time.

*Socio-Economic Environment*

A wide range of human activities occurs in Bass Strait including fishing, commercial oil and gas fields, commercial shipping lanes as well as recreational pursuits, heritage, research and tourism.

## 5 Major Environmental Hazards and Controls

An environmental hazard identification and risk assessment workshop, undertaken via a methodology consistent with ISO14001 Environmental Management Systems; ISO31000 Risk Management and HB203:2006 Environmental Risk Management - Principles and process, identified the following potential sources of environmental impact associated with the BMG NPP Activities:

- **NPP Subsea Equipment:**
  - Physical presence/seabed disturbance of subsea equipment;
  - Accidental releases of production fluids/inhibited water/Transaqu as a result of equipment damage or failure (corrosion, etc.);
- **Inspection and surveillance activities (vessel and ROVs):**
  - Physical presence of vessel to shipping & other marine users (oil spill potential) & seabed impacts;
  - Vessel discharges:
    - Marine Waters: Oily water, deck drainage, cooling water, sewage, food-scrapes with the potential to impact on water quality and marine fauna;
    - Atmosphere: Combustion products with the potential to impact on local air quality;
    - Solid/Hazardous Waste discharges;
  - Mobile vessel threats to cetaceans; and
  - Accidental release or oil and/or chemicals, ROV hydraulic fluid or solid water overboard.
Implemented control measures identified in Table 3 ensures that the environmental risks associated with these impacts are as low as reasonably practicable (ALARP). Control measures are taken into consideration in calculating the residual risk associated with the activity of impact reflected in Table 3.

6 Summary of Management Approach

ROC as the Production Licence Operator on behalf of the BMG JVPs in Licence areas VIC/L26, VIC/L27 and VIC/L28 is accountable for the environmental outcomes from the proposed BMG Non Production Phase activities ensuring activities are managed in accordance with the accepted BMG Non-Production Phase Environment Plan (EP). ROC is committed to protection of the environment in all activities it undertakes. Activities are undertaken in accordance with relevant legislated standards and where legislated standards do not exist, responsible standards are adopted. Successful environmental outcomes are achieved by understanding how proposed activities interact with the environment, identifying possible and foreseeable impacts, and implementing management controls which eliminate or reduce the environmental risk to ALARP.

ROC and their engaged contractors operate under the ROC Health, Safety & Environment (HSE) Policy and associated HSE Management Systems and Response Plans. The ROC HSE Management System applies to all employees, contractors and other third parties. All contractors participating in the BMG Non-Production Phase activities under contractual arrangements with ROC, will implement and comply with all environmental constraints and procedures nominated in the accepted EP.

Oceaneering Services Australia (OSA) has been contracted by ROC to act as facility operator of the BMG facilities. ROC has a clear interest in the environmental performance of the operation, and has had input into the OSA HSE management system adopted for the operation. However, OSA, as contracted operator, has the immediate responsibility for ensuring that activities associated with the BMG facilities are managed in such a way to reduce the risk of negative impacts to the environment to As Low as Reasonably Practicable (ALARP).

Both OSA and ROC ensure all contractors perform work in a healthy, safe and environmentally sound manner compatible with OSA’s policies and objectives. All major contractors involved with work activities on the BMG Facilities are assessed according to ROC/OSA Contractor Selection Procedures. For BMG Non-Production Phase activities all crews will have full inductions and are required to work under the OSA IMS. This requires contractors to provide the necessary procedures, detailing the work they will be performing on the BMG equipment, for OSA approval as facility operator.

Specific responsibilities associated with environmental management arrangements (e.g. control measure implementation) contained in the accepted EP is identified in the EP’s implementation schedule.

The environmental performance of the activity will be monitored against the defined environmental performance objectives for the activity.

