INTERNAL USE ONLY

# Assessment findings

| Assessment ID | 4903 |
|---|---|
| **Duty holder:** | Woodside Energy Ltd |
| **Facility/Activity:** | Scarborough Project |
| **Facility type:** | Offshore Project |
| **Assessment type:** | Offshore Project Proposal |

**Findings relating to OPGGS(S)**

| Regulation Clause ID | Regulation Clause | Topic Scope | Comment |
|---|---|---|---|
| 5A - 5(a) | Includes the proponent's name and contact details | General | Section 1.1 and 1.2 include an overview of the proponent and contact details including an address, phone number and email. A link to a dedicated project website is also provided. |
| | | | No material changes since last revision |
| | | | No material change |

| | | | |
|---|---|---|---|
| 5A - 5(b)(i) | Includes a summary of the project including a description of each activity that is part of the project; | General | Section ES4 provides a list of the activities that are part of the project. Section 1.3.1 provides a project overview and describes that the Scarborough project comprises a number of subsea dry gas wells in the Scarborough and North Scarborough fields with future tieback options at Thebe and Jupiter fields. These wells will be hooked up to a FPU with process facilities for gas dehydration and compression, moored in about 900m water over the Scarborough field. Once processed the gas will be transported 430km by trunkline to onshore processing at the Pluto LNG facility. Key components of the project are provided as dot points and include drilling, installation of subsea infrastructure including the FPU and trunkline, commissioning, operation and maintenance for ~30 years, decommissioning, and extraction of offshore sediments for trunkline stabilisation.Section 1.4.3 describes the scope of the activity being the construction and operation of Scarborough project in Commonwealth waters and including: geophysical and geotechnical surveys at the FPU site and well locations, drilling, installation, commissioning and operation of subsea infrastructure and a FPU, maintenance, decommissioning, sourcing marine sediments for trunkline stabilisation, vessel and helicopter activities.Key project characteristics are described in Section 4.1 and Table 4.1 to include four offshore permit areas, the anticipated hydrocarbon for the project being dry methane gas with no or trace condensate, no H2S and 0.1 mol% of CO2, drilling of up to 30 wells, subsea infrastructure and a minimally manned FPU in 900m of water depth, trenching and backfill. The hydrocarbon characteristics for the field described in this proposal are provided as dry gas(~95% methane and 5% nitrogen) trace levels of condensate and CO2 gas and no detectable H2S (s4.3) determined by the drilling of appraisal wells and compositional analysis undertaken in 2018. A description of the current infrastructure design is included in s4.4.2 and covers wells, subsea infrastructure, approximate extent of seabed disturbance from infrastructure not including wells being 0.234 km2, the FPU, export trunkline.A description of the FPU is provided including how it will be tethered to the seabed, and that suction piling or drive piling may be required (s4.4.2.3). The 430 km trunkline will be a 32 inch carbon steel.Sections 4.4.3.1 to 9 provide an overview of drilling method and references Table 7-37 that provides estimates of drilling discharges for an individual well. The OPP identifies that Woodside may undertake vertical seismic profiling and describes the method and provides the parameters of this operation. Elements of subsea installation activities are described in s4.4.4 and 5, and a description of the installation of the FPU is included in s4.4.6, with a description of FPU utilities included in s 4.4.6.1. The gas export trunkline and its installation process is described in s4.4.7 and shown in Figure 4-1.Estimated maximum volumes of trenching and backfill are provided in Table 4.9 and the locations for these in Figure 4-3.A description of commissioning activities is provided in s4.4.8 including estimated discharge volumes for treated water, and a description for operations activities including estimated discharge volumes for condensed and produced water during watering out is provided in s4.4.9. Decommissioning and well abandonment is described in s4.4.10 including reference to the relevant legislation.IMR activities for the life of the project are described in s4.4.11Support activities include support vessels, helicopter operations and ROV's and these are described in s4.4.12. Aspects of each of the parts of the activity that may result in environmental impacts and risks are summarised in Table 4-10 and include light, atmospheric and acoustic emissions, physical presence, routine, non-routine and unplanned discharges.s9.6 Management of Change may not be relevant to the OPP as there are no provisions in the regulations for revisions?. RFFWI |
| | | | Updated information in relation to trunkline installation also references some“existing spoil grounds” in Commonwealth waters that will be used as part of the Project, however, the locations of these have not been provided in the OPP and it is unclear what spoil ground related activities are proposed as part of the OPP. This matter is addressed in RFFWI2 - Item 5 and will be addressed under the protected matters scope.<br>Management of change issue (letter point 4) - the reference to management of change in relation to Reg 17 has been removed (refer to OPP, p708 of track version). [c]. |
| | | | No material change<br>Conclusion<br>Section 4.1 provides an adequate description of the project and is in sufficient detail to provide information about the project and each activity that is part of the project. Key characteristics of the project and project schedule are provided in Tables4-1 and 4-2 respectively. Each key component of the project is described in detail (e.g. FPU, s4.4.2.3, trunkline, s4.4.2.4). It is also clear what activities are not within scope of the offshore project and are subject to assessment under relevant State and Commonwealth approvals (s4.4.2.5). |

| | | | |
|---|---|---|---|
| 5A - 5(b)(ii) | Includes a summary of the project including the location or locations of each activity; | General | The project location is described in ES1 and is placed in the context of the receiving environment in ES5. Section 1.3.2 identifies the project location as 375 km WNW of the Burrup Peninsula in NW Australia and provides the petroleum titles and defines the project area as the offshore project area, trunkline project area and borrow grounds project area.Section 4.1 and Figure 4.1 provides the locations of the project with the field being 375 km WNW of the Burrup Peninsula connecting to the shore via a 430 km long trunkline. The project location is described in s4.2 and Table 4.3 includes the co-ordinates for key features of the project and a map.The project area is defined in s4.2.1 and includes distinct project areas for the offshore subsea infrastructure and FPU, trunkline and "borrow ground" area for the sourcing of marine sediments for trunkline stabilisation and refers to the related vessel movements. The OPP includes text and figures to adequately describe the locations of the project and activities as far as is currently known (i.e. exact locations of wells not yet known) including figures on the development (4-1, 4-3, 4-4, 4-5, 5-1, 5-2) as well as figures depicting environmental and socioeconomic features proximate to the project.No activities will be undertaken in a WHA |
| | | | Updated information in relation to trunkline installation also references some “existing spoil grounds” in Commonwealth waters that will be used as part of the Project, however, the locations of these have not been provided in the OPP and it is unclear what spoil ground related activities are proposed as part of the OPP. This matter is addressed in RFFWI2 - Item 5 and will be addressed under the protected matters scope.<br>Otherwise no material change. |
| | | | No material changes since last revision.<br>Conclusion<br>The location of each activity that is relevant to the project is adequately defined in section 4.1. Table 4-3 provides approximate location details for key infrastructure. |
| 5A - 5(b)(iii) | Includes a summary of the project including a proposed timetable for carrying out the project; | General | Table 4.1 includes some timeline elements including FID 2020, start up 2023 and project life 2055 or longer. s4.1.1 includes a project schedule additional to the above including pre-FEED in 2018, PER end of 2019, drilling 2020 Phase 1 and 2025 Phase 2, trunkline installation in 2022, FPU installation in 2023 and decommissioning in 2055 or later |
| | | | No material changes since last revision |
| | | | No material changes since last revision<br>Conclusion<br>The OPP includes a summary of the project including a proposed timetable which is provided in Table 4-2. This information is relevant to informing the timing and duration of the project which is relevant to the impact and risk assessment process. |
| 5A - 5(b)(iv) | Includes a summary of the project including a description of the facilities that are proposed to be used to undertake each activity; | General | The facilities that will be used to undertaken each activity are described in sections 4 and 7 and include:<br>wellssubsea infrastructurefloating production unit (FPU) with specific utilities described in s4.4.6.1 export trunklineonshore LNG processing facilitydrilling unit which may be moored, semi-moored, DP or drill shipsupport vesselspipelay vessel2-3 x 250 cui air guns for VSP and sound receiversROVhelicopters |
| | | | No material changes since last revision |
| | | | No material changes since last revision<br>Conclusion<br>A summary of the project has been provided including a description of facilities that are proposed to be used to undertake each activity that is part of the project. Refer to sections 4 and 7 of the OPP. |
| 5A - 5(b)(v) | Includes a summary of the project including a description of the actions proposed to be taken, following completion of the project, in relation to those facilities | General | ES4 identifies decommissioning where the facilities will be decommissioned in accordance with good oilfield practice and relevant legislation at the times4.4.10 identifies that at the end of the project the facilities will be decommissioned in accordance with "good oilfield practice and relevant legislation and practice at the time". Decommissioning will occur "once the Scarborough, North Scarborough, Thebe and Jupiter fields have reached the end of their economic life and may occur in stages" but may be postponed if third-party reservoirs have been tied in. Section 572(3) of the Act has been referenced that all structures must be removed, but that there may be other arrangements sought. Actions involved in decommissioning are identified in this section as including:plugging of production wells and removal of christmas trees and wellheads down to 5 m below the seabedremoval of manifoldsremoval of umbilicalspurging and flushing of infield flowlines which may either be left in place or removedcut off mooring and remove the FPUanchor piles and mooring legs remain in location within the seabedremoval of subsea infrastructurewell abandonment is covered in s4.4.10.1Clarify if "trunkline" is included in definition of subsea infrastructure because this is not explicitly mentioned |

| | | | |
|---|---|---|---|
| 5A - 5(b)(v) | Includes a summary of the project including a description of the actions proposed to be taken, following completion of the project, in relation to those facilities | General | To address Item 5 of RFFWI letter 1 - The OPP has clarify that the trunkline is part of the decommissioning activities that are part of the project (s4.4.10). [c]<br>The OPP acknowledges The OPGGS Act (Section 572(3)) - base case for decommissioning. s4.4.10 provides sufficient information of the actions that may be taken following completion of the project. |
| | | | No material changes since last revision<br>Conclusion<br>An outline of WEL's proposed decommissioning program is provided in section 4.4.10. The OPP recognises that base case in legislation: The OPGGS Act (Section 572(3)) requires that a titleholder “must remove from the title area all structures that are, and all equipment and other property that is, neither used nor to be used in connection with the operations” (OPP, p98). It also notes the provisions of the Act that allow titleholders to identify and seek approval for alternative arrangements. An outline of the potential decommissioning related activities are provided in sections 4.4.10.1- 4.4.11.3. |
| 5A - 5(c) | Describes the existing environment that may be affected by the project | General | The description of the environment is included in section 5 of the OPP.An overview is provided in s5.1 defining the the areas included i.e. offshore, trunkline, borrow ground and also the area used to define the EMBA for a spill risk (see unplanned emissions topic for appropriateness of worse case scenario included)The OPP describes that the EMBA was used to define the area over which a EPBC protected matters search was undertakenFigure 5-1 depicts the environmental setting of the project area and identifies receptors such as marine parks, bathymetry and distance to shorelines.Figure 5-2 depicts how the modelling was used to inform the EMBA.The references used to describe the environment are provided in s5.2The environment is described in terms of its marine regional characteristics, oceanographic and coastal processes including currents, tides, waves and wind, weather, water temperature and salinity in s5.3.1 and s5.3.2.Seabed characteristics are described in s5.3.3 including geomorphology and features of the seafloor (Figure 5-4), bathymetry (Figure 5-5), depth profile (Figure 5-6). Marine sediments are described in s5.3.4, benthic substrates in Figures 5-7 and 5-8, epifauna and infauna in s5.3.10, corals in s5.3.11, marine plants in s5.3.12 and regionally important shoals and banks s5.3.13.Water quality and plankton are described in s5.3.5 and 5.3.9.The OPP contains descriptions of air quality in s5.3.6, ambient light in 5.3.7, ambient noise s5.3.8. Coastal habitats including saltmarshes and mangroves and shorelines as relevant to the EMBA are described in s5.3.14 and s5.3.15, and the Subtropical and Temperate Coastal Saltmarsh Listed Threatened Ecological Community of relevance to the EMBA is described in s5.3.16. Marine fauna of conservation significance are identified and described in s5.4 in terms of BIA's and Critical Habitat. Key fauna that intersect the activity in terms of significant ecological activities include (Table 5-3) seabirds, HB whales, PB whales, dugongs, marine turtles, and whale sharks. For a full assessment on this see Reg 5A-5(d) KEFs that intersect the project areas are described in s5.5 and protected places in s5.6, fo findings see Reg 5A-5(d).Socioeconomic activities that intersect the project area are described in s5.7 and include commercial fisheries including aquaculture, recreational and tourism activities, shipping, oil and gas industry activities, defence activities and coastal settlements. Given the public comments made by Western Gas, the description of overlap of the trunkline with other title owners is insufficient and requires further information. Overall the description of the environment is sufficiently detailed, appropriate for the nature and scale of the project and identifies and describes the environmental receptors in the vicinity of the project and associated activities. |
| | | | There is insufficient information in relation to the value of marine turtle habitats potentially impacted, particularly relative significance. In addition, there is insufficient information on the benthic habitats that may be impacted by the trunkline installation and borrow ground activities. These are addressed in more detail in Reg 5A - 8(b) and under the protected matters scope. |
| | | | No material changes since last revision - findings in Reg 5A-8(b)<br>Conclusion<br>The OPP describes the existing environment that may be affected by the project and includes details of the particular relevant values and sensitivities of that environment (section 5) including those protected under Part 3 of the EPBC Act (s5.4) and relevant values of the Commonwealth marine area such as key ecological features (s5.5). Biologically important habitats and ecological features have been described in sufficient detail to inform the assessment of impacts and risks including using information from the North West Marine Bioregion plan (e.g. when describing KEFs). Where relevant, statutory instruments such as the Conservation Management Plan for Blue whales and the National recovery plan for marine turtles have been utilised to inform the description of the existing environment that may be affected. |

| | | | |
|---|---|---|---|
| 5A - 5(d), 6 (a)-(f) | Details the particular relevant values and sensitivities (if any) of that environment including those matters protected under Part 3 of the EPBC Act (including 5A(6)) | General | Appendix D contains the protected matters reports that were used to identify PM potentially contacted by the project.Matters protected under Part 3 of the EPBC Act that have management plans are identified in s3.5Relevant conservation actions from recovery plans and conservation advice for listed threatened species that occur or have habitat within the Scarborough Project Area are included in Table 3.2 (s3.5.1). Relevant conservation actions address key threats such as marine debris, noise interference, vessel disturbance, light pollution, acute chemical discharge/pollution contamination, habitat degradation/loss/modificationAustralian marine parks that occur within or near the project area are identified in s3.5.2Statement "as these activities will be covered within a future environment plan(s) they do not require any further assessment by the DNP"p70 - disagree. This is exactly the stage at which full consultation is required with DNP is required. This statement should be removed and the submission should ensure full consultation with DNP.Reserve management principles are summarised in Table 3.4The EMBA as defined in s5.1 and shown in figures 5.1 and 5.2 was used to for the basis of the EPBC Protected Matters Search. One Listed Threatened Ecological Community was identified to occur in the EMBA - Subtropical and Temperate Coastal Saltmarsh and from Figure 5.21 it appears that there is one location along the coast where this TEC intersects the EMBA, which the OPP describes as in the vicinity of Carnarvon.Marine fauna of conservation significance are described in s5.4. The project area and EMBA overlap a number of biologically important areas and critical habitat for survival and these are identified in s5.4.1 and Table 5.3. Areas of overlap for the project area (planned impacts) include overlap of the borrow ground, trunkline and/or offshore area with breeding areas for three bird species (Australian Fairy tern, Roseate tern and Wedge-tailed shearwater), HB whale and PB whale migration routes and distribution area for PB whales, FB, GN, HB turtle inter-nesting and critical habitat for survival, and for LH turtle inter-nesting BIA. In addition, the borrow ground and trunkline areas are within 10km of HB and FB turtle nesting BIA's, and the trunkline project overlaps whale shark foraging BIA.Descriptions of species of fauna that may, are likely to or are known to occur in the project area are included in sections: seabirds 5.4.3, fish 5.4.4, marine mammals 5.4.5 and reptiles 5.4.6 and are appropriate to the nature of overlap between the project and distribution.A description of key ecological features that are overlapped by the project are included in section 5.5, and include three KEFs that intersect the project (Exmouth plateau, ancient coastline and slope demersal fish) and three additional KEFs that overlap the EMBA (canyons, waters adjacent to Ningaloo reef, Glomar shoals noting the latter is only 6km from the trunkline project area)An appropriate description of protected places that overlap with the project area is included in section 5.6, places in notably close proximity include the Montebello AMP, the Dampier AMP and the Dampier Archipelago indigenous National Heritage Property on the Dampier Coast. Discussion with PM topic assessor and further information sought in relation to the Exmouth Plateau has identifed that this area is important for internal tides more prevalent in Jan and March and is an important area for sperm whales. Further information is needed as to the spatial distribution and timing of the sperm whales, (and other protected whales) in the vicinity of the offshore area that could be affected by acute (dewatering) and chronic (cooling water) discharges, which extend kilometres from the FPU discharge location. |
| | | | Item 7 - Section 5.5.1 has been updated to acknowledge that the operational area overlaps with Exmouth Plateau KEF with acknowledgement that seasonal upwelling attract larger predators such as billfish, sharks and dolphins. The eastern edgeof EPKEF overlaps small portion of a migration BIA for pygmy blue whales and it is recognised that the southbound migration in November to December and the peak of the northbound migration in May to June. The Exmouth Plateau KEF does not overlap any other whale BIAs, marine turtle habitat critical to the survival of a species or the foraging BIA for the whale shark. It appears that seasonal sensitive is therefore between Nov - Dec and May to June. Item 7 - The the OPP reognises that deep waters above the gully/saddle on the inner edge of the plateau (the Montebello Saddle) are thought to be important for sperm whales that may feed in the region (based on 19th century whaling records; Townsend 1935). The reasons for this aggregation are not known. (page 204). [c]Overall the description of the environment that may be affected is appropriate and sufficient for informing impacts and risks with the exception of seabed habitats that may be impacted by the installation of the trunkline. Refer to findings in the matters protected tab. |