7 Consultation Process

Stakeholder identification was initiated in 2005 during the planning phase of the BMG Phase 1 Oil Development. Key stakeholders were identified through the following mechanisms:

- Review of relevant legislation applicable to Commonwealth Water petroleum and marine activities;
- Identification of marine user groups in the area (possible recreational/commercial fisheries, fishing industry groups, other oil and gas producers, merchant shipping);
• Identification of marine ‘interest’ groups (i.e. technical and scientific entities); and
• Industry/company support groups (APPEA, AMOSC).

Communication with these differing groups identified relevant persons that might be reasonably impacted by the activity and hence requiring consultation; or additional persons to be contacted to determine possible impacts.

Communications/briefings with these parties and information obtained during this process allowed for the collation of a BMG Development Offshore Stakeholder listing; including their relevance to the BMG Development area; and the activity triggers which may initiate consultation/communication events. This is reflected in the BMG Development Stakeholder Plan (Ref: 09/HSEQ/ENV/P15).

Consultation with stakeholders specifically associated with the BMG NPP Activity has involved extensive consultation with the following stakeholders:

• **Regulatory Approval Authorities:**
  
  o **Victorian Department of Primary Industries (DPI):** Meetings commenced in October 2010 with respect to facility shutdown, preservation and non-production activities. Submissions associated with the BMG Non-Production Phase included NPP Facility & Integrity Monitoring Definition (Feb, 2011); revised Well Operations Management Plan to cover NPP activities (March, 2011); Well Recovery Response Plan (April, 2011); Environment Plan for Deconstruction Well Intervention and Trenching (Oct, 2011); and BMG Non-Production Phase Environment Plan (this plan) (Nov, 2011);
  
  o **Department of Sustainability, Environment, Water, Population and Communities (SEWPC):** Submission of the BMG NPP Facility Definition and Planned Activities document (March, 2011) to clarify whether the NPP activity triggered permit requirements under the Environment Protection (Sea Dumping) Act 1981 and Sea Installations Act 1987; meetings and submission of EPBC Referral 2011/6052 covering the Deconstruction Well Intervention and Trenching and NPP activities (July, 2011); and
  
  o **National Offshore Petroleum Safety Authority (NOPSA):** Liaison meetings and submission of BMG Field Safety Case Revision for Non-Production Phase (Nov 2011).

• **Commercial Fishing Groups:**

  Consultation with the key commercial fishing industry bodies [Lakes Entrance Fishing Cooperative (LEFCOL) & South East Trawl Fishing Industry Association (SETFIA)] affected by the BMG Development commenced in December 2010 to advise on the BMG NPP, and activities required to reduce environmental risks to ALARP; and the removal of infrastructure to reduce BMG footprint and allow greater fishing access. Response to the anticipated NPP footprint was favourably received with the following conditions, on the NPP activities:

  o Establishment of a tribunal system for fishing equipment damage claims from fisherman associated with BMG obstructions within the re-opened area;
  
  o ROV surveys of areas returned for general fisheries access verify risk of equipment damage and safety risk to trawl vessels from BMG Development activities is ALARP; and
  
  o Confirmation that the exploration infrastructure (Manta-1, Gummy-1, Basker-1) is sub-surface and poses no obstruction to fishing.
• **Oil Spill Response Organisations (OSROs):**

   Consultation has occurred with the Australian Marine Oil Spill Centre (AMOSC) and the Australian Maritime Safety Authority (AMSA) with regard to the BMG Non-Production Phase (NPP) Oil Spill Response Plan. Aspects confirmed with the OSROs include resource provision and interface arrangements in the unlikely event of a spill from BMG infrastructure or marine vessel engaged by ROC to perform surveillance/inspection activities.

   ROC will continue to consult/communicate with stakeholders in accordance with triggers identified in the BMG Development Stakeholder Plan (Ref: 09/HSEQ/ENV/PL15).

8 **Contact Details**

Further information associated with the environmental aspects of the BMG Non-Production Phase activities may be obtained from ROC by writing to:

   Simon Daniel  
   Manager Production and Development Australia  
   Roc Oil Company Limited  
   Level 18, 321 Kent Street  
   Sydney, NSW, 2000
### Table 2: BMG Non-Production Phase Environmental Risk Assessment Summary

<table>
<thead>
<tr>
<th>Aspects/Activity</th>
<th>Impacts</th>
<th>Management/Mitigation Measures</th>
<th>Residual Risk</th>
</tr>
</thead>
</table>
| **Subsea Equipment: Physical Presence**  | NPP PSZ area limits fishing activities in the area                       | • NPP equipment & PSZ minimised as far as possible – all equipment not required for Phase 2 development removed and PSZ radius reduced around B6 equipment;  
• PSZ Gazetted;  
• BMG Facility on Navigation Charts;  
• Basker-6 flowline corridor trenched (as far as possible);  
• PSZ areas returned to fisheries from Phase 1 operations and pervious exploration well sites verified by ROV to be free of snag hazards;  
• Confirmation that exploration wells do not pose an obstruction to fishing;  
• Fishing plotter upgrades with NPP PSZ;  
• Regular consultation and activity updates with local fishing groups to advise/consult on pending activities; and  
• ROC Fishing Damages Compensation Agreement with Fisheries.  
*(Risk assessed on a social impact basis)* | Medium                                                                 |
| Physical Presence of Subsea Equipment    | BMG Phase 1 PSZ areas returned to fisheries contain snagging hazards     |                                                                                               |               |
| **Subsea Equipment: Accidental Releases** | Alteration to marine characteristics due to equipment acting as artificial reef (long-term impacts) | • NPP equipment minimised as far as possible;  
• Marine growth maintained at a level which does not cause equipment integrity issues; and  
• Equipment/wells decommissioned in accordance with OPGGSA 2006 at end of field life. | Low           |
| Aspects/Activity                                                                 | Impacts                                                                                                                                  | Management/Mitigation Measures                                                                                                                                                                                                                                                                                                                                 | Residual Risk |
|--------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|                                                                                                                                                                                                                                                                                                                                                             |              |
| Loss of Containment from wellheads or well (dragging anchors, seal failure(s),  | **Hydrocarbon release** to marine environment (Maximum initial volume is 0.022MMscfd (650kg/d) (gas), 0.75Bbl/d condensate and negligible oil for 20day period. Longer term continuous leak up to 130kg/d (gas) with small amounts of condensate but more likely to be 0-5kg/d). **Note worst case represented for risk summary table.** (Assessed on Social Impact Basis) **(Environmental Risk Italicised)** | • Wellheads Design Standards (API6A) & SST Design (protected from impact);  
• At least two tested closed barriers (including down-hole barriers);  
• Flowlines/jumpers displaced to inhibited water and wells are in a static non-operational mode (well & SSSV closed);  
• Pressure and function testing of well and Christmas tree during installation;  
• Gazetted PSZ around wellheads;  
• BMG Facility on Navigation Charts;  
• Surveillance presence (currently 24hr Guard Vessel or equivalent);  
• Fishing Plotter upgrades for NPP PSZ;  
• Continued consultation with fisheries on BMG presence and forward plans;  
• Equipment has been left in a storm-safe condition;  
• Regular equipment inspection & monitoring program (09/SS/INT/PL02);  
• Cathodic Protection for Subsea Facilities (DnV RP B401);  
• OSCP (09/HSEQ/ENV/PL03), ERP (09/HSEG/GEN/PL01) & ROC Well Recovery Plan (BMG-EM-PL01);  