| | | | |
|---|---|---|---|
| 5A - 5(d), 6 (a)-(f) | Details the particular relevant values and sensitivities (if any) of that environment including those matters protected under Part 3 of the EPBC Act (including 5A(6)) | General | No material changes since last revision<br>Conclusion<br>In describing the environment that may be affected, the proponent has had regard to particular relevant values and sensitivities including matters protected under the EPBC Act.<br>In describing the values and sensitivities of the environment, the proponent has had particular regard to:<br>The Recovery Plan for Marine Turtles in Australia (Commonwealth of Australia, 2017) including the areas identified as 'habitat critical to the survival of a species'Conservation Management Plan for the Blue Whale 2015-2025Whale shark (Rhincodon typus) recovery plan 2005–2010 and Conservation advice Rhincodon typus (Whale SharkConservation Advice for the Short-nosed Sea snakeApproved Conservation Advice for Megaptera novaeangliae (humpback whale)North West Marine Bioregional Plan (KEFs)North West Network Australian Marine Park Managemet Plan. Other relevant statutory plans have been taken into account with key information summarised in Table3-2 |
| | | Matters protected under Part 3 of the EPBC Act | Benthic habitats<br>The description of the infauna and epifauna of the borrow ground project area on page 151 is brief and summarises results of benthic habitat survey work in the area at a very high level with two still images of the seabed provided.<br>Marine turtle habitat<br>Table 5.3 indicates that flatback turtle, green, hawksbill inter-nesting BIA and habitat critical is overlapped by the Trunkline Project Area and Borrow Ground Project Area. Flatback turtle habitat utilisation in these areas adequately described? (seasonal presence)<br>Page 202 argues that unlikely that significant portion of internesting flatback turtle females will be within project area - what is distance from closest nesting beaches and water depth?<br>The main area of green turtle habitat overlapped is inshore section of trunkline (Figure 5.28). Page 204 discusses context that shallow inshore areas more important for green turtles. Ditto for Hawksbill turtle (Figure 5.29)<br>Fish<br>The description of fish in Section 5.4.4 is heavily focused on EPBC listed species and there is very limited description of the general demersal fish communities that may be present within different parts of the project area, including commercially and ecologically important species.<br>Australian Marine Parks<br>The two Australian Marine Parks (AMPs) that are closest to the project area are the Montebello AMP which is overlapped by the trunkline project area and the Dampier AMP which is adjacent (Section 5.6.1.3 states that the Advisian 2019 ROV survey predominantly targeted areas where the Scarborough trunkline deviates from the existing Pluto trunkline. Is there data from Pluto trunkline surveys that could fill gaps in benthic habitat data for the north-eastern section of the Montebello AMP traversed by proposed trunkline? In addition, the inshore section of the trunkline route is poorly described. [RFFWI]<br>Whales - general point?<br>The description of marine mammals is focused on 'conservation significant' species and does not describe the sperm whale despite SPRAT records stating that "Whaling records from the 19th century suggest that the Exmouth Plateau may have supported large populations of sperm whales (Bannister et al. 2007)." [RFFWI]<br>Editorial<br>Page 253 - "[HOLD: GIS for actual area]" |

| | | | |
|---|---|---|---|
| 5A - 5(d), 6 (a)-(f) | Details the particular relevant values and sensitivities (if any) of that environment including those matters protected under Part 3 of the EPBC Act (including 5A(6)) | Matters protected under Part 3 of the EPBC Act | Benthic Habitats<br>RFFWI #6 - Please provide a more complete description of the benthic habitats between the Pluto platform and the coastal waters boundary.<br>Some descriptive text has been included in section 5.3.10 describing with reference to studies undertaken by SKM 2006, WEL 2009 and Fugro 2019, however no data summaries, tables, figures or photos have been included to verify statements made. Furthermore, the location of these studies on a map is not provided so it is not clear where the different habitat features that were discovered are located. ISSUE<br><br>Marine turtle habitat<br>Table 5.3 shows the following overlap<br>Flatback turtle - trunkline and borrow ground overlap with inter-nesting habitat<br>Green turtle - trunkline and borrow ground overlap with inter-nesting habitat and habitat critical (summer)<br>Hawksbill turtle - trunkline and borrow ground overlap with inter-nesting habitat and habitat critical (summer)<br>Loggerhead turtle - trunkline and borrow ground overlap with inter-nesting habitat<br>New figures have been included in section 5.4 in relation to key habitats for turtles, and information about the recovery plan has been included. For the purposes of this topic assessment, impacts to the seabed may result in indirect impacts on turtles if foraging habitat is removed (see relevant section). Information about impacts to foraging habitat<br>RFFWI #19 requests further information about turtles via the impact evaluation - see that section<br><br>Fish<br>No change to section 5.4.4 on fish<br>RFFWI #20 requests further information about fishes via the impact evaluation - see that section<br><br>Australian Marine Parks<br>See RFFWI #6 above, some text is provided but not supported by data or maps to generate an understanding of the route.<br><br>Whales<br>RFFWI #7 - A description of sperm whale distribution was requested as a general letter point. See general topic assessment. |

| | | | |
|---|---|---|---|
| 5A - 5(d), 6 (a)-(f) | Details the particular relevant values and sensitivities (if any) of that environment including those matters protected under Part 3 of the EPBC Act (including 5A(6)) | Matters protected under Part 3 of the EPBC Act | RFFWI #4<br>Previous letter points #6 and #24 requested a more complete description of the benthic habitats within the Commonwealth marine area between the Pluto platform and the coastal waters boundary, however the description provided was not complete. This letter point RFFWI#4 requested further description of the benthic habitats along the trunkline in Commonwealth, an evaluation of the representativeness of these habitats and relevant evidence to verify the conclusions made.Information has been added to the OPP in section 5.3.3.2, Table 5-2 to describe the seabed along the trunkline route from to KP 32 to 192. Additional information has been included in s5.3.10 to describe the seabed in the trunkline project area. This indicates that the seabed composition is a combination of unconsolidated sediments and areas of low density epifauna. Figure 5-14 shows that almost all drop camera surveys resulted in seabed being classified as "sparse benthic communities consisting of sponges octocorals hydroids and ascidians" (25 of 17 points of classification). Identification and a description of the seabed is included for the spoil ground in commonwealth waters. Additional information has also been added to describe the offshore parts of the trunkline. A low lying feature shown within 140 metres of the trunkline in Figure 5-17 has not been described, but it appears that it is outside the average distance from the trunkline that is predicted to be disturbed although p448 notes "there will be a few locations along the<br>trunkline route where seabed disturbance extends wider than 30 m (e.g. slope crossing)" and Figure 5.16 shows the pinnacles as being in this slope crossing region. While the OPP does not predict disturbance to this feature, any residual uncertainty will be addressed through the EP assessment process. Additional information has also been included in the description of coral in the project area as the modelling includes potential contact between corals and the borrow ground dredge plume, however, the ZoMI attributable to dredging at the offshore borrow ground suggests "reversible impacts to a small area of coral (0.2 ha)" (Section 5.3.1.1)Additional information has been included in section 5.6.1.5 about the seabed within the Dampier Marine Park. The information provided addresses the information request.<br>CONCLUSION<br>The life of the Scarborough project is provided as to 2055 in the OPP. Subsequently, infrastructure on the seabed will remain in situ for a period of around 30 years (Table 4-1).There are three areas within the CMA in which disturbance to the seabed will occur: the offshore project area where a FPSO and up to 20 wells will be located; the trunkline project area (including a spoil ground) from the offshore area to the state waters boundary and a borrow ground area from which trunkline stabilisation material will be sought (Section 1.3.2). A combination of geophysical and geotechnical data, published literature and ROV survey data are used to describe the seabed in these three project areas in terms of their bathymetry, marine regional characteristics, oceanographic environment and coastal processes, geomorphology, sediments characteristics, seabed features and benthic substrate and habitats, water quality, epifauna and infauna present and biota reliant on seabed habitats for foraging (e.g. particularly marine turtles and demersal fish) including those species protected under the EPBC Act (section 5). BIA's for turtles intersect the trunkline project area and borrow ground area as do KEFs of relevance to fishes. Of particular importance is that the trunkline area traverses approximately 80km of seabed within the Multiple Use Zone of the Montebello Australian Marine Park and the borrow ground is immediately adjacent to the Habitat Protection Zone of the Dampier Australian Marine Park. The seabed in these areas is described in more detail than unprotected areas of seabed.In general the seabed in the offshore area and borrow ground area is comprised of unconsolidated sediments and sparse epifauna. The trunkline project area traverses areas of unconsolidated sediments as well as areas with hard substrates and denser aggregations of epifauna. Some rocky outcrops with greater densities of epifauna are visible near the trunkline where it crosses the continental shelf. These areas of the seabed are described as supporting more dense benthic communities and appear to be found in the broader region as well as in the project areas.On the basis of the above and in relation to the topic of management of impacts to the seabed from the pipeline installation, NOPSEMA can be reasonably satisfied that the OPP is appropriate for the nature and scale of the project, in terms of the description of the existing environment that may be affected by the project, including all relevant values and sensitivities of the environment as well as those protected by the EPBC Act. The description of the environment has been informed by the relevant marine bioregional plan (Marine Bioregional Plan for the NorthWest Marine Region) and details provided for identified values of relevant AMPs in the the North-West Marine Parks Network Management Plan and as described by the Australian IUCN reserve management principles. |

| | | | |
|---|---|---|---|
| 5A - 5(e) | Sets out the environmental performance outcomes for the project | Emissions and discharges (unplanned) | The OPP presents EPOs for sensitive receptors in the EMBA and criteria for determining whether impacts and risks are acceptable. Woodside determined whether the impacts and risks of Scarborough are acceptable by considering four criteria (6.4.4): principles of ESD, internal context, external context and other requirements. The OPP (Section 6.5) states that impacts and risks are considered to have been demonstrated to be at an acceptable level if they do not result in a 'significant impact' as defined in the Matters of National Environmental Significance – Significant Impact Guidelines 1.1 (DotE, 2013). Significant impact depends on sensitivity, value and quality of the environment (Section 4) and intensity, duration, magnitude and extent of impact (Section 7).<br>Table 6.3 presents the EPOs by receptor and a summary of the regional context and considerations for determination of acceptability and justification for acceptable limits (i.e. ESD principles, internal and external context, other requirements). The relevant EPOs for risks from unplanned hydrocarbon releases are presented in Table7.59.<br>Issues:<br>- See point in General assessment that EPO's define levels of impact that are unacceptable, however, they do not set a measurable level of performance that is required to ensure that impacts will be of an acceptable level<br>- EPOs that relate to environmental risks of unplanned hydrocarbon releases do not demonstrate a commitment to prevent the identified spill risks being realised. For example a commitment to prevent a loss of well control or vessel collisions. (RFFWI Item 11) |
| | | | EPO's related to unplanned risks (RFFWI Item 11):<br>A single overarching EPO for the risk of unplanned hydrocarbon releases has been included as follows which provides a commitment to prevent the identified vessel collision spill risks occurring:<br>EPO19.1: No release of hydrocarbons to the marine environment due to a vessel collision associated with the Scarborough development (Table 7.75, previously 7.59).The OPP (Section 3.2.2) also acknowledges that a titleholder is required to have in place an accepted EP before commencing a petroleum activity and that the EP must detail appropriate environmental performance outcomes, standards and measurement criteria for the impacts and risks of those activities. |
| | | | No material changes since last revision.<br>Summary: the OPP provides an appropriate EPO in relation to unplanned hydrocarbon discharges consistent with the principles of ESD and that, when considered with the management controls (including forward processes to ensure the EPOs will be achieved at the EP stage), demonstrate that the environmental impacts and risks will be managed to an acceptable level relevant to criteria 5D 6(d). WEL will be required to conduct activity-specific evaluations of environmental impacts and risks and prepare an EP and OPEP for each project stage that must be accepted by NOPSEMA. The EP/OPEP development stage requires WEL to show how it meet its EPO in relation to preventing unplanned hydrocarbon releases and demonstrate that spill impacts and risks will be managed to ALARP and acceptable levels through the implementation of spill prevention and mitigation control measures. |

| | | | |
|---|---|---|---|
| 5A - 5(e) | Sets out the environmental performance outcomes for the project | General | The principles of ecologically sustainable development, as defined in Part 1, section 3A of the EPBC Act, are:<br>decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerationsif there are threats of serious or irreversible environmental damagelack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation the principle of inter-generational equity – that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generationsthe conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making andimproved valuation, pricing and incentive mechanisms should be promoted.EPO's are required to be:<br>consistent with the principles of ecologically sustainable developmentdemonstrate that the environmental impacts and risks of the project will be managed to an acceptable levelScarborough EPO's are provided in Table 6.3. However, the defined acceptable levels of impact relevant to the values of the Commonwealth Marine Area have been based on the DoEE Significant Impact Guidelines 1.1 (section 6.4 and 6.5). These EPO's define levels of impact that are unacceptable, however, they do not set a measurable level of performance that is required to ensure that impacts will be of an acceptable level.<br>Please provide information to define what would be considered as acceptable levels of impacts from the Scarborough project to environmental receptors, and revise the EPO's to set performance outcomes that are well below unacceptable levels and are measureable. Guidance in relation to this can be found in Attachment A of NOPSEMA's Draft OPP Content Requirements.<br>Monitoring of EPO implementation (s9.4) states that EPO's will be generally demonstrated through successful implementation of controls, EPS and MC. Remove statement because may not be appropriate for some EPO's or provide alternatives that may be required. "Controls may include environmental monitoring programs", these are rarely controls but MC to determine whether EPO or EPS are being met. Controls are persons, procedures, equipment that reduce/mitigate the risk or impact. |
| | | | Section 6.5 has been revised from EPOs to significant impacts and acceptable levels . The significant impact has been defined relevant to each relevant utilising Significant impact guidelines 1.1.<br>Section 7.1.1.4 has been revised to include clarification on the framework that has been used to demonstrate acceptability and to support the establishment of appropriate EPOs. The acceptable levels are the inverse of what is considered significant under the Significant impact guidelines. As such WEL assigns acceptable levels at levels that are less than what is considered significant. The acceptable level also takes into account the principles of ESD, internal content ,external content and relevant requirements such as those of international and national standards, laws, policies and plans / conservation advices.<br>Table ES-0-1 states 'Undertake the Scarborough development in a manner that will not seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species'. This is applicable to whales and turtles to which this topic relates. This EPO is appropriate as it is relevant to all life stages and is not inconsistent with relevant recovery plan.<br>However, the following requirements of relevant plans of management / recovery plans have not been addressed in environmental performance outcomes for the activity to provide assurance that the project will be managed consistent with the defined acceptable levels of impact:<br>Anthropogenic noise in biologically important areas will be managed such that any blue whale continues to utilise the area without injury and is not displaced from a foraging area.Ensure turtles are not displaced from habitat critical to their survival and that anthropogenic activities in biologically important areas are managed so that the biologically important behaviour can continue.<br>These could be addressed by addressing the points raised in 5A - 8(b) in relation to GHG emissions, marine turtles and light and blue whales and noise.<br>To demonstrate that EPOs for marine turtles and whales can be met, the OPP needs to demonstrate consistency with recovery plans. [RFFWI] |

| | | | |
|---|---|---|---|
| 5A - 5(e) | Sets out the environmental performance outcomes for the project | General | The OPP has included additional EPOs that demonstrate that the project is to be managed to an acceptable level consistent with relevant recovery plans and the principles of ESD:<br>EPO 1.5: Trunkline installation and borrow ground activities will be undertaken in a manner that aims to avoid the displacement of marine turtles from important foraging habitat or from habitat critical during nesting and internesting periods.<br>EPO 4.4: Impact piling activities will not occur during the months of May and June, and November and December to avoid peak migration periods of the pygmy blue whale.<br>There are also additional EPOs for GHG mitigation. These are:<br>EPO 3.1: Optimise efficiencies in air emissions and reduce direct GHG emissions to ALARP and Acceptable Levels.<br>EPO 3.2: Actively support the global transition to a lower carbon future by net displacement of higher carbon intensity energy sources.<br>Conclusion:<br>As a whole the EPOs provide measurable levels of performance required for the management of environmental aspects of an activity to ensure that environmental impacts and risks will be of an acceptable level.<br>The additional EPOs to limit noise, avoid displacement of marine turtles and GHG emissions set a level of performance, that when read in conjunction with the impact assessments for these factors, provide NOPSEMA with reasonable satisfaction that EPO are consistent with the regulatory intent i.e.:<br>are consistent with the principles of ESDare relevant to identified environmental impacts and risks for the projectdemonstrate that impacts and risks will be managed to an acceptable level; andset measurable levels against which the environmental performance. |
| | | Matters protected under Part 3 of the EPBC Act | The EPOs of relevance to seabed disturbance (EPOs 1, 2 and 16) provide statements about the unacceptable impact that will be not occur and are not informed by a clear definition of the acceptable levels of impact.<br>80 km of trunkline extends into the Montebello AMP and with a 30 m disturbance area (15 m either side of trunkline) this equates to 2.4 km2. It may be more appropriate for the EPO to set a disturbance limit for the AMP. For example, no disturbance outside of defined30 m corridor and disturbance minimised within this corridor. |

| | | | |
|---|---|---|---|
| 5A - 5(e) | Sets out the environmental performance outcomes for the project | Matters protected under Part 3 of the EPBC Act | EPOs for seabed disturbance<br>RFFWI #9<br>The following EPO's apply to seabed fauna for seabed disturbance<br>EPO 6.4: Undertake Scarborough development in a manner that will not modify, destroy, fragment, isolate or disturb an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity results.<br>EPO 6.5: Undertake activities within the borrow ground to not harm or cause destruction to the sea floor habitats (including significant areas of sponge habitat) in the Dampier Marine Park habitat protection zone. How will the harm or destruction be measured given the close proximity? Need a larger buffer or undertake in situ monitoring and have an adaptive management program.<br>EPO 6.6: Seabed Disturbance from trunkline installation within the Montebello Marine Park will be limited to less than 0.1% of the total park area. Note elsewhere in the OPP is says 0.07%; this EPO does not address whether or not the percentage disturbed includes biologically important areas for foraging habitat for marine turtles.This may be captured in the risk evaluation but at present how the habitat described is distributed along the trunkline is unclear.<br>EPO 6.7:Trunkline installation and borrow ground activities will be undertaken in a manner that aims to avoid the displacement of marine turtles from habitat critical during nesting and internesting periods. Unsure what this means?<br>EPO 6.8: Undertake Scarborough Trunkline Installation within the Montebello AMP in a manner that will be not be inconsistent with the objective of the multiple use zone.Unsure what this means?<br>EPO 6.9: Undertake Scarborough development in a manner that will not modify, destroy, fragment, isolate or disturb an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity of the Continental Slope Demersal Fish Communities KEF results. How is this measured?<br><br>The objective of the Multiple Use Zone (VI) of the Montebello Marine Park is to provide for ecologically sustainable use and the conservation of ecosystems, habitats and native species. Natural values of the marine park include diverse fish communities and biologically important areas for foraging habitat for marine turtles.<br>The objective of the Multiple Use Zone (IV) in the Dampier Marine Park is to provide for ecologically sustainable use and the conservation of ecosystems, habitats and native species. The objective of the Habitat Protection Zone (IV) is to provide for the conservation of ecosystems, habitats and native species in as natural a state as possible, while allowing activities that do not harm or cause destruction to seafloor habitats. The objective of the National Park Zone (II) is to provide for the protection and conservation of ecosystems, habitats and native species in as natural a state as possible. The Dampier Marine Park is noted as a hotspot for sponge diversity. |