• ROC retains AMOSC membership; and  
• Metocean conditions will dissipate hydrocarbon gas/condensate. | Medium |
<p>| internal/external corrosion)                                                    | (Environmental Risk Italicised)                                                                                                           |                                                                                                                                                                                                                                                                                                                                                             | Low          |
| Oil Spill (Environmental) impact to Cetaceans, Turtles, Migratory Birds, Endangered Sharks or Safety Impacts to Marine Users resulting from a natural weathering/dispersion oil spill response strategy |                                                                                                                                                                                                     | • Incident at maximum gas/condensate release rates does not create any surface sheen. Localised dissolved phase within the water column. <strong>No impact</strong> to these identified protection priorities within the ZPI expected.                                                                 |              |
| Oil Spill (Environmental) impact to commercial fisheries resulting from a natural weathering/dispersion oil spill response strategy |                                                                                                                                                                                                     | • Incident may create localised area of dissolved phase hydrocarbons leading to impacts on juvenile fish species present. Very unlikely to cause significant impact at a population level given natural losses through predation and fishing.                                                                 | Low          |</p>
<table>
<thead>
<tr>
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</table>
| Loss of Containment from flowlines/BAM (third party dropped objects, dragging anchors, internal/external corrosion, damaged flowlines during construction (& not identified)) | **Inhibited water/hydrocarbon release.** (Maximum credible initial hydrocarbon release rates are estimated at up to 460kg (gas) within an hour and small amounts of condensate with likely rates considerably less. Longer term gas release rates are likely to be under 20kg/d). Note possible release of 2.3m³ of diesel (discrete volume) within an hour from B6 flowline. **Note worst case represented for the risk assessment summary table.** | • Flowlines/jumpers displaced to inhibited water and wells are in a static non-operational mode (well & SSSV closed);  
• BAM valves closed;  
• Flowline Design Standards (Doc No: 3626-SS-WELS-54-RP-001) appropriate to the environment;  
• B6 flowline trenched as far as possible;  
• Hydrosure™ 0-3670RD (Dyed) is classified as a ‘gold’ chemical under the UK Offshore Chemical Notification System (OCNS) (low environmental risk);  
• Trenching Procedures (PROJ/J10-262/ENG) & Deconstruction Procedures (Doc No: 220114-P-PR-002) adopted to prevent inadvertent damage to equipment;  
• Gazetted PSZ around flowlines;  
• BMG Facility on Navigation Charts;  
• Surveillance presence (currently 24hr Guard Vessel or equivalent);  
• Fishing Plotter upgrades for NPP PSZ;  
• Regular equipment inspection & monitoring program (09/SS/INT/PL02);  
• Cathodic Protection for Subsea Facilities (DnV RP B401);  
• OSCP (09/HSEQ/ENV/PL03), ERP (09/HSEG/GEN/PL01) & ROC Well Recovery Plan (BMG-EM-PL01);  
• ROC maintains AMOSC membership; and  
• Metocean conditions will dissipate hydrocarbon gas/condensate | Low |
| Oil Spill (Environmental) impact¹ to Cetaceans, Turtles, Migratory Birds, Endangered Sharks & commercial fish resulting from a natural weathering/dispersion oil spill response strategy for B6 Flowline Diesel Spill | • Extremely localised surface oiling area will have little/no impact on cetaceans, turtles, migratory birds, endangered sharks and commercial fishing vessels.  
• Localised dissolved phase toxicity on fish very unlikely at a population level given natural system losses & fish mobility. Impacts to commercial fishing vessels are also unlikely. | Low |