| | | | |
|---|---|---|---|
| 5A - 5(e) | Sets out the environmental performance outcomes for the project | Matters protected under Part 3 of the EPBC Act | Changes to EPOs in response to the latest RFFWI letter include:<br>EPO 6.1: Undertake Scarborough development in a manner that prevents a substantial change to water quality that may adversely impact on biodiversity, ecological integrity, social amenity or human health.EPO 6.2: Undertake activities within the borrow ground to not harm or cause destruction to the sea floor habitats (including significant areas of sponge habitat) of the Dampier Marine Park habitat protection zone.EPO 6.3: Changes to water quality in the Montebello Marine Park as a result of the trunkline installation will be not be inconsistent with the objective of the multiple use zone.EPO 6.4: Undertake Scarborough development in a manner that will not modify, destroy, fragment, isolate or disturb an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity results. EPO 6.5:Seabed Disturbance from trunkline installation within the Montebello Marine Park will be limited to less than 0.07% of the total park area.EPO 6.6: Trunkline installation and borrow ground activities will be undertaken in a manner that aims to avoid the displacement of marine turtles from important foraging habitat or from habitat critical during nesting and internesting periods.EPO 6.7: Undertake Scarborough Trunkline Installation within the Montebello AMP in a manner that will be not be inconsistent with the objective of the multiple use zone.EPO 6.8: Undertake Scarborough development in a manner that will not modify, destroy, fragment, isolate or disturb an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity of the Continental Slope Demersal Fish Communities KEF results.<br>A point for consideration is that the EPO for the DMP is specific only to the Habitat Protection Zone, and there is no EPO for the National Park Zone. This is presumably because the dredge plume modelling for the borrow ground activities predicts no contact between the modelled Zone of Influence and the National Park Zone of the Dampier Marine Park. However, the trajectories of the modelling do show turbidity could travel distances as far as the National Park Zone, if according to variability not accounted for in the model, the plume were to go in that direction. The inclusion of a tiered monitoring and management framework informed by telemetered water quality data (turbidity) should ensure that if actual outcomes for the turbidity plume vary from what has been predicted, this would be detected in a suitable manner to inform changes to the dredging operations where designated trigger levels are exceeded at a monitoring site/s as a result of the dredging activities and adaptively manage the dredging activity to ensure that impacts are not greater than what has been predicted. In fact the OPP also states that even the modelled impacts are not expected to eventuate due to the implementation of this tiered monitoring and management framework that will ensure water quality is managed to a level where impacts to benthic communities and habitats, including coral communities within State waters will not occur. This gives a high degree of confidence that the areas predicted to be moderately impacts at recoverable levels will not in fact be impacted, and that if monitoring detects that modelling predictions are inaccurate measures will be taken to ensure that the requirements of all zones in the marine park management plan will be met.<br><br>CONCLUSION<br>The OPP sets out appropriate EPOs for the project that are consistent with the principles of ecologically sustainable development and demonstrate that the environmental impacts and risks of the project will be managed to an acceptable level when considered in combination with the impact assessment. The EPO's for seabed disturbance are consistent with ESD because they allow for development that includes a quantified amount of environmental disturbance, which is not irreversible, and is not 'serious', in that biological diversity and essential ecological processes at relevant spatial scales can be maintained. Furthermore, implementation of the monitoring and management framework will inform changes to dredging activities to ensure dredging activities and associated water quality are managed to a level where impacts are not predicted to occur to benthic communities and habitats, including coral communities within State waters.The EPO's in combination with the impact assessment demonstrate that the environmental impacts of seabed disturbance for the project will be managed to acceptable levels as having regard to the Matters of National Environmental Significance - Significant impact guidelines 1.1 (DoE 2013), North-west Marine Parks Network Management Plan (DNP 2018), and Recovery plan for marine turtles in Australia (DoEE 2017). |

| | | | |
|---|---|---|---|
| 5A - 5(f)(i) | Describes any feasible alternative, including a comparison of the environmental impacts and risks arising from the project or activity | General | Feasible alternatives to the project design are described in section 4.5 of the OPP. Four different project concepts are considered including:<br>A semi-submersible linking to Pluto LNGSubsea tiebacks to shoreSubsea tieback via Pluto upstreamFLNG conceptAn assessment has been provided including economic, technical, environmental and social drivers. The proposed option (1) does have the greatest environmental impacts except for FLNG, with greater ecological impacts for seabed disturbance, vessel movements, IMS risk, underwater noise, atmospheric and light emissions, planned and unplanned discharges, but less of a socio-economic impact. However options 2 and 3 are not selected due to economic and technical drivers.<br>Options within the chosen design are also evaluated including:<br>mooring of construction vesselsmanning of FPUdrilling fluidspiling techniquescompression facilitiestrunkline route - see protected matters topic scopepost-lay stabilisation - see protected matters topic scopeenergy efficienciesproduced water reinjectionMODU designand include a comparison of environmental impacts from the different options.<br>Re-injection of greenhouse gases has not been evaluated as an option in section 4.5.4.8. Options that have been chosen at this stage include overboard disposal to PFW, other options for PFW and cooling water have not been described, for example reinjection, onshore treatment and disposal of hydrotest.<br>No options for drill cuttings discharge options are considered, only WBM v NWBM |
| | | | Item 12 letter 1 - Stage 2 - The OPP includes an analysis of geo-sequestration (s4.5.4.2) and asserts that ceosequestration of CO2 emitted from gas turbines on the FPU would require further processing to strip the CO2 from the exhaust stream, compress and reinject and concludes that it is not considered to be technically feasible for the Scarborough project. s4.5.4.9 includes an alternatives analysis of re-injecting produced water into the reservoir and transport and onshore treatment.. Reinjection was not deemed preferred because it is not considered justified to offset the relatively<br>small rate of produced water which will be treated to meet ecological thresholds. Reinjection also incurs significant additional cost (estimated $300 million) associated with drilling activities which is considered grossly isproportionate to the impact reduction offered. Transport to onshore for processing and disposal is not considered feasible. The case is made that transporting the water to shore would require either a separate pipeline to be constructed, or transport by support vessel. Both of these options require additional infrastructure on the FPU, either large pumps to supply the pressure needed to pump water over 400 km to shore or holding tanks to store water in between supply vessel visits. This is not considered appropriate for a weight constrained floating facility.<br>Tertiary treatment of produced water appears to be a suitable option that also demonstrates that the project's produced water stream can be managed to an acceptable level. |
| | | | No material changes since last revision<br>Conclusion:<br>Section 4.5.4 provides a comprehensive discussion of alternatives to the proponent's selected/preferred design and management of the project. The OPP provides for the evaluation of feasible project alternatives and has compared environmental impacts and risks of the preferred project with the alternative(s), with well-reasoned and supported cases for the alternatives were not preferred. |

| | | | |
|---|---|---|---|
| 5A - 5(f)(i) | Describes any feasible alternative, including a comparison of the environmental impacts and risks arising from the project or activity | Matters protected under Part 3 of the EPBC Act | Borrow ground location<br>Table 4.27 sets out a summary assessment of pipeline stabilisation options. The preferred option is use of sand sourced from a borrow ground >250 m from the Dampier AMP. Other borrow ground options include borrow ground immediately adjacent to AMP, within the AMP, from Mermaid Sound or from existing spoil grounds. The offshore locations (within or adjacent to the Dampier AMP) are preferred due to known quantity and quality of material suitable for backfill. During the stage 1 assessment, Woodside were asked to include a buffer between borrow ground and Dampier AMP and a 250 m buffer was selected. Request further information as to why a buffer distance of 250 m was selected and why a larger buffer is not feasible? For example, what level of material testing has been undertaken to determine extent of suitable material and therefore level of flexibility in selecting location? [RFFWI]<br>Trunkline route<br>The trunkline route options are assessed in Section 4.5.4.6 with the assessment divided into consideration of the deepwater (west of Pluto platform) and shallow water (east of Pluto platform). The assessment of alternatives is well supported by environmental context, including location of existing pipelines, sand waves, suitable scarp crossing locations and rock pinnacles. These features are also clearly shown in Figure 4.5. A reasonable argument is also presented as to why an alternative route north of the Montebello AMP is not preferred. The case includes the requirement for additional pipeline crossings, a longer pipeline (and more disturbance) and the fact that greatest biomass of filter feeders have been documented to the north of the AMP. |
| | | | Borrow ground location<br>RFFWI #12 - Justify the feasible alternative of locating the borrow ground further from the marine park<br>Unsupported text has been added to section 4.5.4.6 in relation to moving the borrow ground so that there is a greater buffer between it and the Dampier Marine Park. Considering the the depth and manoeuvrability of vessels, 250 m is not considered a sufficient distance to ensure there are no impacts to the marine park, and greater justification is required in relation to why the borrow ground cannot be located at least 500m, but 1-2km away, to be addressed through impact assessment |

| | | | |
|---|---|---|---|
| 5A - 5(f)(i) | Describes any feasible alternative, including a comparison of the environmental impacts and risks arising from the project or activity | Matters protected under Part 3 of the EPBC Act | No material changes since last revision<br>CONCLUSION<br>Borrow ground location (s4.5.4.6)<br>Table 4.27 sets out a summary assessment of pipeline stabilisation options. The preferred option is use of sand sourced from a borrow ground >250 m from the Dampier AMP. Other borrow ground options include borrow ground immediately adjacent to AMP, within the AMP, from Mermaid Sound or from existing spoil grounds. The offshore locations (within or adjacent to the Dampier AMP) are preferred due to known quantity and quality of material suitable for backfill. During the stage 1 assessment, Woodside were asked to include a buffer between borrow ground and Dampier AMP and a 250 m buffer was selected. Further justification was requested in relation to a greater buffer zone distance. Woodside have provided more information in relation to their impact assessment for why a greater buffer distance is not required to still meet acceptable levels of impact. During the EP stage, WEL will still have to demonstrate that such a short buffer distance manages impacts to ALARP and acceptable levels, however, in the most recent submission WEL have committed to implement an environmental monitoring and management framework for borrow ground activities that would detect if impacts from turbidity are greater than what has been predicted in the OPP and adaptive management will be undertaken to ensure that the EPO's in relation to the protection of seabed habitat will be met. WEL have also consulted with DNP in relation to the location of the borrow ground as a relevant stakeholder to inform their evaluation of acceptable levels of impact.<br>Trunkline route (s4.5.4.5)<br>The trunkline route options are assessed in Section 4.5.4.5 with the assessment divided into consideration of the deepwater (west of Pluto platform) and shallow water (east of Pluto platform) options. The assessment of alternatives is well supported by environmental context, including location of existing pipelines, sand waves, suitable scarp crossing locations and rock pinnacles. These features are also clearly shown in Figure 4.5. A reasonable argument is also presented as to why an alternative route north of the Montebello AMP is not preferred. The case includes the requirement for additional pipeline crossings, a longer pipeline (and more disturbance) and the fact that greatest biomass of filter feeders have been documented to the north of the AMP.<br>On the basis of the above information NOPSEMA can be reasonably satisfied that the OPP has appropriately identified, evaluated and compared the impacts from the activities that will cause seabed disturbance according to the feasible options that are available. Further justification in relation to the buffer distance between the borrow ground and the Dampier Australian Marine Park will be required in relation to demonstrating impacts are reduced to ALARP during the EP stage. |
| 5A - 5(f)(ii) | Describes any feasible alternative, including an explanation, in adequate detail, of why the alternative was not preferred | General | For many of the alternatives described in s4.5 explanations of seemingly adequate detail are provided for why the alternative was not preferred, however, in the majority of cases decisions relating to which options will be implemented are deferred to the EP stage.<br>No options for drill cuttings discharge options are considered, only WBM v NWBM<br>No options have been considered for the hydrotest discharge point e.g. treatment at pluto and onshore discharge<br>Options that have been chosen at this stage include overboard disposal to PFW, other options for PFW and cooling water have not been described.<br>The option for greenhouse gas capture and reinjection has not been discussed in section 4.5.4.8.<br>See protected matters topic scope for trunkline route and post-lay stabilisation evaluation. |

| | | | |
|---|---|---|---|
| 5A - 5(f)(ii) | Describes any feasible alternative, including an explanation, in adequate detail, of why the alternative was not preferred | General | Options analysis for drill cuttings disposal analysis<br>The options analysis includes an evaluation of alternative drilling cuttings disposal options (section 4.5.4.12). This includes onshore disposal, alternative offshore disposal and overbioard discharge. The option to seek alternative disposal options was not deemed feasible because the drilling locations are already located in deep water away from sensitive seabed features. The option to dispose onshore utilising support vessels was not preferred on the basis that it does not provide material environmental benefit given land fill, transportation costs and fuel consumption when the offshore area is located away from environments that would be sensitive too drill cuttings discharges.<br>This is a matter that can be further evaluation taking into account the ALARP principles during the EP assessment process for the drilling activities of the project.<br>Options analysis for discharge of PFW<br>The OPP includes an options analysis for the disposal of PFW (s4.5.4.9). These include: Re-injection into the reservoir, onshore treatment / disposal, treatment and overboard disposal. A decision has been made to progress offshore treatment and disposal because: Onshore treatment and disposal would lead to an increased volume of produced water discharged to a coastal / nearshore environment (considered more sensytive that offshoreOption to re-inject would require an additional well and subsea infrastructure which is not considered commensurate with the impact of the PFW when it can be managed (potentially to tertiary levels) with offshore treatment.Discharge of hydrotest water<br>The OPP has evaluated the options of full dry commissioning and standard trunkline commissioning (s4.5.4.10) . While the preferred option is full dry commissioning, the OPP has included standard commissioning as an option in the event that circumstances during commissioning trigger the fall back option of standard commissioning (i.e. pipeline fill with seawater and dosed with chemicals then discharged). The OPP has evaluated the impacts of discharging hydrotest water (7.1.12).<br>Geo-sequestration of CO2<br>This option has been considered in section 4.5.4.2 and has been discounted on the following grounds:<br>For Scarborough, emissions of reservoir CO2 will occur from the onshore processing and not from the FPU and is therefore not assessed under this Proposal.<br>Geosequestration of CO2 emitted from gas turbines on the FPU would require further processing to strip the CO2 from the exhaust stream, compress and reinject. This technology is significantly complex and prohibitive on an offshore facility where space is restrictive. Gas projects that employ geosequestration are onshore and typically capture reservoir CO2 only. It is not considered to be technically feasible for the Scarborough project.<br>There is sufficient information to meet the intent of the Reg (feasible alternative) however findings of the evaluation of GHG emissions and associated acceptability is provided in the GHG evaluation section of the OPP where further management of GHG emissions is considered (s7.1.3). |
| | | | No material changes since last revision.<br>Conclusion<br>The alternatives analysis utilises a process that is underpinned by an analysis of all feasible project design options with a comparison of technical and environmental factors. There is an adequate explanation of why feasible alternatives have not been adopted. See comments above on Rev 4. |
| | | Matters protected under Part 3 of the EPBC Act | Addressed in findings above. |
| | | | As above |
| | | | No material changes since last revision<br><br>CONCLUSION<br>The reasoning why alternatives were not preferred in relation to a comparison of impacts to the seabed has been included in the OPP and is suitable for the identification and evaluation of impacts. |

| | | | |
|---|---|---|---|
| 5A - 7(a) & (b) | Describes the requirements, including legislative requirements, that apply to the project and are relevant to the environmental management of the project and describes how those requirements will be met | General | Legislative requirements are identified and described in section 3 of the OPP.<br>These requirements include:<br>EPBC Act, Ocean Policy, marine bioregional plans, EPBC management plans for protected species and australian marine parks, EPBC Policy Statement 2.1 as applicable to manage of impacts of noise on whales, other approvals required under the OPGGSA besides the OPPrelevant commonwealth legislation relating to navigation acts, radiation, sea dumping, chemical use, pollution to the air and sea, biosecurity, heritage and hazardous wasteinternational agreementsRelevant state legislation does not appear to be referred to<br>How any specific relevant legislative requirements will be met is not detailed in the OPP.<br>Pluto Gas Plant MS 757 - s12 Greenhouse Gas Abatement outlines a number of specific measures that must be covered in a Greenhouse Gas Abatement Program. |
| | | | Recovery Plans<br>Marine turtles -It is still unclear how the project will ensure that the recovery plan for marine turtles will be met. Refer to 5A - 8(a)=<br>Blue whales - It is still unclear how the project will be managed to ensure that the reqwuierments of the blue whale recovery plan will be met. Refer to 5A - 8(a).<br>Principles of ESD (Object of Regs)<br>It is still unclear how the project will be mnanaged to ensure that the principles of ESD will be met (refer to RFFWI 2 and 5A - 8(a)). This is particularly relevant to GHG emissions and associated impacts of climate change.<br>Clarity in relation to how the EPBC Act applies to the project<br>In section 3.1, the OPP contains general information in relation to the Environment Protection and Biodiversity Conservation Act (1999) (EPBC Act), and its application to the Project.<br><br>The information presented in section 3.1 does not describe in sufficient detail how the requirements of the EPBC Act which are relevant and applicable to the Project will be met. Specifically, the OPP needs to explain more clearly why the Project does not need to be separately referred for assessment under the EPBC Act. For example, the OPP could clearly explain the effect of the strategic assessment, its associated approval relevant to the NOPSEMA Program, or otherwise. |

| | | | |
|---|---|---|---|
| 5A - 7(a) & (b) | Describes the requirements, including legislative requirements, that apply to the project and are relevant to the environmental management of the project and describes how those requirements will be met | General | Impacts to marine turtles (letter point 11)<br>The focus of this general assessment was on critical pathways of impacts on threatened species. Taking into account the threatened status of pygmy blue whales and marine turtles, the potential for underwater noise to disturb pygmy blue whales in a foraging BIA and the potential for light impacts to interfere with biologically important behaviours for marine turtles, the focus of the general assessment was on these receptor and pressure pathways. The assessment focused on whether the OPP presented a well-founded, evidence based case for whether the project could be managed consistent with the Conservation management plan for blue whales. The assessment found that, with the management controls in place for pile driving, the project could be managed not inconsistent with the pygmy blue whale recovery plan.<br>Section 7.1.1.3 clarifies the requirements of the recovery plan for marine turtles in Australia. Specifically, the recognition that anthropogenic noise must be managed to that marine turtles are not displaced from an identified habitat critical to the survival, and for activities in BIAs to ensure that biologically important behaviour can continue. The assessment also found that the potential 8 week duration trunkine and borrow ground activities would not interfere with biologically important behaviours for marine turtles. Further detail of assessment findings in relation to these relevant recovery plans can be found under Regulation 5A - 8(b).<br>The OPP also recognises the relevance of the National Light Pollution Guideline for Wildlife (Commonwealth of Australia, 2020), including to undertake a project specific lighting assessment.<br>Principles of ESD<br>OPP includes content identifying principles of ESD are requirements and explaining how the proponent considers that the project will be managed consistent with ESD. This is evident in EPOs set and the evaluation in each section of the evaluation against the principles of ESD (e.g. s7.1.1.3, 7.1.3.9, Table 7-42).<br>Clarity in relation to how the EPBC Act applies to the project<br>Additional information has been added to Section 3.1 which references the “Final Approval Decision for the taking of actions in accordance with an endorsed program under the Environment Protection Biodiversity Conservation Act (EPBC Act)” and the “Program Report – Strategic Assessment of the environmental management authorisation process for petroleum and greenhouse gas storage activities administered by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) under the Offshore Petroleum and Greenhouse Gas Storage Act 2016".<br>These documents have the effect that certain actions can be undertaken in accordance with the Endorsed NOPSEMA program without further referral / approval under the EPBC Act. The updates to the section also refer to the actions that are excluded from the Program and notes that the scope of the Scarborough OPP does not include any of the excluded actions (e.g. seabed in the GBRMP, actions in the Antarctic, injection and / or storage of GHG).<br>Conclusion<br>The OPP has adequately described the requirements, including legislative requirements that apply to the project and are relevant to the environmental management of the project including how those requirements will be met. The OPP demonstrates the proponent's understanding of requirements relevant to environmental management of the project and explains how those requirements will be met as part of the impact and risk analysis to provide confidence that the acceptable levels of impact and risk can be achieved |
| | | Matters protected under Part 3 of the EPBC Act | Note about decommissioning - page 392 talks about options of leave in-situ, removal or part removal of infrastructure and a future comparative assessment. Consistency with default position in the OPGGS Act?<br>There is a statement on page 401 that seabed disturbance will not be inconsistent with objectives of the relevant marine park zones. The objectives are stated but there is no explanation of how the scale of seabed disturbance is not inconsistent.<br>Marine turtle recovery plan requirements - flatback turtle inter-nesting BIA and habitat critical overlapped. Some of the specific recovery plan actions that may require further consideration include:<br>Manage anthropogenic activities to ensure marine turtles are not displaced from identified habitat critical to the survival as per section 3.3 Table 6.Manage anthropogenic activities in Biologically Important Areas to ensure that biologically important behaviour can continue. (page 49 of recovery plan). These actions should be addressed in relation to all disturbance impacts from the project in these habitats, e.g. light, noise, seabed disturbance. Noting that specific actions apply for some threats such as light (page 56 of recovery plan). |

| | | | |
|---|---|---|---|
| 5A - 7(a) & (b) | Describes the requirements, including legislative requirements, that apply to the project and are relevant to the environmental management of the project and describes how those requirements will be met | Matters protected under Part 3 of the EPBC Act | Decommissioning<br>RFFWI #5 - Please clarify plans for decommissioning the trunkline.<br>Clarifications made in section 4.4.10, 7.1.5, 7.1.4.1, 7.1.5.1 and 7.1.6.1 to include mention of the trunkline as to be removed with other subsea infrastructure. NO FURTHER ISSUE<br><br>Seabed disturbance consistent with objectives of marine park zones.<br>RFFWI #13 - State government legislative requirements<br>Section 3.5.2 has been included to reference the EP Act for dredging, but the submission states that this "does not apply to activities occurring outside state jurisdiction", but does not describe how the requirements will be met or discuss how suspended sediments generated in commonwealth waters from trunkline installation and borrow ground will be managed. However later in the OPP the statement is made that "it should be noted that proposed management of potential impacts to significant benthic communities and habitats within State waters will be addressed under relevant state legislation" p436 [issue]<br><br>Marine Turtle recovery plan requirements<br>RFFWI #19<br>Marine Turtle Recovery Plan requirements are to "manage anthropogenic activities to ensure marine turtles are not displaced from identified habitat critical to their survival as per section 3.3 Table 6<br>Marine turtles have been added to the list of receptors potentially impacted by seabed disturbance in section 7.1.6.2, and an impact evaluation has been included in relation to foraging areas that may potentially be impacted by seabed disturbance. The key to understanding potential impacts to turtles is understanding extent of impacts to the habitats being disturbed by the activity. The OPP has made the case that key foraging is elsewhere for turtles and that habitat loss will not grossly affect the available foraging habitat for turtles at a proportional level. During an assessment of the habitats themselves it will be determined whether there will be any loss of important habitat. NO FURTHER ISSUE |
| | | | s3.5 states "Western Australian specific legislation is described, where impacts from Scarborough in Commonwealth waters may impact State jurisdiction".<br>The OPP now addresses the management of turbidity plumes from trunkline and borrow ground activities affecting WA State waters via the monitoring and management framework for dredging therefore this requirement is met.<br>CONCLUSION<br>The OPP is required to demonstrate that the environmental impacts of the activity will be managed to an acceptable level, which means complying with requirements, including legislative requirements that apply to the project and are relevant to the environmental management of the project and demonstrating how those requirements will be met.<br>The OPP addresses all relevant legislative requirements in relation to seabed disturbance including:<br>risks in relation to introduced marine speciesdecommissioning in the removal of all subsea infrastructure unless otherwise authorisedconsistency with objectives of the Dampier Marine Park and Montebello Marine Park zone objectivessea dumping legislationconsistency with the marine turtle recovery plan and broader requirements of the EPBC Act relevant to protection of the CMA. |
| 5A - 8(a) | Includes details of the environmental impacts and risks for the project | Emissions and discharges (unplanned) | Risk Identification and Assessment Process: The OPP applied a systematic risk assessment process (Fig. 6.1) to identify and evaluate the impacts and risks of the project. Impact and risk scoping matrices (Section 6.3) were created to identify routine and non-routine (e.g. unplanned hydrocarbon release) aspects (or hazards) of the project which present potential risks and the pathways of those impacts/risks for each receptor. Seven potential pathways for impacts and risks to receptors in the EMBA of an unplanned hydrocarbon release were identified (Table 6.2) and details of these impacts and risks are presented in Sections 7.2.6.1 & 7.2.6.2.<br>Hydrocarbon characteristics: The Scarborough field hydrocarbon characteristics are'dry' gas with only trace levels of condensate based on reservoir samples and well tests obtained from two appraisal wells and compositional analysis undertaken in 2018 (Section 4.3).<br>Vessels involved in the construction and operation of the project will all use MDO or MGO for fuel (Section 7.2.6.1). No HFO is to be used by vessels during the project. An appropriate level of information is provided on the hydrocarbon characteristics to support the risk evaluation and modelling predictions of MDO fate and weathering (Fig. 7.23).<br>Spill scenarios: The EP identifies risks of a loss of well control or pipeline leak/rupture, but hydrocarbon releases would have no or negligible liquid component (Section 7.2.6.1). Consequently oil spills due to releases of the production gas are not considered to be credible and not considered further in the spill risk assessment. A range of vessel activities are associated with construction of the Gas Export Trunkline (Section 4.4.7), Pre-lay Survey (Section 4.4.7.1), Trunkline Installation (Section 4.4.7.2), Trunkline Stabilisation (Section 4.4.7.3) and Inspection, Maintenance and Repair Activities (Section 4.4.11). A variety of vessels including barges, tugs, heavy lift vessels, accommodation support vessels, survey |

vessels and supply vessels and installation (ISV) and pipelay vessels will be involved in the project (Section 4.4.12). Representative spill scenarios from bunkering failures and vessel collision are identified (Section 7.2.6.1). A spill scenario based on the largest single tank of the refuelling vessel (2,000 m3) supporting the deepwater pipelay vessel has been adopted as the worst case scenario for the spill modelling to define an EMBA (see below). This is a conservative approach as the other project installation and support vessels will have smaller fuel tanks and the entire tank inventory may not be lost in any collision involving the refuelling vessel.

Spill modelling & EMBA: WEL conducted spill modelling of the worst case MDO spill scenario to identify the environment that may be affected (EMBA) and support the consequence analysis for unplanned hydrocarbon releases (Section 7.2.6.2). Three release locations were selected for the modelling (Table 7.55) to be representative of scenarios with the greatest potential consequence and probability. The EMBA was derived by combining outcomes of Stochastic modelling with a buffer applied (approximately a minimum of 50 km) to accommodate exposure below the threshold levels. The EMBA also extended inshore to accommodate a spill scenario occurring anywhere along the trunkline route and simplified to a rectangular shape for ease of use (Section 5.1, Fig. 5.2, Appendix I). EMBA forms the basis of the EPBC Protected Matters search (Section 5.1). Deterministic model runs were selected to provide an indication of the actual area of entrained oil exposure from a single spill incident with the largest impact to receptors towards the south-west considered to be at the greatest risk (Figs. 7.19-7.21). The modelling method is appropriate and consistent with standard industry approaches to predicting consequences of the spill risks identified for this project.

Issues:

- The environmental impact thresholds for surface, entrained and dissolved hydrocarbons applied to the oil spill modelling (Table 7.56) to define the EMBA are not consistent with advice in NOPSEMA Bulletin #1. The surface, entrained and dissolved hydrocarbons applied by Woodside to the spill modelling to define an EMBA may not suitably identify all impacts of hydrocarbons at the surface and in the water column in the event of the oil spill scenarios presented in the OPP. For example, the environmental impacts/risks associated with unplanned hydrocarbon releases includes “changes to the functions, interests or activities of other users” and “change in aesthetic values”. The details of these impacts/risk notes that a visible sheen or residue has potential to reduce the visual amenity of an area for tourism and discourage recreational activities (epdf p.544). However, the surface exposure thresholds (10 g/m2, Table 7.56) applied to the modelling are based on biological impacts and do not account for visible sheens that would occur at levels below this threshold. (RFFWI Item 27)

NOPSEMA has previously requested that Woodside revise these surface, entrained and dissolved aromatic hydrocarbon thresholds applied to spill modelling to define an EMBA during two recent EP assessments (North Rankin RMS 4830 and Julimar Drilling RMS 4869). Issue to discuss further with assessment team

Environmental impacts: The OPP follows a multi-step environmental impact and risk evaluation process (Section 6.4.2). An environmental risk consequence was assigned to each environmental risk (identified in the scoping matrices) based on receptor sensitivity, magnitude of impact and likelihood of occurrence (Section 6.4.2). The general sensitivity of each receptor was ranked (low, medium, high) based on criteria of quality, sensitive to change and importance (Section 6.2.2, Table 6.3). The magnitude of the impact of an unplanned hydrocarbon release on each receptor was assessed based on extent, duration, frequency and scale of impact utilising outputs of the spill modelling (Section 7.2.6.2). The rankings of general receptor sensitivity and magnitude of impacts of an MDO spill were then combined to derive a consequence level (Fig. 6.2) for each receptor.

The final stage of determining the risk involves combining the consequence level and likelihood to identify the risk level (Fig. 6.3). The outcomes of the risk assessment are summarised in Table 7.59 and a detailed risk evaluation is presented for each receptor (epdf pp. 546-568) which had a risk rating of low or higher (Section 6.4.2.2).

Issues

- The description of the likelihood of a vessel collision states that “Considering the rapid weathering of MDO and lack of any liquid hydrocarbon fraction in the dry gas, the inherent low likelihood of a collision occurring, and adopted controls, the likelihood of this event occurring was evaluated as Highly Unlikely”. This appears to indicate that the assessment of likelihood considered the likelihood of consequence and not just the likelihood of the event occurring, whereas the risk evaluation method describes the process as considering the likelihood that the risk source(s) lead to the incident occurring. (RFFWI Item 26)
- The likelihood of an unplanned hydrocarbon release due to a vessel collision is ranked as “Highly Unlikely” (Section 7.2.6.3). The descriptor for highly unlikely (Fig. 6.3) is “Has occurred once or twice in the industry” and the frequency is “1 in 10,000-100,000 years”. This ranking appears to be inconsistent with information provided in the risk evaluation (Section 7.2.6.3) which states that 37 collisions were reported in Australian waters between 2005 and 2012. (RFFWI Item 26)

Spill scenarios: The description of the deepwater pipelay and refuelling vessels (Section 7.2.6.1) has been amended to clarify that both types of vessels may have a maximum single

| | | |
|---|---|---|
| | | tank inventory of 2000 m³ of MDO. This does not make a material difference to the risk evaluation as the worst case spill risks in Submission 1 were evaluated on the basis of potential spill scenarios up to 2000 m³ of MDO from refuelling vessels.<br>Spill modelling & EMBA (RFFWI Item 27): A lower surface threshold of 1 g/m2 has been adopted from the Bonn Agreement oil appearance code (2015) to represent the full area of potential socio-cultural impacts due to the presence of visible surface oil (Table 7.71, previously 7.56). Exposures at this lower surface threshold are not predicted by the stochastic modelling to impact any additional key receptors (e.g. AMPs and Protected areas) beyond those previously predicted to be impacted at the 10 g/m2 ecological impact threshold presented in the previous submission (Table 7.73, previously 7.57).<br>Woodside has retained a 500 ppb threshold for dissolved aromatic and entrained hydrocarbons in the water column. The results of ecotoxicity testing of Marine Diesel commissioned by Woodside in 2013 have been detailed in the revised submission and provide an appropriate justification to support the 500 ppb thresholds (Table 7.71, previously 7.56). These thresholds will need to be further reviewed at the EP development stage to determine if they are appropriate to establish planning areas for scientific monitoring of potential exceedance of water quality triggers, but are appropriate for the evaluation of environmental impacts and risks as part of an OPP.<br>The overall approach taken to define the EMBA also incorporates a level of conservatism by basing the spill modelling on a complete loss of the volume of the largest fuel tanks of the deepwater pipelay and refuelling vessels and an additional 50 km buffer has been applied to the outer most edge of the predicted maximum extent of surface and subsurface hydrocarbons at the threshold levels by stochastic modelling (Figure 5.2). Further, the key characteristics of the closest protected marine places outside the EMBA have also been summarised to provide additional regional context and support the risk evaluation of the worse-case spill scenario (Section 5.1, Table 5.8).<br>Taken together, the overall approach adopted in the OPP to identify the environment that may be affected by the worst case spill scenarios and to support the risk evaluation is appropriate to the nature and scale of these impacts and risks.<br>Environmental Impacts - Likelihood of spill impacts (RFFWI Item 26): The description of the likelihood of a vessel collision (Section 7.2.6.3) has been revised to focus on firstly, the likelihood of a collision event occurring and secondly, likelihood of a diesel release if a collision occurred. References to the likelihood of consequences have been removed so that they the evaluation is now consistent with the risk evaluation method (Section 6.4.2.2).<br>The ranking of the likelihood of a vessel collision remains ranked as "highly unlikely" following the clarifications to the meaning of likelihood. The description of likelihood frequencies in Woodside's risk assessment table (Fig. 6.3) are unchanged and it is difficult to see how these quantitative values applied to all types of corporate risks are relevant to environmental risks, so the application of the likelihood rankings is dependent on the interpretation of the "experience" text descriptions. Based on these descriptions it appears reasonable to classify the likelihood of a vessel collisions as "highly unlikely". Elevating the "highly unlikely" likelihood ranking for vessel collisions by one level to "unlikely" would not affect the overall moderate risk ranking (Fig. 6.3) for the identified receptors, except for coral which has a potential major consequence ranking due to its "high sensitivity" to hydrocarbons (Table 7.75). However, the detailed risk evaluation found that unplanned hydrocarbon releases from Scarborough are not expected to modify, destroy, fragment, isolate or disturb an important or substantial area of coral habitat, such that an adverse impact on marine ecosystem functioning or integrity results due to the short duration and confined spatial extent of potential spills. |
| | | No material changes since last revision.<br>Summary: The OPP appropriately identifies and evaluates the environmental impacts and risks of unplanned hydrocarbon discharges from the project relevant to criteria 5D 6(c). The evaluation applied an appropriate risk identification and assessment process for an OPP including detailed modelling of the consequences of unplanned hydrocarbon discharges. The OPP justifies the use of exposure values applied to the spill modelling having regard to NOPSEMA guidance and are appropriate for the evaluation of impacts and risks of a project in an OPP, but will require further consideration in relation to the requirements of the risk evaluation and development of an implementation strategy at the future EP and OPEP preparation stages. |
| | General | Details of the environmental impacts and risks for the project are included in section 7 of the OPP. The impacts and risks are as follows:<br>Light emissions - impacts on seabird BIA's, turtle BIA's in s7.1.1Atmospheric and GHG emissions - impacts at the local airshed and onshore emissions are referred to, scope 3 emissions are not suitably detailed in s7.1.2 RFFWIAcoustic emissions - sources will include VSP, side0scan sonar, drilling piling, operations, decommissioning and are sufficiently detailed in s7.1.3. Displacement of other users as an impact has been detailed in 7.1.4 See PM topic scope for seabed disturbance s7.1.5. Sewage and grey water is detailed |

| | | |
|---|---|---|
| | | in s7.1.6, food waste in s7.1.7, chemicals and deck drainage in s7.1.8Brine and cooling water are detailed in s7.1.9Operational fluid discharges are detailed in s7.1.10. Routine and non-routine discharges subsea installation and commissioning s7.1.11Routine and non-routine drilling discharges s7.1.12Unplanned chemical discharges s7.2.1Unplanned solid waste discharge s7.2.2Unplanned seabed disturbance s7.2.3Unplanned introduction of IMS s7.2.4Unplanned collision with marine fauna s7.2.5Unplanned hydrocarbon release s7.2.6Cumulative impact assessment s8 |
| | | Sections 7.1.3.2 and 7.1.3.3 have been revised to identify impacts of climate change and potential impacts from local airshed air quality changes. The identification of these potential impact pathways is suitable.<br><br>No material change to other items |
| | | No material changes since last revision<br>The OPP has included details of all relevant impacts and risks. In addition, to the information included in Rev 4 in relation to GHG emissions and their potential indirect consequences, the OPP now clarifies that scope 3 emissions generated through third party consumption of LNG originating from the Scarborough field are an indirect consequence considered to be potential impacts subject to assessment and decision making in the OPP (s7.1.3).<br>Conclusion:<br>All impacts and risks to the environment resulting from all aspects of the project have been detailed in the OPP in sufficient detail to set the foundation for an appropriate level of evaluation for those impacts and risks. The proponent has utilised an appropriate methodology to identify impact and risk pathways which then establishes the foundation for the evaluation of impacts and risks needed to demonstrate the project's impacts and risks can be managed to an acceptable level |
| | Matters protected under Part 3 of the EPBC Act | Page 86 - states that compression facilities are likely to be installed at a later stage - could be second platform, on the riser platform or subsea. Does the OPP detail potential impacts associated with this aspect of the project? Indicative size of unit and location and method of install.<br>Details of impacts from anchoring/mooring along the pipeline route<br>Table 7.18 sets out the receptor and impact focus for the evaluation of impacts and turtles are not listed as a receptor despite overlap with BIAs. Are they adequately addressed as a value of the AMP? It is noted that the report of the benthic habitat survey of the Montebello AMP often states that "the high epibenthic diversity, which included soft corals and sponges, could very well provide a foraging habitat for threatened marine turtles, along with other mobile fauna which are able to live at or travel to these depths." This possibility is not well detailed or evaluated in the OPP. |
| | | Compression facilities<br>RFFWI #8 - The option for an additional compression platform/facility has been removed from section 4.4.4.<br><br>Anchoring<br>RFFWI #25 - seabed disturbance from anchoring/mooring<br>Temporary mooring option via pile driving for pipelay vessel has been removed. A new project area has been included, which proposes anchoring, although unlikely in deeper waters may occur within 1.5 km either side of the trunkline. A statement has been included that unless in distress, anchoring will not occur in the Montebello marine park due to water depths. s7.1.6.2.<br><br>Evaluation of impacts to turtle foraging habitat<br>RFFWI #19 - indirect impacts to turtles through loss of foraging habitat<br>Marine turtles have been added to the list of receptors potentially impacted by seabed disturbance in section 7.1.6.2, and an impact evaluation has been included in relation to foraging areas that may potentially be impacted by seabed disturbance. The key to understanding potential impacts to turtles is understanding extent of impacts to the habitats being disturbed by the activity. The OPP has made the case that key foraging is elsewhere for turtles and that habitat loss will not grossly affect the available foraging habitat for turtles at a proportional level. During an assessment of the habitats themselves it will be determined whether there will be any loss of important habitat. NO FURTHER ISSUE<br><br>Changes made to the OPP by the proponent<br>Additional impacts have been added to the OPP in relation to:<br>a greater seabed disturbance than previously predicted at the slope crossing, with stabilisation extending several hundred metresincrease of trunkline project area to 1.5 km either side to align with vessel operational area, proponent states no additional sensitivities |