¹ Safety impacts to marine users not deemed credible due to the small size and subsea release of diesel.
<table>
<thead>
<tr>
<th>Aspects/Activity</th>
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</tr>
</thead>
</table>
| Loss of containment from Umbilicals (third party dropped objects, dragging anchors, trawler drag, or damage from deconstruction/trenching activities and not identified) | Transqua/hydrocarbon release (Estimated hydrocarbon release rates are 2m³ (initial release rate) within an hour with a long-term gas release rate of 1-2kg/d (gas) with very small amounts of condensate). | • Control lines which have potential to contain hydrocarbons are isolated at the SST;  
• B6 umbilical trenched as far as possible;  
• Trenching Procedures (PROJ/J10-262/ENG) & Deconstruction Procedures (Doc No: 220114-P-PR-002) adopted to prevent inadvertent damage to equipment;  
• TransquaHT2™ is assessed as a non-Charmable product (Initial Grouping-Group D). The MSDS indicates this product is readily biodegradable and is not expected to bio-accumulate. Chemical is low environmental risk;  
• Gazetted PSZ around umbilicals;  
• BMG Facility on Navigation Charts;  
• Surveillance presence (currently 24hr Guard Vessel or equivalent);  
• Fishing Plotter upgrades for NPP PSZ;  
• Regular equipment inspection & monitoring program (09/SS/INT/PL02);  
• Cathodic Protection for Subsea Facilities (DnV RP B401);  
• OSCP (09/HSEQ/ENV/PL03), ERP (09/HSEG/GEN/PL01) & ROC Well Recovery Plan (BMG-EM-PL01);  
• ROC retains AMOSC membership; and  
• Metocean conditions will dissipate hydrocarbon gas/condensate | Low |
| Oil Spill (Environmental) impact to Cetaceans, Turtles, Migratory Birds Endangered Sharks, Fish or Safety Impacts to Marine Users resulting from a natural weathering/disispersion oil spill response strategy | | • Incident at maximum gas/condensate release rates does not create any surface sheen and no dissolved phase impacts are expected within the water column given the very small size of release. No impact to these identified protection priorities within the ZPI expected. | - |