| | | | |
|---|---|---|---|
| | | | contacteddepth of borrow ground was incorrectly provided as 100 m and is actually 35-40 m, proponent states this was a typo and no other changes were necessaryunits for area of seabed disturbance from MODU anchoring and clump weights have been corrected to decrease the proposed impact |
| | | | No material changes since last revision<br><br>CONCLUSION<br>The OPP must appropriately identify and evaluate the environmental impacts and risks of the project appropriate to nature and scale.Seabed disturbance from relevant aspects of the project have been identified and evaluated in s7.1.6 of the OPP. This includes impact from installation of drilling and subsea infrastructure in the project area, dredging in the borrow ground area and dredging, pipelay, backfill and spoil disposal in the trunkline project area. The identification and evaluation of seabed disturbance includes direct physical disturbance, generation of turbidity/water quality impacts, removal of benthic food sources/habitats (corals and epifauna), indirect impacts on fauna relying on these food sources/habitats and implications where the seabed is assigned a value such as a KEF or is located within an Australian marine park.On the basis of the above it has been determined that the OPP appropriately details the environmental impacts related to disturbance to the seabed from the project. |
| 5A - 8(b) | Includes an evaluation of all the impacts and risks, appropriate to the nature and scale of each impact or risk | Emissions and discharges (unplanned) | The OPP Risk Evaluation method (Section 6.4.2.2) combines consequence and likelihood of risks for each environmental receptor (Fig. 6.3) of unplanned hydrocarbon releases to determine a residual risk ranking (Table 7.59). A summary of risk evaluation rankings, management controls, EPOs and residual risk ratings for unplanned hydrocarbon releases by receptors and impacts/risk is presented in Table 7.59. A detailed risk evaluation of each receptor potentially impacted by unplanned hydrocarbon releases is presented in Section 7.2.6.2. This risk evaluation assesses the predicted level of impact based on spill modelling against the environmental performance outcomes for the categories of predicted impacts (Table 7.58). The detailed risk evaluation also assesses relevant management plans, recovery plans or conservation advice and objectives and values of AMPs. An overall risk rating (Fig. 6.3) for unplanned hydrocarbon releases (Moderate B1) was determined by combining the highly unlikely rating for vessel collisions with the worst consequence rating from all the receptors (Major – coral – change in habitat). The overall assessment of impacts for each receptor are determined to be acceptable based on the four acceptability criteria (principles of ESD, internal context, external context, other requirements, epdf pp. 569-70).<br>Issues<br>The OPP risk evaluation follows a systematic process, but there are inconsistencies and ambiguities in the information and outcomes of the evaluation presented in the report.? For example, the detailed risk evaluation of unplanned hydrocarbon releases (Section 7.2.6.2, epdf pp. 546-568) presents a summary statement at the end of the evaluation for each receptor about the acceptability of impacts related to the magnitude of the impact, for example: “Based on the detailed risk evaluation, the magnitude of potential impact of a change in water quality from unplanned hydrocarbon releases is assessed as slight and is considered acceptable”. However the risk assessment process identifies that the magnitude of impact was combined with receptor sensitivity to define the significance or consequence level (Fig. 6.2), which was then combined with likelihood to determine an overall risk level (Fig. 6.3). The determination of whether the impacts and risks of the project are acceptable are based on consideration of four criteria (i.e principles of ESD, internal context, external context, other requirements, 6.4.4) not on the magnitude of impact alone. (RFFWI Item 28) |

| | | | |
|---|---|---|---|
| 5A - 8(b) | Includes an evaluation of all the impacts and risks, appropriate to the nature and scale of each impact or risk | Emissions and discharges (unplanned) | Risk evaluation and acceptability of impacts (RFFWI Item 28): The detailed risk evaluation (Section 7.2.6.2) of impacts of unplanned hydrocarbon releases (i.e. MDO & MGO releases from vessel operations) on receptors with the potential to be exposed (Table6.2) has been amended to remove ambiguous references to acceptable levels of impact based solely on the magnitude of impacts. The risk evaluation now presents a consistent assessment of risk consequence based on the magnitude of potential impact and receptor sensitivities as per the method detailed in Section 6.4.2.2. The risk evaluation also gives consideration to relevant statutory instruments and guidance produced under the EPBC Act (e.g. AMP management plan values and objectives, conservation advice and recovery plans). As a result, the revised detailed risk evaluation of the environmental risks arising from the potential emergency conditions (unplanned hydrocarbon releases) is appropriate to the nature and scale of these risks.<br>High level descriptions of reasonable control measures to prevent vessel spills and to ensure the environmental risks of the project will be acceptable are presented as part of the evaluation of likelihood of spill events (Table7.75). The OPP also highlights that detailed spill response strategies will need to be developed for the activity OPEPs. Section 7.2.6.4 summarises potential response strategies to be further developed for the activities proposed in future EPs and OPEPs to reduce potential consequence of spills to ALARP and acceptable levels.<br>A new subsection (Section 7.2.6.4 Demonstration of Acceptability) has been added which expands on the comparison of unplanned hydrocarbon release risks to the criteria for defining acceptable levels of impact and risk to the environment presented in the previous version. The OPP acknowledges that a spill event is not considered acceptable, but instead focuses on evaluating the predicted likelihood and consequences of such an event on the receptors identified in the EMBA against the acceptability criteria. |
| | | | No material changes since last revision.<br>Summary: The OPP provides an appropriate evaluation of the environmental impacts and risks of unplanned hydrocarbon discharges from the project relevant to criteria 5D 6(c). The evaluation applied an appropriate risk identification and assessment process including detailed modelling of the consequences of unplanned hydrocarbon discharges. |
| | | General | An evaluation of the impacts and risks are included in section 7 of the OPP and further information will be required.<br>The evaluation for light makes unsupported statements of no impact to populations of birds and to populations of turtles, despite the project being in BIA's for these fauna. (s7.1.1) RFFWIThe evaluation for atmospheric emissions does not include scope 3 emissions (s7.1.2) RFFWIModelling was undertaken for acoustic emissions and could cause TTS and PTS in whales, and migratory pathways (BIAs) for PB whales, with HB whales in close proximity (s7.1.3, Appendix D). Noise levels from piling and FPU operation can cause TTS and PTS in cetaceans. The evaluation for noise is reasonable but the conclusions make unsupported statements of no impact to populations of cetaceans and to populations of turtles, despite the project being in BIA's for these fauna (s7.1.3). The control VSP Procedure is referred to but only cites "industry standards" and does not provide the detailed standards and from where they are derived that would be used for this to be acceptable i.e. timing for pre-start and soft start, etc. Also noted is s7.1.3.3. refers to "atmospheric emissions". Greater detail about this evaluation is included in the modelling report attached as Appendix E but not much of this detail is included in the OPP to present a robust case for acceptability of impacts. Sperm whales are not identified as potential species of interest despite the fact they are known from the Exmouth Plateau. The evaluation states that there may be an impact to tourism and recreation activities from physical present in the trunkline project area but that "given the location and the short term nature" and that impacts are "unlikely" they have not been evaluated further. Greater impact evaluation for each of the affected fisheries should also be included s7.1.4. See PM topic scope for seabed disturbance s7.1.5. Evaluation for sewage and grey water, food waste, chemicals and deck drainage discharges (7.1.6, 7.1.7 and 7.1.8) have not taken into account seasonal timing of trunkline installation vessels and cumulative impacts from multiple discharges in AMPs RFFWIThe evaluation for brine and cooling water (s7.1.9) includes discharges from the vessels, FPU and MODU all grouped together. The evaluation should really look at all vessel discharges cumulatively for each scenario i.e. MODU, FPU and vessels and the locations and time frames for the discharges will differ between activities. The evaluation concludes that dilution of chlorine in cooling water back to background is achieved at 6.4 km from the discharge point. The evaluation states "based on impact evaluations for water and sediment quality, the discharge of brine and cooling water is expected to result in a relatively small area of impact around the FPU", however 6.5 km is not a small area and is in a distribution area for PB whales. The evaluation of impacts from the cooling water on marine fauna at the sea surface including protected species is unsupported (p431). The plankton assessment relies on results of a seismic survey, rather than more comparable pollution studies to assess the impact of the cooling water. Although impacts to the bethos and sediments are likely to be less due to the surface nature of the plume, arguably productivity at the surface may be |

greater and this has not been identified, particularly as it may apply to protected matters. Suggest separating out impacts of temperature, for which impacts cease at 345m from the FPU and would be relatively benign if no sharps changes, from chlorinated water which is above ANZECC thresholds for 6.4 km from the FPU. Note that the modelling report is included in Appendix F RFWWIThe evaluation includes TPH discharged at 29 mg/L extending ~866m from the FPU if discharged at the surface (s 7.1.10 and appendix G) with an impact threshold set by ANZECC ARMCANZ of 0.07 mg/l. The evaluation of impacts is not supported for fish, marine mammals, marine reptiles or fisheries. The detailed evaluation of impacts to water and plankton is reasonable, however, the cumulative impacts of all FPU discharges should also be assessed RFWWIInstallation of the FPU and subsea infrastructure, and commissioning and precommissioning will result in multiple discharges to the marine environment (s7.1.11 and appendix H). The largest of these is 223 000 m3 and 66 000 m3 and the location and timing is not specified in the OPP but likely to be in the vicinity of the FPU. Modelling undertaken states that the maximum horizontal distance reached before dilution to less than the lethal concentration of 0.06. ppm of biocide was 1.56 km. Dewatering of a very similar volume from the Wheatstone trunkline was estimated to extend 3.5 km from the source and the submission asserts that this is because difference flow rates were modelling. Further information may be required to determine what commitments will be made to ensure more limited dispersion distances. Unsure if dewatering onshore has been considered as an option, doesn't seem like it. Timing of discharge may be relevant in relation to seasonality of sensitive receptors. No overlay of dewatering on receptors. No impact assessment for marine fauna. Not quantitative and no supporting literature for "temporary and localised impacts". Note in the description of the Exmouth Plateau (s5.5.1) the features is characterised by internal tides resulting in upwelling known to be strongest during January and March. Oceanographic patterns may need to be considered in relation to discharges. RFFWIDischarge of drilling muds, fluids, cuttings and cement are identified and evaluation in s7.1.12 and in summary, impacts from these could be expected up to 1km from each well site. No alternatives have been included for drill cuttings (cement, mud etc) discharge reduction, no consideration in relation to timing and receptors has been considered. All drill cuttings will be disposed of in the Exmouth Plateau KEF and therefore level of protection is greater. Note in the description of the Exmouth Plateau (s5.5.1) the features is characterised by internal tides resulting in upwelling known to be strongest during January and March. Oceanographic patterns may need to be considered in relation to discharges. RFFWIEvaluation of impacts for unplanned events are similar as for those for which planned events are evaluated (i.e. chemical discharges, solid waste discharges, seabed disturbance). Evaluation for IMS and collision with marine fauna are suitable for the nature and scale of the risk, and can be managed to acceptable levels. However, see points on issues with EPOs. Further reduction of risk would be undertaken during EP stage when ALARP becomes a consideration. See detailed topic scope for identification and evaluation of unplanned hydrocarbon releases. Evaluation of cumulative impacts does not consider receptor based impacts from multiple aspects of Scarborough e.g. mixing of different discharges in one location. Cumulative impact of light emissions (s8.2.1.2), vessel discharges (s8.2.1.3) and operational fluids (s8.2.1.4) are unsupported and do not properly evaluate light from multiple construction vessels particularly during pipelay on the inshore section for receptors such as seabirds and turtles. Section 8.2.2.2 on cumulative impacts on the biological environment is unsupported and qualitative. For example, description of light states that light density will be less than 1 and 0.03 lux at distances of 300m and 1.4 km, but that light from vessels will not interact because of a 500 m exclusion zone, however, this is not explained. Similarly the submission states that there maybe cumulative effects of multiple vessel noise on marine turtles but then makes a statement that impacts will be short term and locations which is completely unsupported. This applies to all other receptors considered. Some receptors not considered e.g. light on seabirds. RFFWIAdopted controls in Table9.3 are not well linked to impact evaluations to justify specific parameters applied e.g.

Noise emissions - potential impacts on PBW
Context:
RFFWI 1 Item # 14 requested a description of how 'all relevant legislative requirements will be met by the environmental management for the Scarborough Project for each of the aspects evaluated in the OPP'. The Blue conservation management plan 2015 (statutory recovery plan for blue whales) requires that 'Anthropogenic noise in biologically important areas will be managed such that any blue whale continues to utilise the area without injury and is not displaced from a foraging area'. The OPP acknowledges that the FPU location is within the pygmy blue whale (PBW) distribution BIA, within 36 km of a migration BIA and that migrating individuals may traverse the Offshore Project Area. The peak of the southbound PBW migration is over the period November to December and the peak of the northbound migration is over the period of May to June. Based on underwater acoustic modelling the OPP predicts that 'Cumulative Sound Exposure Levels (SEL24h) from driven piling in the Offshore Project Area are estimated to exceed threshold criteria for PTS and TTS for low frequency cetaceans at maximum depth distances of 34 km and 99 km (Rmax),

respectively'. The OPP also includes commitments to manage pile driving by implementing a soft start procedure at the commencement of piling activities and shut down zones during the activity. (OPP, Table7.25).
Issue:
The OPP does not demonstrate that proposed pile driving will be carried out in a manner such that impacts to PBWs will be of an acceptable level. This is because the control measures proposed are not demonstrated to be effective in preventing injury in to blue whale in BIAs and ensuring the OPP is not inconsistent with the recovery plan for this species.

Artificial light - potential impacts on marine turtles
The acceptable level - This includes to not modify, destroy, fragment, isolate or disturb an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity results.
Table 6.3 - States that there are there are no Management Plans, Recovery Plans or Conservation Advice related to ambient light.
Issue:
The OPP has not demonstrated that the received levels of light within habitats critical for survival (including nesting beaches) associated with trunkline installation and borrow ground activities will be of an acceptable level. This is because:
The OPP predicts the attenuation of light in lux (a measure of light specific to human light sensitivities) (section 7.1.1.2) which is not a biologically relevant metric for determining the intensity and extent of light that may result in marine turtle behavioural disturbance;The OPP does not predict received levels of light at key nesting beaches (i.e. Rosemary Island and Legendre Island) considering biologically-relevant wavelengths and intensity metrics relevant to marine turtle visual perception ranges and disturbance thresholds.;The study referred to in the evaluation (Woodside Study 2014) is not justified as an appropriate source of information with which to inform the impact evaluation as there is no information given that demonstrates the representativeness of that study to the proposed trunkline installation and borrow ground activities (e.g. background light environment, existing lighting design and mitigation/management of the light sources and light emission intensity and directionality); andThe evaluation does not adequately consider the effects of light from trunkline installation and borrow ground activities on nesting females and hatchlings.Planned liquid discharges
Cooling water
The FPU is located in the Exmouth Plateau KEF important for biological productivity in the region (DEWHA, 2008a). Internal waves are considered to occur more frequently and to be stronger during the wet and dry seasons. High productivity events are sporadic although high chlorophyll-a concentrations coincide with high catch rates for pelagic and demersal fish. Key sources of impact to the KEF from the project include operational discharges and drill cuttings disposal.
The zone of potential effect is estimated to be a 2.5km radius from the discharge point for cooling water. The OPP demonstration that this level of impact is acceptable because:
- The location of the discharge is not within an important habitat for a migratory fish species and as such there is no predicted impacts to any important habitats.
- The plume will conservatively (based on the maximum diameter and horizontal extent and 99% species protection at 99th percentile) cover an exposure area
within the top 30 m of water of 5.48 km2 of the 49,310km2 (approximately 0.01%) of the Exmouth KEF.
- While the discharge is to occur within the Exmouth Plateau KEF, this is at a significant distance (>50 km) from the location that has been identified as having increased productivity according the Brewer et al., 2007. Subsequently it is not anticipated that this discharge will result in impacts to the ecological integrity of the KEF
- Given low predicted impact to fish, and low levels of commercial and recreational fishing at the Offshore Project Location, there is no predicted impact to fisheries targeting the offshore fisheries.
The OPP has demonstrates that impacts from cooling water can be managed consistent with EPO 3.5: Undertake Scarborough drilling activities in a manner that prevents significant impacts on the values of the Exmouth Plateau KEF.
Produced water
The OPP predicts that for TPH to reach the ANZECC and ARMCANZ guideline value of 0.07mg/L the maximum horizontal distance from the discharge source is 810m and a width of 1-4 m. As such, any potential impacts to water quality are expected to be limited to within relatively close proximity of the source of the discharge where concentrations are highest. This statement has been supported by plume dispersion modelling . The OPP predicts that impacts from produced water discharges will not have impacts on sediment quality (OPP, p529).
Although the alternatives analysis states that treatment options to manage the impact of discharging produced water including tertiary treatment, comingling with seawater return and discharge depth are currently being investigated with a goal of reducing the impact to ALARP, there are no commitments in Table7.47 that commits to the treatment of produced water. Given the OPP demonstrates that impacts will be of an acceptable level, the level of treatment requires to meet the mixing zone requirements will be the subject of an EP

assessment where the application of the ALARP principles can be tested.
Hydrotest water discharge:
On the basis that modelling predicts that hydrotest water will potentially have toxicity effects as far as 1.56 km from the discharge points, on on the basis that there is potential for seasonal upwellings and periods of higher productivity coinciding with blue whale presence,
GHG emissions and climate change
Context
Scarborough OPP key points in relation to GHG emissions associated with third party consumption of Scarborough gas:
The total lifecycle of GHG emissions from Scarborough would be in the range of 0.04-0.11% of global GHG emissions depending on the national determined contributions (NDCs) (Table 7.12)
The emissions generated from third party consumption are forecast at an average of 25.11 MT pa and 778.53 MT for the expected field life.
Scarborough project will be supplying existing gas markets (China, Japan, India and South-east Asia)
Each year the International Energy Agency (IEA) publishes a World Energy Outlook (WEO). The WEO has included a Sustainable Development Scenario (SDS), which describes an energy system for mitigating climate change, providing universal energy access by 2030 and reducing the severe health impacts of air pollution.
The WEO SDS shows that natural gas continues to increase in key Asian markets until at least 2040 (the end of the modelled period (Figure 7-8)). In the consumer countries relevant to Scarborough (via Pluto), gas consumption is predicted to grow by 130% between 2017 and 2040. Third party consumption of gas will continue irrespective of Scarborough's availability in these markets.
Because of the projected natural gas consumption in Scarborough gas consumer countries, GHG emissions resulting from consumption of Scarborough gas are not a substantial cause of the level of emissions in the target markets.
Failure to supply Scarborough gas to the target markets may result in electricity generation from higher carbon intensity fuels.
It is concluded that the Scarborough project will not facilitate to a major extent the third party consumption of gas and associated emissions.
In making its decision, NOPSEMA has had regard to the meaning of 'impact' under section 527E of the EPBC Act and EPBC Policy statement 'Indirect consequences' of an action. In determining whether GHG emissions generated by third parties (secondary actions) are assessable as an 'impact' NOPSEMA has considered Woodside's assertions that:
(a) the emissions resulting from consumption of Scarborough gas are not a substantial cause of the level of GHG emissions in the jurisdictions target markets; and
(b) the Scarborough (the primary action) will not facilitate to a major extent the consumption of Scarborough gas and subsequent release of GHG emissions to the global atmosphere.
Issue: Based on the available information in the OPP (summarised above) NOPSEMA has not been able to determine whether GHG emissions generated through the consumption of Scarborough LNG are considered an 'impact' assessable under the EPBC Act / NOPSEMA's EPBC Program because:
A level of importance is attributed to markets for the Project's product and the emissions control frameworks that are applicable in those markets. It is noted that the OPP states that China is currently receiving product, and that there is growing demand in China, India, Japan and South East Asia (Figure 7-8). However, this information appears to be provided by way of general background, and not specific to the Project. End user countries are not adequately identified and are the applicable control frameworks in those countries are not described.Taken together, content of the OPP which indicates that1) failure to supply gas to target markets, including gas specifically from the Project, may result in an increase in electricity generation from higher carbon intensity fuels, and 2) a 'growing international demand' for gas could be interpreted as being inconsistent because it could be construed that the claimed potential benefits of natural gas in emissions reduction would be compensated for by a growing demand for and increased use of gas over time.Based on the available information in the OPP (summarised in the context above above) NOPSEMA has not been able to determine whether GHG emissions generated through the consumption of Scarborough LNG are considered an 'impact' subject to assessment and decision making under NOPSEMA's EPBC Program because the following statements are not substantiated:
- the emissions resulting from consumption of Scarborough gas are not a substantial cause of the level of GHG emissions in the jurisdictions target markets; and
- the Scarborough project (the primary action) will not facilitate to a major extent the consumption of Scarborough gas (secondary actions) and subsequent release of GHG emissions to the global atmosphere.The example statements above contain general references to the assessments and conditions applicable to the Pluto LNG Facility, but do not contain sufficient detail in relation to how these documents and associated GHG mitigation measures apply to the Project. As the OPP should be a complete and standalone assessment, to the extent that WEL's would like NOPSEMA to consider information included in the assessment documents prepared in relation to Pluto, this information should be included in the OPP, with such updates as may be necessary to ensure its currency.In the

event that GHG emission generated by third-party consumption of Scarborough gas in overseas markets (secondary actions) are determined to be impacts of the Scarborough project, the OPP will need to provide a robust demonstration that these impacts will be mitigated and managed to an acceptable level. In addition, a relevant EPO will be also need to be provided in this circumstance.
Scope 1 and 3 in Australian jurisdiction
Context:
The management of Scarborough GHG emissions (scope 1 and scope 3) emitted within Australian jurisdiction will be compliant with Australian Greenhouse Gas management frameworks, specifically the National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015 (Cth) (SGM) made under the National Greenhouse and Energy Reporting Act 2007 (Cth) (NGERS) (administered by the Clean Energy Regulator (CER) (Ref)). WEL will comply with Australian legislation by keeping GHGe at or below the emissions baselines set by the Clean Energy Regulator or dealing with any excess emissions accordingly (s6.5).
By complying with the Australian government's GHG management framework and based on scope 1 estimates, the GHG emissions produced as a result of contracting, extracting, producing and exporting Scarborough LNG (Scope 1 and scope 3 in Australian jurisdiction, Table 7-6) is not expected to impact Australia's ability to meet NDC commitments of the Paris Agreement.
The project will be managed consistent with the principles of ESD because WEL consider Scarborough gas to be a clean and reliable energy source of energy that is expected to play a key role in the future energy mix (as a partner to renewables). In addition, gas has the potential to contribute significantly to the reduction in global GHG emissions by displacing higher carbon intensive power generation (e.g. coal burning).
WEL will manage the project to meet the following EPO 'Optimise efficiencies in air emissions and reduce Scope 1 (SJV) greenhouse emissions to ALARP and Acceptable Levels'.
Finding:
NOPSEMA is reasonably satisfied that Woodside has demonstrated that GHG emissions Scarborough Project will be acceptable to because:
The NGER Safeguard Mechanism is the Australian government's current GHG management framework that is in place to meet Paris Agreement greenhouse gas reduction obligations. WEL has demonstrated that they will comply with the NGER framework and other relevant requirements such as the greenhouse gas abatement requirements of WA Government's approval of the Pluto LNG project (Ministerial Statement 757 for the Pluto LNG project).Pluto LNG GHG emissions generated through processing Scarborough GHG have been assessed and approved by the WA government (Ministerial Statement 757).The Scarborough project (Scope 1 emissions upsteam) represents 0.06% of Australia's cumulative emission budget for the period of 2021-2030 to reach the 26% reduction target (DoEE, 2018).The CO2 concentration in the Scarborough, Thebe and Jupiter reservoirs is considered relatively insignificant (0.1mol%) compared to reservoirs produced from recent offshore projects in the region (OPP, s7.1.3.1) and will not have an unacceptable impact on the local or regional airshed.Ongoing commitments to further reducing GHG emissions to ALARP are reflected in WEL's greenhouse gas environmental performance outcome (EPO) and can be further managed through continuous improvement provisions for subsequent environment plans.Issues:
The OPP does not sufficiently make the case that the scarborough project will noty a carbon budget approach is appropriate and proposes that internationally agreed science has established that the amount of emissions allowable to maintain a safe climate has already been exceeded and therefore all future developments should achieve net zero GHG emissions. The energy efficiency measures listed in the OPP (allowance for battery energy storage system, waste heat recovery unit, gas-gas exchanger, flow coated trunkline, turbine and equipment selection) are not sufficient to achieve the current environmental performance outcome of reducing GHGe to ALARP and Acceptable Levels because there is no inclusion of control measures to avoid, reduce or offset the Proposal's GHG emissions. Conclusion
Based on the available information in the OPP (summarised in the context above above) NOPSEMA has not been able to determine whether GHG emissions generated through the consumption of Scarborough LNG are considered an 'impact' subject to assessment and decision making because the following statements are not substantiated in the context of the Indirect consequences policy (section 527E, EPBC Act).
• the emissions resulting from consumption of Scarborough gas are not a substantial cause of the level of GHG emissions in the jurisdictions target markets; and
• the Scarborough project (the primary action) will not facilitate to a major extent the consumption of Scarborough gas (secondary actions) and subsequent release of GHG emissions to the global atmosphere.

Artificial light impacts on marine turtles (letter point 11)
Section 7.1.1 has been updated to include a detailed evaluation of light emissions summarised as follows:
The OPP recognises that skyglow is the diffuse glow caused by light that is screened from view but through reflection and refraction creates a glow in the atmosphere. Scattering of light by dust, salt and other atmospheric aerosols increases the visibility of light as skyglow

while the presence of clouds reflecting light back to earth can substantially illuminate the landscape. Modelling has been undertaken for two representative vessel types using ILLUMINA Artificial Light At Night (ALAN) methodology presented in Aube et al., (2005) against the nearest turtle nesting habitat to the Trunkline and Borrow Ground Project Areas. The ILLUMINA model is a three-dimensional model that accounts for both line of sight and atmospheric scattering, allowing the attenuation of light over distance and extent of light glow to be modelled. Four scenarios were considered associated with trunkline installation and stabilisation activities. Details are presented in appendix LReceptors within a 20 km buffer of project light sources were considered potentially impacted based on recommendations of the National Light Pollution Guidelines for Wildlife (Commonwealth of Australia (2020)).According to Table 7-1, impacts to marine turtles from trunkline installation activities may occur over a period of ~8 months.Applying the potential impact criteria in Table 2-1 of Appendix L to the borrow ground activity, the results show that at ~4.7 km from the source light levels have reduced to ambient. At distances between ~ 1.5 km and 4.7 km from the source, radiance is equivalent to between 0.1 and 0.01 radiance of a full moon and, therefore, light may be visible but unlikely to result in a behavioural impact. Impacts may occur within ~1.5 km of the trailer suction hopper dredge (borrow ground site), depending on moon phase, and are more likely within ~0.5 km of the TSHD, when radiance is equivalent to that of one full moon.When applying the potential impact criteria in Table 2-1 the results show that, at ~5.7 km from the source, radiance has reduced to ambient. At distances between ~ 1.8 km and ~5.7 km from the source, radiance is equivalent to between 0.1 and 0.01 radiance of a full moon and, therefore, light may be visible but unlikely to result in a behavioural impact (i.e. biologically relevant). Impacts may occur within ~1.8 km of the pipelay vessel, depending on moon phase, and are more likely within ~0.6 km of the vessel, when radiance is equivalent to that of one full moon (Appendix L)The OPP has been able to demonstrate that background light will be achieved at nesting beaches (including Delambre and Rosemary), providing confidence that hatchlings and nesting turtles are highly unlikely to be impacted by the light glow associated with the borrow ground and trunkline activities.While there is potential for pipelay vessels and dredging vessels to increase light levels above ambient light levels as far as 5740m and 4730m respectively (Table 7-3) (based on light levels of 0.01 radiance and above), the OPP appears to limit the area of impact (i.e. distance at which hatchlings could be attracted) to 1.7 and 1.4km respectively (Table 7-3) using the 0.1 and above threshold (1/10 of a full moon). Acceptability

The proponent's acceptability assessment is based on modelling results and draws the following conclusions using relevant scientific literature:

In-water life stages

There is no evidence, published or anecdotal, to suggest that internesting, mating, foraging or migrating turtles are impacted by light from offshore vessels. As such, light emissions from the vessels are unlikely to result in displacement of, or behavioural changes to, individuals in these life stages. Although individuals undertaking internesting, migration, mating or foraging may occur within the operational areas, marine turtles do not use light cues to guide these behaviours.Flatback turtles generally demonstrate internesting displacement distances of 3.4 – 62 km from the nesting beach, typically confined to longshore movements in nearshore coastal waters or traveling between island rookeries and the adjacent mainland (Whittock et al. 2014).Pendoley (2005) provides details of tracking data for green and hawksbill turtles nesting on Rosemary Island. Results suggested that nesting female hawksbill turtles remained within 1 km of nesting beaches on Rosemary Island (Pendoley, 2005). Female green turtles travelled greater distances, up to 5 km, but typically remained within shallow, nearshore waters between0 and 10 m deep (Pendoley, 2005). Based on scientific literature, the OPP was able to demonstrate that impacts to marine turtles from artificial light during in-water life stages will not be inconsistent with the recovery planNesting

At the closest point to Rosemary Island (14 km), maximum radiance from the project vessels is equal to 0.003 (0.3%) that of a full moon. At the closest point to Legendre Island (6.6 km) the maximum radiance is equal to 0.005 (0.5%) that of a full moon. It s on these grounds that the OPP concludes that modelled lighting levels at the nearest receiving beaches to project areas are well below levels where possible impacts to nesting turtle behaviour can be expected (Table 7-2). [C]Based on the modelling and an evaluation interpreting the modelling using appropriate light impact thresholds, the OPP is able to demonstrate that the ~8 month pipeline installation activity is not likely to impact nesting turtles and is theretofore not inconsistent with the recovery plan.

Hatchling emergence

The OPP recognises that hatchling orientation has been shown to be disrupted by light produced at distances of up to 18 km from the nesting beach (Hodge et al. 2007, Kamrowski et al. 2014), although the degree of impact will be influenced by a number of factors including light intensity, visibility (a function of lamp orientation and shielding), spectral power distribution (wavelength and colour), atmospheric scattering, cloud reflectance, spatial extent of sky glow, duration of exposure, horizon elevation and lunar phase. Disruption to orientation of emerging hatchlings has been found to occur most often during new moon phases and least frequent during full moon phases (Salmon & Witherington, 1995). Light modelling of representative project vessels has indicated that light will not be at levels likely to impact turtle behaviour at nesting beaches within 20 km of

the Trunkline or Borrow Ground Project Areas ( Appendix L). Given the predicted level of light emissions from project activities, the distance to turtle nesting habitat and the temporary nature of the trunkline installation and stabilisation activities, the OPP concluded that impacts to turtle hatchling seafinding behaviour resulting from vessel lighting are not predicted.

Hatchling dispersal

Once in nearshore waters, artificial lights can also interfere with the dispersal of hatchlings. Presence of artificial light can slow down their in-water dispersal (Witherington & Bjorndal, 1991; Wilson et al., 2018), increase their dispersion path, potentially depleting yolk reserves, or even attract hatchlings back to shore (Truscott et al.,2017).In addition to interfering with swimming, artificial light can influence predation rates, with increased predation of hatchlings in areas with significant skyglow (Gyuris 1994; Pilcher et al 2000). In the absence of wave cues however, swimming hatchlings have been shown to orient towards light cues (Lorne & Salmon 2007, Harewood & Horrocks 2008) and in some cases, wave cues were overridden by light cues (Thums et al. 2013; 2016; Wilson et al., 2018). When tidal influences were considered, modelled currents around the Dampier Archipelago and Montebello Islands ranged from  Should light emissions be at a level that results in attraction, green and flatback hatchlings may be able to swim against currents towards the vessel light sources. However, given that the vessels will only be present for approximately two hours at a time within the Borrow Grounds Project Area, any attraction will be temporary, and once vessels have left the Project Area, the OPP concludes that dispersing behaviour would continue under natural conditions. Since the distance between Legendre Island and the Trunkline Project Area is 12 km, the number of hatchlings emerging from Legendre Island occurring within the Trunkline Project Area is likely be a small proportion of the total number emerging from the closest nesting beaches.The OPP consolidates the acceptability case by concluding that in the unlikely event that dispersing hatchlings from Rosemary Island or Legendre Island are carried by currents into the vicinity of the project vessels and become attracted to sources of artificial light, the impact will be temporary in that attraction will only occur during hours of darkness; following sunrise or the vessel departing the area, the attraction will cease and normal expected patterns of hatchling dispersal will return.Although attraction to light sources may have consequences at the individual level (e.g. energy depletion and increased predation risk), the numbers that could be impacted are highly unlikely to comprise a significant proportion of the annual number of hatchlings emerging from the nesting beaches. The area that may result in light levels that may attract hatchlings is 0.6 km of the pipelay vessel and ~0.5 km of the TSHD.The distance from the pipelay activity to turtle nesting beaches is 14.15km and 12km (Rosemary and Legendre islands respectively) and the distance between the borrow ground activity and nesting beaches (14.15km – Rosemary and 6.6km – Legenrdre).Noting the intermittent nature of the borrow ground activities, the distance between nesting beaches and the area of potential impact, the relatively small area of impact (0.5m from the source) it is highly unlikely that hatchlings would be attracted to this light from the borrow ground and trunkline installation activities and unlikely that there would be an adverse impact on biologically important behaviours.  To address any uncertainty in the evaluation in relation to the light sources associated with dredges and pipeclay vessels, NOPSEMA will require the further demonstration that predicted light impacts will remain of acceptable level when specific light sources are better characterised. This may include the need for the adoption of control measures (e.g. light shielding, light type, seasonal timing) should these be required in order to demonstrate that the borrow ground and trunkline installation activities will be managed to as low as reasonably practicable (ALARP), to an acceptable level and consistent with the principles of ESD.

Conclusion

Based on the impact evaluation provided, the project has demonstrated that it will not be inconsistent with the recovery plan for marine turtles because:

There is unlikely to be an affect on nesting turtles informed by light modellingThere is unlikely to be an effect on hatchlings emergence (misorientation of disorientation)There is no published literature to indicate that artificial light interferes with foraging, migration or internesting behaviours and therefore the trunkline and borrow ground activities are unlikely to affect biologically important behaviours. While there is potential for changes to light on water to attract dispersing hatchlings, this is short-term with a low likelihood of occurrence given the distance of the activities to the nesting beaches. With regard to the marine turtle recovery plan, including but not limited to its objectives, threats and action areas, the OPP demonstrates that the activity will not result in impacts that would be inconsistent with the National Recovery Plan for marine turtles.

Underwater noise and blue whales

To address letter point 10, the titleholder has included the following EPO:

EPO 4.4: Impact piling activities will not occur during the months of May and June, and November and December to avoid peak migration periods of the pygmy blue whale.

The OPP has adopted this outcome to address letter point 10.

Conclusion

By including this commitment, underwater noise generation at levels that may cause injury or displacement (i.e. received levels that would have potential to be inconsistent with the

blue whale recovery plan), will not take place during peak northern and southern migration of PBW. In addition, the migrating/ foraging BIA is not spatially restricted and avoidance behaviours during migration should there be whales present, would aid in preventing injury. The OPP demonstrates that the project is unlikely to injure or displace blue whales from foraging when in biologically important areas which provides NOPSEMA with confidence that the proposed project can be managed so that it is not inconsistent with the blue whale recovery plan.

GHG emissions

GHG calculations

The total scope 1 emissions are approx 0.47 mtCO2e annually and 11.52 MTCO2-e total. All reservoir CO2 emissions from the Pluto LNG facility are required to be offset under current onshore approvals (Table 7-17, 87.97MT for the expected field life).

Total emissions are provided in Table 7-12, Table 7-13, Table 7-15 (scope 1); Table 7-17, Table 7-19, Table 7-20. The methods used are provided in Table 7-18. i.e. NGERs methods (scope 1 = methods 1 2; scope 3 – Table 7-18 (third party consumption NGER Schedule 1 (Consumption) S3.80 (Distribution).

The OPP quantifies scope 3 emissions predicted from customer use and transport using an emission factor sourced from Ecoinvent v3.5 database (Table 7-18). According to the OPP, this follows an international standard for life cycle assessments. For calculating the consumption of domestic gas produced from Scarborough, an emissions factor has been developed based on NGERs measurement and determination (s3.76) and are negligible.

Evaluation of GHG emissions

The OPP recognises that climate change is caused by the concentration of GHG emissions in the global atmosphere. The OPP makes a case that natural gas from Scarborough is expected to support an overall reduction in net global atmospheric concentration by displacing more emissions-intensive fuels (OPP, 7.1.3). The OPP has included the quantification and evaluation of scope 3 GHG emissions as part of this OPP. NOPSEMA has had regard to EPBC 1999 (CTH) Policy Statement 'Indirect consequences' of an action: Section 527E of the EPBC Act and in doing so deems that scope 3 emissions of the Scarborough project are an indirect consequence that that facilitate the generation of scope 3 GHG emissions to a major extent. As such, scope 3 emissions are considered potential impacts and are assessable under this OPP.

Based on the calculations of GHG emissions in the OPP, total third party consumption estimates are 778.53 CO2-e MT for the total expected field life (Table 7-19). Table 7-20 summarises the total Scarborough GHG emissions over the total expected field life (total scope 1 and scope 3 = 878.02 MtCO2e). This has then been couched in the context of Scarborough's contribution to global emissions and shows that Scarborough's contribution is approximately 0.11% of total global GHG (MTCO2/yr) for scope 3 and 0.002% of global emissions using IEA scenarios.

Figure 7-9 shows a relative comparison of life cycle emissions intensity from various electricity generating technologies. This indicates that the median intensity of natural gas is over 250g of Co2e/kWh less than the median energy intensity of oil generated power and half of the median value of the of coal. What this also shows is have significantly more emissions intensity natural gas power generation is compared to electricity generation from renewable resources.