Guard/Survey Vessel Activities: Presence/Transit of Vessels
<table>
<thead>
<tr>
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</tr>
</thead>
</table>
| Vessel Movement          | Collision with and damage to species of national environmental significance (i.e. cetaceans) | • ROC/OSA Contractor HSE Selection Procedure/assessment;  
  • Adherence to proximity distances detailed in the Guidelines for Whale Watching (EA, 2005) & EPBC Regulation 2000 (Part B);  
  • Environmental induction for guard/survey vessel (including APPEA cetacean CD);  
  • Cetacean Sighting reports sent to SEWPAC & NOPSEMA; and  
  • Fauna avoidance due to noise impacts from vessel (refer below). | Medium        |
| Vessel Lighting          | Artificial light attracting marine species (altered behaviours)         | • Navigation and workplace lighting only (light spill minimised); and  
  • Affected species transient within Licence area – not close to any environmentally sensitive areas.                                                                                                                                                                                                                                                              | Low           |
| Mattress/Sandbag Deployment | Seabed disturbance resulting in loss of seabed flora/fauna                | • Deployed within PSZ on subsea equipment;  
  • ROV operation in accordance with ROV Operating Procedures by trained personnel;  
  • Removed at decommissioning phase in accordance with the OPGGSA 2006;  
  • Installation footprint minimised as far as possible and location documented; and  
  • Sand-bags (non-plastic) are filled with inert sand. | Medium        |
| Ballast Water Discharges | Introduction of exotic organisms through ballast discharge which colonise and create competition for local resources causing ecological disruption | • ROC/OSA Contractor HSE Selection Procedure/assessment;  
  • Vessels are sourced and routinely work from local ports wherever possible;  
  • For international vessels compliance with the AQIS Australian Ballast Water Management Requirements (2008);  
  • AQIS Clearance Certificates & Ballast Exchange Records;  
  • BMG equipment located in deep water (150m) – limited survival success of introduced species; and  
  • BMG not located in proximity to sensitive marine resources. | Medium        |
**Aspects/Activity** | **Impacts** | **Management/Mitigation Measures** | **Residual Risk**
--- | --- | --- | ---
**Vessel Biofouling** | Introduction of exotic organisms which colonise and create competition for local resources causing ecological disruption hull and vessel niches fouling) | • Vessels are sourced and routinely work from local ports wherever possible;  
• For international vessels, prior to entry into Australian waters a biofouling risk assessment in accordance with the *National Biofouling Management Guidelines for Petroleum Production and Exploration Industry* (DAFF, 2009) will be undertaken with any inspection, cleaning and coating reapplication undertaken as appropriate;  
• All vessels to have current statement of Compliance for International Anti-fouling Inspection Systems (as appropriate);  
• ROVs are cleaned and maintained between deployments;  
• BMG equipment located in deep water (150m) – limited survival success of introduced species; and  
• BMG not located in proximity to sensitive marine resources. | Medium
**Vessel Transit (Noise Impacts)** | Physiological and behavioural impacts to species of national environmental significance (i.e. cetaceans, turtles) | • Support Vessel noise reported at as much as 170-190dBA @1m. Noise rapidly decays with increased distance from source;  
• Auditory damage of cetaceans thought to occur at approximately 230dBA with avoidance behaviour measured between 150-180dBA (cetaceans) and 175dBA (turtles);  
• Cetacean and Turtle species will practice avoidance at disturbing noise levels;  
• Transient presence of cetacean and turtle species; and  
• Vessel propulsion systems maintained in accordance with Manufacturers specifications. | Low

**Guard/Survey Vessel Activities: Discharges to Sea**
<table>
<thead>
<tr>
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| Sewage/Grey Water Discharge to Sea      | Altered water quality leading to toxic, turbidity or BOD impacts on marine flora & fauna | • ROC/OSA Contractor HSE Selection Procedure;  
• Discharge in accordance with Vessel Operations Manual (i.e. MARPOL 73/78 Annex IV requirements (e.g. compliant sewage treatment plant (STP) (macerated/disinfect) or equivalent));  
• Current ISPP for STP (where applicable);  
• Equipment routinely inspected and maintained in accordance with manufacturers specifications (as appropriate);  
• Vessel activity minimised in the Field;  
• Guard/survey environmental induction to crew; and  
• Low volumes/high dispersion in marine environment. | Low            |
| Putrescible Waste (food-scrap) Discharge to Sea | Altered water quality (BOD) leading to impacts on marine flora & fauna | • ROC/OSA Contractor HSE Selection Procedure/assessment;  
• Discharge in accordance with Vessel Operations Manual (MARPOL 73/78 Annex V requirements (e.g. wastes macerated (<25mm size) & discharged more than 12nm from shore (or bagged for onshore disposal)));  
• Where provided, macerator maintained in good condition and checked/maintained routinely;  
• Vessel activity minimised in the Field;  
• Guard/survey environmental induction to crew; and  
• Low volumes/high dispersion in marine environment. | Low            |
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| Equipment/Machine Space Oily Water Discharge to Sea | Altered water quality leading to toxic, turbidity or BOD impacts on marine flora & fauna | • ROC/OSA Contractor HSE Selection Procedure/assessment;  
• Oily water management in accordance with Vessel Operations Manual (i.e. MARPOL 73/78 Annex I requirements);  
• Equipment and machine spaces are fully contained and have dedicated drains leading to an oily water treatment system for oily waste products;  
• Oily residues containerised in transit tanks and returned to shore for disposal. Volumes recorded;  
• Where provided, OIW discharge is monitored and meets MARPOL Annex 1 discharge criteria (>15ppm);  
• Where provided, equipment is maintained and monitor is routinely calibrated in accordance with manufacturer’s specifications. Current IOPP (where applicable);  
• Vessel activity minimised in the Field;  
• Guard/survey environmental induction to crew; and  
• Low volumes/high dispersion in marine environment. | Low |
| Deck Drainage Discharge to Sea (normal/uncontaminated runoff) | Altered water quality leading to toxic, turbidity or BOD impacts on marine flora & fauna | • ROC/OSA Contractor HSE Selection Procedure/assessment;  
• High standards of house-keeping maintained on vessels;  
• Bunding (temporary or permanent) is provided for those areas/activities with increased risk of oil/chemical spill;  
• Spill clean-up materials (e.g. absorbents, containers) located in accessible locations;  
• Spill materials removed prior to deck wash-down;  
• MSDSs available for all chemicals used (includes spill response requirements);  
• Bunded oil areas directed to shipboard oily water system;  
• Vessel activity minimised in the Field;  
• Guard/survey environmental induction to crew; and  
• Low volumes/high dispersion in marine environment. | Low |
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| Cooling Water Discharge to Sea         | Altered water quality (thermal impacts) leading to impacts on marine flora & fauna | • No chemical (anti-foulant) dosing in cooling water systems;  
• Equipment routinely maintained;  
• Vessel activity minimised in the Field; and  
• Small vessels will emit low volumes of hot water which will quickly disperse in the marine environment.                                                                                                                                                                                                                                             | Low          |
| Vessel/Guard Vessel Activities: Discharges to Atmosphere | Emissions from Combustion Sources: Engines/Incinerator | Degraded marine environment (atmosphere) due to inefficient use of hydrocarbon resources, smoke/particulate and combustion product release  
• Fuel consumption monitored;  
• Waste disposal via incinerator monitored;  
• Regular equipment monitoring and maintenance to maintain maximum efficiencies;  
• Current IAPP (where applicable);  
• Vessel activity minimised in the Field; and  
• Low combustion volumes generated and rapid dilution/dispersion in atmosphere.                                                                                                                                                                                                                                                                                      | Low          |
| Guard/Survey Vessel Activities: Accidental Releases | Solid or hazardous waste overboard incident | Degraded marine waters leading to impacts on marine fauna and flora  
• ROC/OSA Contractor HSE Selection Procedure/assessment;  
• Limited chemicals/wastes/packaging on-board vessels;  
• No solid/hazardous waste overboard policy (as per Garbage Management Plan [MARPOL 73/78 Annex V]);  
• Clear waste identification, segregation, containment (skips/sealed drums) and labelling;  
• High standards of housekeeping on-board vessel;  
• Wastes disposed/recycled onshore; and  
• Environmental Induction for all personnel on vessels.                                                                                                                                                                                                                                                        | Low          |
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| Diesel spill due to guard/survey vessel collision with 3rd Party Vessel | Oil Spill to the Marine Environment (Spill Volume considered is 50m³) | • ROC/OSA Contractor HSE Procedure/assessment;  
• Gazetted BMG PSZ;  
• Navigation Charts identify BMG Facilities;  
• BMG PSZ placed in fishing vessel plotters;  
• Continued liaison with Fishing Groups on BMG activities;  
• Vessel(s) on DP and can manoeuvre around errant 3rd Party vessels;  
• Navigation aids on vessel(s) including lighting and continuous radar/radio monitoring and visual surveillance;  
• Availability of implemented and tested SOPEP or approved Vessel spill Response/Clean-up Procedures with regular drills/exercises conducted;  
• BMG Field NPP OSCP (09/HSEQ/GEN/PL03) & AMOSC Membership;  
• Grounding causal pathway not considered credible due to the distance to shore and lack of emergent landforms in the Licence Area. | Low |
| Oil Spill (Safety) impact to Third Party Marine Users by adopting a natural weathering/dispersion oil spill response strategy | Incident will create safety hazard within the ZPI in proximity to spill site diminishing with distance and increased time from spill.  
Marine notifications will alert near-by vessels of possible hazard and avoid area. | Low |
| Oil Spill (Environmental) impact to Cetaceans, Turtles or Endangered Sharks resulting from a natural weathering/dispersion oil spill response strategy | Incident creates surface oiling for approximately 6hrs;  
Species transient through area;  
Volume considered sufficient to damage individuals within species within ZPI. | Low |
| Oil Spill (Environmental) impact to Marine Birds resulting from a natural weathering/dispersion oil spill response strategy | Incident creates surface oiling for approximately 6hrs;  
Species transient through area;  
Volume considered sufficient to damage/cause death to species within ZPI. | Low |