However, the OPP discusses the important role of natural gas in the context of the global reduction in net GHG emissions expected from the use of

Scarborough gas as a cleaner energy source than other transportable, dispatchable fuel options and in supporting a progressive transition to renewable energy. The OPP concludes that Scarborough gas is expected to contribute to lower net atmospheric concentrations of GHGs than would otherwise be the case if Scarborough were not developed (OPP, p390). This conclusion is supported by the following:

Within Asia, the International Energy Agency (IEA) forecasts suggest that most future gas demand in Asia is in China, India, Japan and Korea, and 'Other developing Asia' (IEA, 2019). These regions have therefore been selected as likely customer markets. Scarborough is geographically positioned to provide LNG to Asian markets, so it's unlikely that material amounts of Scarborough LNG will be consumed in Europe, which is the other major importer. This does not preclude sales of Scarborough gas to other customers.The IEA concluded that coal to gas switch helped avoid the emission of 100 MtCO2-e to the global atmosphere (IEA, 2020). Coal-fired power generation continues to be the single largest emitter, accounting for 30% of all energy-related carbon dioxide emissions.There is evidence in the WEO 2019 report that natural gas has displaced some demand for coal generated electricity, particularly in China and USA. https://www.iea.org/reports/global-energy-co2-status-report-2019/natural-gas#abstract Given Scarborough is geographically positioned to provide LNG to Asian markets and the IEA forecasts indicate a growing demand for natural gas in Asian markets, the OPP asserts that natural gas will displace the demand for coal / oil generated power in these markets. The IEA 2020 report concludes 'The switch from coal to gas accounted for over one-fifth of the rise in gas demand. The United States led the growth followed by China'. Driven by economics and policies, coal-to-gas switching avoided almost 60 Mt of coal demand, with the transition to less carbon-intensive natural gas helping avert 95 MtCO2-e. Without this coal-to-gas switch, the increase in emissions would have been more than 15% greater (IEA, 2020) The OPP discusses the limitations to to the growth in renewables noting that the target markets of Scarborough gas (India, Japan,

Pacific ex Australia and SEA) cannot build sufficient renewables to meet the projected 2050 energy demand and where this occurs, gas is expected to be an important part of the decarbonised energy supply. All likely customers for Scarborough gas are in countries that have ratified the Paris Agreement. Under the Paris Agreement and global GHG accounting conventions, each country is responsible for accounting for, reporting and reducing emissions that physically occur in its jurisdiction. There are international frameworks in target markets under respective NDCs (OPP, p432).[NOPSEMA notes that the statement that 'All likely customers for Scarborough gas are in countries that have ratified the Paris Agreement' is only partially correct. One of the anticipated Asian markets is China who which provides the following limitation to their ratification of the Paris accord the Agreement applies to the Hong Kong Special Administrative Region and the Macao Special Administrative Region of the People's Republic of China." While NOPSEMA recognises the OPP's misrepresentation of the ratification of target market countries to the Paris accord, NOPSEMA has had regard to during in its decision making.]In accordance with the Paris Agreement, these countries are required to update their NDCs, to "reflect its highest possible ambition", by 2025. These measures constitute examples of how third party emissions associated with the combustion of Scarborough gas will be managed and mitigated in customer nations. [NOPSEMA notes that while there is limited information presented in the OPP on mitigation measures that will apply to export markets, this is addressed by the Paris Agreement as the global mechanism for reducing GHG emissions and the measures proposed by WEL to address uncertainty in their prediction that 'Scarborough gas is expected to contribute to lower net atmospheric concentrations of GHGs than would otherwise be the case if Scarborough were not developed']The role of gas will increasingly be to supplement domestically produced renewables. The evaluation of the demand for the product is largely based on International Energy Agency (IEA) World Energy Outlook (WEO). The WEO has included a Sustainable Development Scenario (SDS), which describes an energy system for mitigating climate change, providing universal energy access by 2030 and reducing the severe health impacts of air pollution. It recognises that there are limits to the growth of renewables. CSIRO (2017) surveyed literature from global regulatory agencies and collated data showing that many of the potential markets for Scarborough gas (India (IND), Japan (JPN), OECD Pacific ex Australia (PAO) and South East Asia (SEA)) cannot build sufficient renewables to meet their projected 2050 electricity demand. Where growth of renewables is constrained, gas is expected to be a particularly important component of efforts to decarbonise energy supply.[NOPSEMA recognises that there is uncertainty in the role that natural gas will play in reducing global emission and achieving the WEO SDS. This uncertainty is recognised in the WEO 2019 report e.g.World Energy Outlook 2019 states 'In the Sustainable Development Scenario, natural gas consumption increases over the next decade at an annual average rate of 0.9% before reaching a high point by the end of the 2020s. After this, accelerated deployment of renewables and energy efficiency measures, together with a pickup in production of biomethane and later of hydrogen, begins to reduce consumption' https://www.iea.org/reports/world-energy-outlook-2019/gas#abstract The IEA report states that "the use of renewables needs to expand much more quickly in all three sectors to be on track to meet long-term climate goals, cleaner air objectives, and aims to provide access to modern energy sources, as demonstrated in the IEA Sustainable Development Scenario (SDS)"Figure 5 of the 2019 WEO (IEA, 2019) report indicates that energy efficiency and renewables were responsible for avoiding approx. 215MT of emissions led by China and Europe.CSIRO report indicates that China (one of the target markets) is able to meet 300% of energy demand by various renewable technologies by 2050. (Electricity generation technology cost projections 2017-2050 Jenny A Hayward and Paul W Graham December 2017 https://publications.csiro.au/rpr/download?pid=csiro:EP178771&dsid=DS2). At this point in time, the project is expected to extend beyond 2050 with a 40 year project life. This uncertainty, particularly in relation to the long-term role natural gas plays in reducing GHG emissions and replacing higher energy intensive fuels, increases beyond 2030. However, the proponent has recognised the uncertainty and has proposed mitigation / management measures (OPP, Rev5 390-392) with a commitment to monitoring global energy outlooks and emerging regulatory change in order to adapt business plans and strategies for changing expectations and to manage risk].Impacts associated with GHG emissions

The OPP concludes that, due to the high level of complexity and numerous variables associated with climate and ecological processes and the relatively small contribution to global GHG emissions from Scarborough, it is not considered feasible to correlate the potential impact of Scarborough GHG emissions on receptors, including MNES (be that impact negative or positive in the case of replacing higher carbon fuels). Specifically, the OPP concludes that it is not possible to link GHG emissions from Scarborough with climate change or any particular climate related impacts given:

• That it is the net global GHG concentrations that cause climate change and climate related impacts;

• The estimated scope 1 and scope 3 emissions associated with Scarborough are negligible in the context of existing and future predicted global GHG concentrations;

• The inability for a project proponent to precisely predict the amount of total future global GHG emissions;

• The inability for a project proponent to predict future national and international initiatives

on climate change and the impact they will have on total future global GHG emissions, including Scarborough emissions.
NOPSEMA recognises the difficulties and challenges presented in establishing an identifiable and measurable causal link between the project's GHG emissions and a rise in global temperature. The OPP asserts that Scarborough gas is expected to contribute to lower net atmospheric concentrations of GHGs than would otherwise be the case if Scarborough were not developed. The uncertainties in the above prediction are addressed by WEL's commitments to management and mitigation.
An evaluation of the potential impacts of a rise in global temperature and climate change impacts on the ecological and socio-economic values in Australian jurisdiction is provided in section 7.1.3.8. Through the assessment of the OPP NOPSEMA has had regard to these potential impacts and while there is no direct causal link made by the proponent between the Scarborough project's emissions and these impacts, a precautionary approach has been taken by the proponent by committing to adaptive management in the event the OPP predictions that Scarborough gas is expected to contribute to lower net emissions of GHG is proven to be unfounded and not released.
Evaluation conclusion and proposed management
The evaluation concludes that the expected role of Scarborough gas in reducing net global atmospheric concentrations supports the environmental acceptability of the project. In addition, WEL has applied the mitigation hierarchy to the mitigation of GHG. These include (OPP, p389-390):
Direct emissions
Energy efficiencies to reduce direct emissions to ALARP The FPU will be designed to have no continuous operational flaring, consistent with Woodside's implementation of the World Bank Zero Routine Flaring Initiative for oil projects Facility specific management plan which will be developed prior to the operational phaseAnnual setting of energy efficient improvements and flare reduction targets Reporting GHG emissions and energy use from the offshore facilities in accordance with its requirements under the NGER Act and will be subject to the safeguard mechanism. Scope 1 emissions will be managed consistent with national frameworks i.e. Australia's primary policy to manage Scarborough GHG emissions is the Safeguard Mechanism. This requires any Scope 1 emissions above a facility specific baseline to be offset; and GHG emissions from onshore processing are covered under other appropriate legislation and approvals, for example the Pluto Ministerial Statement757 and Greenhouse Gas Abatement Program and the proposed North West Shelf Project Extension (under assessment)Indirect emissions from process onshore
Condition 12 of MS 757 - GHG Abatement Program Offsetting reservoir CO2 emissions – The indirect GHG emissions associated with reservoir CO2 at the Pluto LNG Facility (which will include processing of Scarborough gas) is offset, as required under Ministerial Statement 757. In addition, despite the tie-in of the Scarborough field to the Pluto facility, emissions will not the values approved under Ministerial Statement 757 (Figure 7-12, p388). Adoption of methane guiding principlesThird party emissions
As articulated above, Scarborough gas is expected to contribute to lower net atmospheric concentrations of GHGs than would otherwise be the case if Scarborough were not developed (OPP, p438 track version). On the basis that climate change, and the policy response to it, has evolved rapidly and is expected to continue to do so, WEL proposes a suite of management and mitigation measures to address uncertainty and are considered by the proponent to be appropriate given WEL does not have control over third party GHG emissions. These mitigation and management measures have been taken into account noting that WEL does not have operational control over third party GHG emissions.
Therefore proposed mitigation measures include (OPP, p390-392):
Promotion of methane guiding principles Actively pursuing opportunities to promote LNG in displacing higher carbon intensity fuels noting LNG is predicted to provide a growing amount of energy into the global mix in a decarbonising economy. A program to develop and deploy new technologies to substitute carbon intensive fuels such as LNG fuel research and opportunities to produce and export hydrogen on a commercial scale. Advocacy - engaging and advising legislator and regulators to support frameworks to transition to lower-carbon future. e.g. Paris Agreement i.e mechanisms for increasing GHG reduction ambitions through successive NDCs. Support for market mechanisms such as carbon pricing, Advocate for the development of effective domestic and international offset markets; Maintain membership of relevant international climate related business advocacy groups A program to continue to monitor and report on the global energy outlook including the demand for lower carbon intensive energy such as LNG. continued monitoring and adaptive management are expected to remain a central part of Woodside's approach to climate change. Acceptability
The OPP has used a global perspective to evaluate emissions and associated potential impacts. This recognises the global scale of emission and impact and recognisees the global need for climate change management, efforts and policy response. The OPP recognises the inherent uncertainty associated with climate change, and that the policy response to it, has evolved rapidly and is expected to continue to do so. Therefore, Woodside proposes to adopt a range of management and mitigation measures to addressing the uncertainty. These management measures are taken into account in conjunction with the two relevant EPOs: includes two EPOs and adopted controls (s7.1.3.10):
EPO 3.1: Optimise efficiencies in air emissions and reduce direct GHG emissions to ALARP

and Acceptable Levels.
EPO 3.2: Actively support the global transition to a lower carbon future by net displacement of higher carbon intensive energy sources
To demonstrate that these EPOs can be met, the following mitigation, management and monitoring measures are commitments in the OPP:
Gas (including Scarborough) is expected to play a key role in the future energy mix needed to contribute to an incremental reduction in global emissions by displacing more carbon intensive power generation. Contribution to the IEA's sustainable development scenarioAustralia's NDC is to reduce emissions by 26-28% below 2005 levels by 2030. The federal government's plan to meet the NDC already considers the emissions from processing Scarborough gas through an onshore LNG plant. GHG emissions from onshore processing are covered under other appropriate legislation and approvals, for example the Pluto Ministerial Statement 757 and Greenhouse Gas Abatement Program and the proposed North West Shelf Project Extension (under assessment).Actively monitor and market the role of LNG in displacing higher carbon intensity fuels.Advocate for stable policy frameworks that reduce carbon emissions.Monitor and report on the global energy outlook including the demand for lower carbon intensive energy such as LNG.WEL will monitor developments in the global energy outlook and emerging regulatory change in order to adapt business plans and strategies for changing expectations and to manage risk.While the information provided about management measures is high level at this stage of the project there is adequate information provided that explains what WEL proposed to do to meet EPO 3.2 in particular through future regulatory approvals process required before activities can take place which provides for the proponent to further detail management measures and have these regularly reviewed and tailored to match circumstances at the time of reviews. The EP assessment and authorisation process requires an evaluation of all activity-specific risks and impacts, including those associated with GHG emissions and global climate change, and will also require the application of the ALARP test. At this EP assessment stage, the regulations provide an additional opportunity to ensure that WEL's commitments to monitor whether their EPO is being achieved and to make clear commitments, in the form of adaptive management, to ensure that actions can be taken should there be evidence to suggest the EPO is not being achieved. Once in an EP, these commitments will be embedded within Petroleum Environmental Law and subject to NOPSEMA's compliance monitoring and enforcement provisions. The OPP has utilised current published and reputable literature that is relevant to the topic of GHG emissions and global climate change to support arguments. While there is a reference missing in the bibliography, it can be inferred / reasonably assumed, that the EIA reference is the World Energy Outlook 2019 IEA (2019), "World Energy Outlook 2019", IEA, Paris https://www.iea.org/reports/world-energy-outlook-2019.
Further, to facilitate consistency in environmental assessments on GHG matters between NOPSEMA and DAWE, NOPSEMA wrote to DAWE on 28 Feb activating information sharing provisions, sharing the GHG chapter with the DAWE and requesting the Department's views on whether 'the information is inconsistent with current views of DAWE regarding possible requirements for its assessment under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) of WEL's evaluation and management of scope 3 greenhouse gas emissions and implications for global climate change for the Browse to Northwest Shelf Project' (A719267). In response to this request, DAWE has replied and indicated 'that there is inherent uncertainty in forecasting future energy mix scenarios and future global policy responses to climate change. This uncertainty will need to be further considered and adaptively managed through the environmental assessment and the environment plan processes' (A723360). This view that is expressed by DAWE is not inconsistent with NOPSEMA's conclusion in relation to the GHG evaluation and acceptability.
NOPSEMA also wrote to DISER on 5 March asking DISER on their views of the Scarborough GHG chapter (Rev 5) in relation to:
- the forecast global energy demand reference in the WEL extract
- the role of natural gas in meeting this demand including any views on uncertainties.
In response, DISER replied to NOPSEMA (latter dated 13 March 2020) stating that their view is consistent with that shared by the IEA that global energy demand will increase into the future and that natural gas is a transition fuel that can replace more emissions intensive fuels. The response also notes that there is significant uncertainty as to the scale and durability of the demand for important LNG in developing markets around the world as the IEA does not quantify or provide a range of this uncertainty. This uncertainty is not mentioned in WEL discussion on the the role of LNG in displacing more carbon intensity fuels. The Department concludes with a view that if, anything, this uncertainty could suggest a downward influence on LNG demand from emerging Asian markets. NOPSEMA has considered these views of DISER and concludes that they are not inconsistent with NOPSEMA's assessment findings and conclusions which identify uncertainty in relation to the long-term demand of LNG globally. NOPSEMA is reasonably satisfied that with the monitoring and management measures in place, WEL will be able to adaptively manage the project to ensure that the EPO 3.2: Actively support the global transition to a lower carbon future by net displacement of higher carbon intensive energy sources will continue to be met.
Conclusion

| | | |
|---|---|---|
| | | NOPSEMA is confident that the uncertainty will be addressed through the measures described and committed to in the OPP. Implementation of these measures will be further defined and applied through environment plans that must be accepted by NOPSEMA prior to any activity relevant to this offshore project commencing.<br>With the proposed management measures in place, including those associated with third party emissions outside of the proponent's operational control, in conjunction with the monitoring and adaptive management commitment and measurable EPOs, the OPP demonstrates that the GHG emissions associated with the Scarborough project will be managed to an acceptable level. Further, NOPSEMA is confident that EP assessment, authorisation and compliance monitoring processes (enshrined in legislative requirements), will provide a statutory mechanism to hold WEL to account for their predictions and monitoring and management, and verify whether WEL continues to demonstrate an acceptable level of impact in accordance with policy, relevant regulatory change and control measures in EPs.<br>**********<br>Overall conclusion<br>An evaluation of predicted levels of impact against the defined acceptable levels of impact have been undertaken for all higher order impacts and risks. The OPP demonstrates a thorough understanding of the environmental impacts and risks, including their sources, potential events, likelihood and consequences, confidence levels in sufficient detail to determine whether the environmental impacts and risks will be managed to an acceptable level (e.g. Table 7-42, Table 7-53, Table 7-57, Table 7-61). Where there is a need for additional scrutiny of particular impact pathways, such as GHG, impacts to marine turtles and impacts to blue whales, the evaluation has adopted EIA tools such as modelling (light and noise) and methodologies for GHG calculations and accounting. The level of detail, sophistication and technical rigour applied throughout the impacts / risk evaluation in the OPP is proportionate the nature and scale of the impact and risk. The OPP has demonstrated that the impacts and risks of the project will be of an acceptable level and consistent with the principles of ESD:<br>Principles of ESD<br>Decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations (the 'integration principle') – NOPSEMA has considered the proponent's evaluation of the socio-economic and ecological matters that may potentially be affected by the project. The OPP has demonstrated an integrated approach to considering all environmental features, including those social and economic features that make up the definition of environment under Regulation 4 of the Environment Regulations. Specifically, the OPP has evaluation the potential impacts and risks of the project on Commonwealth and State managed fisheries, recreation and tourism activities, commercial shipping and other oil and gas exploration and operational activities, and NOPSEMA is of the view that the OPP has demonstrated that impacts on these socio-economic values will be of an acceptable level.If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation (the 'precautionary principle'). – NOPSEMA has considered the proponent's evaluation of impacts and risks to the environment as well as its case for why these impacts and risks will be of an acceptable level. This includes consideration given to measures committed to by the proponent to manage residual scientific uncertainty associated with evaluation of environmental impacts and risk, particularly in relation to impacts to the Commonwealth marine area and potential impacts arising from the generation of greenhouse gas emissions.That the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations (the 'inter-generational principle') – NOPSEMA has considered measures the proponent has taken to apply the mitigation hierarchy so as to avoid and minimise environmental impacts and risks and to manage these to be of an acceptable level though defining appropriate EPOs. The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making (the 'biodiversity principle').– NOPSEMA has considered the proponent's evaluation of environmental impacts to the biodiversity and ecological values of the Commonwealth marine area, including listed threatened and migratory species listed under the EPBC Act, and the environmental performance outcomes defined in the OPP.Improved valuation, pricing and incentive mechanisms should be promoted (the 'valuation principle') – NOPSEMA notes that the proponent will bear the costs relating to management of environmental aspects of the project and its activities to ensure that environmental impacts and risks will be of an acceptable level. The project and its component activities to ensure. |
| | Matters protected under Part 3 of the EPBC Act | Given that the Permit Area is in deep water and remote from sensitive benthic features, the focus of this topic is on the trunkline installation and stabilisation, including dredging of sediments from the proposed borrow ground in Commonwealth waters.<br>Borrow ground dredging<br>Page 395 states that thresholds have been developed based on the definitions of management zones suggested within the EPA Technical Guidance - EIA of marine dredging proposals. It is stated on page 396 that thresholds were developed by MScience (2019) |