2 Expected largest single tank size of a vessel to be engaged in the BMG Field during NPP
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| Diesel spill due to guard/survey vessel collision with 3rd Party Vessel        | **Oil Spill (Environmental) impact to Commercial Fishing Stocks resulting from the adoption of a natural weathering/ dispersion oil spill response strategy** | • Incident creates surface oiling for approximately 6hrs (no dispersant used);  
• Fish mobility in area makes chronic/acute exposure unlikely;  
• Local impacts to juvenile fish immediately below the slick (not significant at a population level);  
• Volume considered sufficient to cause localised impacts to fish within ZPI. | Low          |
|                                                                                  | **Oil Spill (Environmental) impact to Commercial Fishing Vessel/catches resulting from the adoption of a natural weathering/ dispersion oil spill response strategy** | • Incident notification to occur as part of the response & third party fishing vessels to avoid area;  
• Vessel catch only impacted if trawl nets retrieved through surface oiled area. | Low          |
| Diesel/Gasoline spill from refuelling generator on back deck                    | **Oil Spill to the Marine Environment (Diesel/Gasoline Volume estimated at 5-10litres)** | • ROC/OSA Contractor HSE Procedure/assessment;  
• Chemical/Fuel Handling Procedures and Spill Response Procedures available;  
• Chemicals/fuels stored and handled in designated areas;  
• Bunding/spill-trays available during refuelling with possible direction to an oily-water treatment system;  
• Spill kits available;  
• Equipment integrity inspection prior to transfer; and  
• Availability of implemented and tested SOPEP or approved Vessel spill clean-up Procedures by qualified personnel with routine drills. | Low          |
<p>|                                                                                  | <strong>Oil Spill (Environmental) impact to Cetaceans, Turtles, Migratory Birds, Endangered Sharks or Safety Impacts to Marine Users resulting from a natural weathering/dispersion oil spill response strategy</strong> | • Incident calculated to have a ZPI of 18m@10µm thickness for shore period (hrs) of time. Localised dissolved phase within the at the sea surface. Given the small quantities released, rapid evaporation/ dispersion no impact to these protection priorities are expected within the ZPI. | -            |
|                                                                                  | <strong>Oil Spill (Environmental) impact to commercial fisheries resulting from a natural weathering/dispersion oil spill response strategy</strong> | • Incident may create localised area of dissolved phase hydrocarbons beneath the slick leading to impacts on juvenile fish species present. Extremely unlikely to cause significant impact at a population level given natural losses through predation and fishing. | Low          |</p>
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| **ROV Hydraulic Oil Hose Failure during Operations** | Oil Spill to the Marine Environment (up to 25litres)                     | - ROC/OSA Contractor HSE Procedure/assessment;  
- Equipment routinely maintained and inspected prior to deployment subsea;  
- Use of pressure-rated hoses/fittings; and  
- Rapid dispersion of spill (subsea) in Bass Strait marine environment.                                                                 | Low          |
| **Oil Spill (Environmental) impact to Cetaceans, Turtles, Migratory Birds Endangered Sharks, Commercial fish stock or Safety Impacts to Marine Users resulting from the adoption of a natural weathering/dispersion oil spill response strategy** |                                                                 | - Incident calculated to have a ZPI of 28m@10µm thickness. Oil is non-toxic and quickly disperses in the environment.  
- Small quantities released and rapid dispersion no impact to identified protection priorities within the ZPI expected. | -            |
| **Packaged Chemical Spills**                         | Degraded marine waters leading to impacts on marine fauna and flora and disruption to fishing activities | - ROC/OSA Contractor HSE Procedure/assessment;  
- Small quantities of chemicals stored on-board;  
- Stowage, lashing and securing of chemicals in accordance with IMDG Code;  
- Chemicals are packaged and labelled in accordance with IMDG Code;  
- Chemical storage and handling areas are routinely inspected for leaks and spills an if detected, are cleaned-up immediately;  
- Crew members trained in handling chemicals;  
- MSDS and Clean-up procedures available for all chemicals; and  
- Spill kits to be provided in appropriate locations. | Low          |
| **Loss of ROV (outside PSZ)**                        | Hazard to adjacent marine users (fishermen equipment damage) (Risk assessed on a social impact risk) | - ROC/OSA Contractor HSE Selection Procedure;  
- ROV Operating Procedures;  
- ROV Maintenance & Quality Control;  
- ROV Operators Trained;  
- Notification of lost equipment to fishing vessels; and  
- ROC Fishing Damage Compensation Agreement with local fishing groups. | Medium       |