based on WAMSI dredging node studies (Pineda et al. 2017).
The suspended solid concentration thresholds are provided in Appendix J - Scarborough Dredge Dispersion Modelling - Offshore Borrow Ground. The thresholds for the offshore environment are 3.6 mg/L for summer and 1.5 mg/L for winter for the zone of influence. Zone of moderate impact for offshore - 22.5 mg/L SSC and Zone of High Impact for Offshore - 47 mg/L SSC. This is consistent with the threshold value listed in the DSDMP for state waters.
A comparison between Figure 7.12 and Figure 7.14 indicates that the zone of influence for suspended sediment extends over known coral habitat in State Waters - should more sensitive thresholds therefore be applied? Will the scope and spatial extent of the DSDMP mean that monitoring data and management decisions will apply to potential impacts to this coral habitat from the borrow ground? Noting that this coral habitat may be subject to pressures from operations in state and commonwealth waters. [RFFWI]
Further consultation with DNP to share benthic habitat data, evaluation of impact and case for consistency with the AMP management plan? This should be completed now to confirm appropriate site selection for borrow ground.
Trunkline installation
Page 401 explains that the trunkline project area runs adjacent to the Pluto pipeline, therefore restricting impacts to previously disturbed areas inshore of the Pluto field. What was the disturbance width around the Pluto pipeline and will the scarborough trunkline and disturbance corridor be within this? Has the area recovered since the Pluto pipeline was installed? Page 89 states that appropriate measures will be established the protect existing trunklines - is there potential to widen disturbance corridor?
Have the cumulative impacts of trunkline pre-lay dredging works, installation and back-fill/stabilisation been evaluated? What measures will be implemented to reduce disturbance in more sensitive areas, e.g. adjacent to pinnacles and areas of higher density sponge habitat within AMP. [RFFWI]
Page 389 states that trenching and backfill activities would result in seabed disturbance between approx. KP 34 to KP 50 in Commonwealth waters. These locations are shown in Figure 7.11 as being in relatively shallow water near state waters boundary. Any seabed survey work in this area to inform EIA. There is no SSC modelling for this activity component - is there potential for impacts to inshore sensitivities? [RFFWI]
Page 392 refers to removal of subsea infrastructure and states that this will be evaluated at end of field life with multiple options left open, i.e. leave, remove or part remove. Do we need this to be evaluated now with an option selected? [RFFWI]
Page 392 refers to potential for support vessel anchoring in shallower waters while working on the trunkline route. Control measures to identify sensitive areas and preclude anchoring or use anchoring methods with less disturbance? This also applies to pipelay vessel mooring/anchoring - there is a statement on page 88 that pipelay vessel may require temporary mooring which may require pile driving. 30 m disturbance corridor with rock pinnacles 350 m from trunkline alignment. Controls to avoid disturbance from anchoring etc.? [RFFWI]
Page 402 lists relevant BIAs that intersect the trunkline project area in the Montebello AMP and the only marine turtle BIA that overlaps the trunkline route within the AMP is that for the flatback turtle, this area is also identified as part of a habitat critical. There is inadequate consideration of cumulative disturbance impacts to this turtle habitat, e.g. noise, light, habitat removal and not a strong case for consistency with recovery plan. [RFFWI]
Statement on page 402 - "The intersection of the trunkline with the area of denser sponges is not expected to fragment the community given that any loss of sponges will be localised to the trunkline footprint. Nor is it expected to result is substantial loss given the spatial extent of the community running perpendicular to the trunkline route." This argument should be supported by analysis of the benthic habitat spatial data for this dense sponge community. [RFFWI]
The seabed disturbance aspects of this activity cover a diverse marine area extending from 1000 m depth at the Permit Area to ~ 40 m at the state waters boundary with variation in the density and type of epifauna along the trunkline route. There are also different methods of stabilisation required along different parts of the trunkline that influence the potential for impacts. For example, sediment displacement at KP 210 and trenching and burial between KP 34 and KP 50. The evaluation needs to better account for differences in the potential for impact along different sections of the trunkline route and better support impact predictions with appropriate evidence. [RFFWI]

Given that the Permit Area is in deep water and remote from sensitive benthic features, the focus of this topic is on the trunkline installation and stabilisation, including dredging of sediments from the proposed borrow ground in Commonwealth waters.
Issues already addressed: turtles (through habitat and other aspects through general assessment (RFFWI #19), decommissioning (see RFFWI #5) and anchoring (see RFFWI #25)
General approach
RFFWI #21 - Issues identified were that installation in areas of higher sponge density and waters shallower than 40 m not specifically considered, supporting evidence for conclusions not provided, acceptable impacts not clearly defined.

Additional text that WEL have added does not conclusively show that there will be no impacts to coral communities, which are important habitat to marine turtles from the borrow ground activities. The modelling undertaken looks only at suspended sediments and not particle deposition, and no monitoring is proposed to ensure that thresholds predicted are not breached, and if so what will be done. This is integral to being able to show that EPO of no harm/destruction to marine park and also no impacts to turtle habitat occurs. ISSUEIt should be noted that epifauna and infauna are stated to be "low value" receptors in table 7.32, however corals and sponges could be argued to be high value in the context of turtle habitat. ISSUEImpact evaluation is inconsistent for what is slight or minor for epifuna/infauna, turtles and AMPs but likely minor because high value receptors, and water quality should perhaps be greater than negligible because in an AMP and high value habitats. (see Table 7-32) compared with s7.1.6.2. Table 7-31 is repetitive and unsupported. It has not been clearly demonstrated in the OPP what habitats are where. ISSUEControls included are: CM12: Infrastructure will be positioned on the seabed within design footprint to reduce seabed disturbance. - anchoring controls, dredge controls, trenching etc controls ISSUECM33: A 250m buffer zone will be implemented between the offshore borrow ground and the Dampier AMP - 250 m buffer yet to be shown no feasible alternatives or acceptable ISSUECM34: Development of a management framework for dredging and backfill activities based on water quality - this is a new control with no detail or performance standards included to inform how acceptable levels are met ISSUE
RFFWI #18 - Please provide evidence of formal consultation with DNP and provision of sufficient information, and a defined acceptable level of impact for AMP zones informed by their advice and relevant to the impacts from the project.
Two instances of contact made to DNP have been added to Table 10.4 and three of contact to Table 10.5, however, these have not addressed the RFFWI, because sufficient info was only provided to the department on the final date (10 Dec 2019,) and information had not been received back at time of resubmission of the OPP ISSUE
Borrow ground dredging
Issues
A comparison between Figure 7.12 and Figure 7.14 indicates that the zone of influence for suspended sediment extends over known coral habitat in State Waters - should more sensitive thresholds therefore be applied? Will the scope and spatial extent of the DSDMP mean that monitoring data and management decisions will apply to potential impacts to this coral habitat from the borrow ground? Noting that this coral habitat may be subject to pressures from operations in state and commonwealth waters. [RFFWI]Further consultation with DNP to share benthic habitat data, evaluation of impact and case for consistency with the AMP management plan? This should be completed now to confirm appropriate site selection for borrow ground.Letter points
RFFWI #13 - State government legislative requirement - DSDMP - see requirements above, WEL have cited EP Act but said activities in Commonwealth are not relevant, and then have stated elsewhere in the plan that impacts addressed through state management plans. NOPSEMA has viewed Woodside's EPA Referral and the EPA Report and impacts from dredging at the borrow ground that impact sensitive habitats that may impact turtles have not been included in the state documentation. WEL has added an additional control to this submission of the OPP for a management framework, but no information about this framework has been provided. ISSUE
RFFWI #22 - The request for further information was in relation to providing an evaluation of potential for impacts to coral habitat inshore of the borrow ground, and measures to ensure impacts will be acceptable. In response to this Woodside have included additional text to section 7.1.6.2 to state that suspended sediment thresholds will not cause impacts to corals and have included the name of control for management with no additional information. The submission does not clearly demonstrate that impacts from activities at the borrow ground will be acceptable to sponges, corals, turtles that rely on these habitats and the values of the Dampier marine park. ISSUE

Trunkline installation
Issues
Page 401 explains that the trunkline project area runs adjacent to the Pluto pipeline, therefore restricting impacts to previously disturbed areas inshore of the Pluto field. What was the disturbance width around the Pluto pipeline and will the scarborough trunkline and disturbance corridor be within this? Has the area recovered since the Pluto pipeline was installed? Page 89 states that appropriate measures will be established the protect existing trunklines - is there potential to widen disturbance corridor? Have the cumulative impacts of trunkline pre-lay dredging works, installation and back-fill/stabilisation been evaluated? What measures will be implemented to reduce disturbance in more sensitive areas, e.g. adjacent to pinnacles and areas of higher density sponge habitat within AMP. [RFFWI]Page 389 states that trenching and backfill activities would result in seabed disturbance between approx. KP 34 to KP 50 in Commonwealth waters. These locations are shown in Figure 7.11 as being in relatively shallow water near state waters boundary. Any seabed survey work in this area to inform EIA. There is no SSC modelling for this activity component - is there potential for impacts to inshore sensitivities? [RFFWI}Statement on page 402 - "The intersection of the trunkline with the area of denser sponges is not expected to fragment the community given that any loss of sponges will be localised to the trunkline footprint.

| | | | |
|---|---|---|---|
| | | | Nor is it expected to result is substantial loss given the spatial extent of the community running perpendicular to the trunkline route." This argument should be supported by analysis of the benthic habitat spatial data for this dense sponge community. [RFFWI]The seabed disturbance aspects of this activity cover a diverse marine area extending from 1000 m depth at the Permit Area to ~ 40 m at the state waters boundary with variation in the density and type of epifauna along the trunkline route. There are also different methods of stabilisation required along different parts of the trunkline that influence the potential for impacts. For example, sediment displacement at KP 210 and trenching and burial between KP 34 and KP 50. The evaluation needs to better account for differences in the potential for impact along different sections of the trunkline route and better support impact predictions with appropriate evidence. [RFFWI] Letter points<br>RFFWI # 23 - Requested information about impacts in shallow water areas of the pipeline between state waters boundary and KP50. Unsupported text has been included to describe a low value habitat and the expectation that thresholds of impacts from turbidity won't exceed that of a ZoI, however, sediment deposition has not been discussed. This section also refers to a management plan for water quality impacts to 'significant' benthic communities however no detail has been provided about how this will be used to ensure acceptable levels of impact are met ISSUE<br>RFFWI #24 - Requested information and a revised EPO about potential impacts to dense sponge habitats in the Montebello Marine Park. Some text has been included in the response document, but is not made clear in the submission that sponges in the mAMP occurr as isolated or low density aggregations and denser aggregations are in the central southern and south western section of the marine park 30 km from the trunkline. It is still not clear in the submission what habitat is where in the areas to be affected by the trunkline. ISSUE<br><br>Other issues<br>No monitoring to validate model for ZoINo map to show ground truthing for habitat surveys, locations of rock pinnacles and other features along the trunkline route, other statemens including p 448 sponges assocauted with complex bathymetry, known snensitivities, run perpendicular to trunkline etc (also anchor disturbance section)Little comparison of what is elsewhere to demonstrate representativenessDoesn't discuss alignment with Pluto in terms of increasing area of disturbance, what is distance from Pluto * check thisFigure 5-17 shows coral habitat immediate to borrow ground in state waters, state waters documentation implies this is Madeleine shoals, is this in Zone of Influence, habitat should be described for ZoI not in immediate borrow ground throughout, e.g. incl shoreline habitat<br>Reference material<br>Relevant appendices for this topic scope include:<br>Appendix A - offshore benthic habitat assessment - Advisian 2019 deepwater and continental shelf, SKM 2006 and Ocean Affinity 2018 continental slope<br>Appendix B - borrow ground habitat survey - Advisian 2019<br>Appendix C - Montebello AMP habitat survey - Advisian 2019<br>Appendix J - borrow ground modelling study - RPS 2019<br>Reference is made to Woodside 2009 Pluto LNG Foundation project survey between state waters and KP 50.3 29 sites drop camera p 155 and 444 - request report<br>Reference is made to "modelling of the trenching disposal and backfill operations for the commonwealth component of the turnkline also shows that no exceedances of any ZMI or ZHI thresholds are expected in operations in commonwealth waters" between KP32 and KP50 and reference Woodside 2019 - request report |
| | | | Modelling common to both trunkline and borrow ground has now been included in the OPP to support the impact evaluation (s7.16 and Appendix J)<br>Modelling of turbidity generated by dredging has been undertaken for both winter and summer seasonsPercentile distributions are used to represent modelling (95th used)PSD's have been include as per each section of trunkline, for borrow ground KP30-50 were used but this approach is considered conservative with actual PSD data being characterised as mainly coarse sand with only 3% fines. Modelling did not include the 250m buffer zone for conservatism,The ZoI threshold will be exceeded at any point within the model domain where dredging, spoil disposal and backfill is forecast to increase the depth-averaged concentration of SSC (specifically the contribution attributable to dredging activities) to a level greater than the seasonal 80th percentile of baseline SSC over a 24-hour average period for that specific ecological zone. Ecological zones are offshore, zone B and zone A based on community type and distance offshore (Figure 7-19). Coral thresholds were used for zone B and sponge for offshore zone.Information has been included (p503) to describe that sediment deposition thresholds of impact are breached only after benthic habitats are impacted by suspended sediment reducing light attenuation and causing impacts, and so the OPP proposes that managing impacts according to SSC will capture any sediment deposition impacts. Outputs from the modelling are described in the OPP (p505 and 506) and shown in figures 7-20 to 7-24, whereby dredging in the borrow ground is predicted to cause moderate impact to corals on the south west corner at Hauy Island, which is located in WA State waters. Moderate impacts are defined in the OPP as "the area within which predicted impacts on benthic organisms are recoverable within a |

period of five years following completion of the dredging activities" and references the work of the Western Australian Marine Science Institute's Dredging Node (WAMSI: https://www.wamsi.org.au/dredging-science-node) as technical justification.There are some elements of the OPP that are unclear, for example, thresholds that have been applied to the maps (given the late inclusion of Madeleine Shoals - footnote 63 p505) within the coral thresholds predictions rather than offshore sponge threshold predictions e.g. Figure 7-24), the OPP stating that the ZoMI threshold extends to the coral communities only during in winter, but Fig 7-21 suggests this may also be the case in summer (see Appendix J), and a note stating that there could be sedimentation impacts to corals. Given, however, the statement included that these impacts will not be realised clarity on these issues will be subject to assessment during the environment plan approval phase.No modelling has been undertaken at this stage to determine whether moving the borrow ground further offshore or dredging in a different way could reduce the impacts to these inshore corals.Risk assessment has been updated to include a more detailed assessment of the actual habitats in the disturbed areas as well as the importance of habitat to marine turtles and fish.WEL commits to implementing a monitoring and management framework so that "modelled impacts do not eventuate" (p475). Framework will use telemetered water quality monitoring data to inform changes to the dredging program where trigger levels are being approached so as to proactively manage the activity to prevent impacts to benthic communities (p526). WEL states that modelling has indicated that detectable water quality changes (ZoI thresholds) are not predicted within the National park Zone of the Dampier Marine Park (see EPO point about this).

RFFWI #5 - Impacts from trunkline works in shallow waters

Clarify whether use of existing spoil ground(s) in Commonwealth waters forms part of the Project. If so please describe all aspects of activities associated with their use (e.g. locations, activities) and evaluate all impacts and risks to benthic habitats;

The OPP now references Spoil ground 5A within the project area between KP32 to KP 50, which is a previously used spoil ground for installation for the Pluto trunkline, which lies parallel. The impact evaluation includes assessment for the spoil ground. Update the OPP to include further details about the extent, severity and duration of impacts from trenching, backfill and spoil disposal activities in waters

The OPP has been updated according to the request, including that impacts include 5km2 area of spoil ground used during trunkline works. The seabed disturbance area for the trunkline is 13km2 based on 430km x 30m (p448). The OPP has been updated to predict a potential area of 17km2 to be disturbed in the borrow ground area. Of some uncertainty is the importance of the coral habitat to which there may be some impacts at Huay island, however, the OPP states that these predicted impacts will not be realised due to the monitoring and management framework which will ensure that dredging activities are managed so that turbidity thresholds that could cause impacts are not exceeded.Evaluate impacts to benthic habitats described in response to the point above and demonstrate how requirements such as existing approvals, acceptable levels and EPO's will be met

The evaluation has now included impacts to benthic habitats along the trunkline route, acceptable levels and EPOs.Append modelling report/s for activities along this part of the trunkline route to the OPP to support the above description and evaluations

Modelling reports have been appended (Appendix J).

RFFWI #6 - Impacts from borrow ground activities

Provide a map or maps at an appropriate scale and relevant text to identify and describe all specific features of the environment that may be contacted by turbidity generated by dredging in the Commonwealth borrow ground, and including the National Park Zone of the Dampier AMP;

Maps have been included (figures 7-20 to 7-24) to describe the modelling outputs and identify environmental features that may be impacted.Provide an evaluation of impacts for any biological components that have not been already included in section 7.1.6.2;

Evaluations have been included for features not previously identified. Section 5.3.1.1 has been updated in relation to coral being present in the area that may be contacted by dredge plumes generated in the borrow ground project area, these are located at Huay Island and Madeleine Shoals. A modification has been applied post modelling to have Madeleine shoals examined according to coral not sponge thresholds, but not clear how this applies to the maps. However, the OPP commits to implement an adaptive monitoring and management framework to avoid impacts to corals and further detail on this framework will be subject to assessment during the EP submission phase of the project. Provide further information to identify and describe the area that may be affected by sediment deposition resulting from borrow ground activities including to the benthic values of the Cat IV zone of the Dampier Marine Park;

Further information in relation to sediment deposition has been provided as described for modelling outputs above.Provide an impact evaluation for receptors in this area and include any measures that will be used to ensure that acceptable levels of impact and EPO's will be met; and

Impact evaluation has been included as well as suitable changes to EPOs, and an adaptive management framework has been included. In considering the outcomes of this evaluation, WEL should also consider any implications for the suitability of the proposed buffer between the proposed borrow ground dredging and the marine park.

The suitability of the proposed buffer has been considered in relation to ZoI but not the

ZoMI contact at Huay Island, however, commitment is made for the monitoring and management framework to mitigate these impacts and as such changes to the buffer zone and other control measures may be considered during adpative management, as well as during the ALARP demonstration required for the EP submission phase of the project.
RFFWI #7 - Impact categories assigned to epifauna
Update the impact assessment to reflect published information about the importance of these epifauna as habitat to protected species (turtles) and key ecological features (demersal fishes) in the North West marine region;
The categorisation of epifauna (foraging habitat and habitat for turtles and fishes) as "low value" receptors in Table 6-3 is not consistent with how they are classified in published literature in relation to marine turtles and fishes. However, Woodside have made a case that the particular epifauna that will be affected by their activity are represented elsewhere and that this has been taken into account in the assigning of the receptor sensitivity category.If and where loss of epifauna habitat is identified in the OPP, WEL should evaluate the potential consequences to marine turtles and fish and demonstrate how WEL's EPOs 6.7 and 6.9 will be met.
Potential consequences of loss of epifauna has been considered in the OPP in relation to fish and turtles and EPOs have been suitably updated.
RFFWI #8 - Management of impacts from installation and dredging activities
In order to address the above issue, WEL could provide further information about the management framework for dredging and backfill activities (CM34), including the features mentioned above, and explain how it will be used to ensure the Project will be managed such that impacts will be of an acceptable level and demonstrate that all EPOs related to disturbance of the seabed will be achieved.
WEL has provided further information about the management framework (p526) (CM34) and has included a commitment that the framework will be used to achieve EPO's 6.2 and 6.4. In addition the OPP states "It should be noted however, any modelled impacts are not expected to eventuate due to the implementation of a tiered monitoring and management framework informed by water quality. This framework will be implemented to ensure dredging activities and associated water quality are managed to a level where impacts are not predicted to occur to benthic communities and habitats, including coral communities within State waters." (p475).RFFWI #9 - Consultation with DNP
Demonstrate that sufficient information has been provided to the DNP
Additional information has been included in Table 10-5 in relation to consultation with DNP to inform acceptable levels of impact. The description of the information provide to DNP as stated as being provided to DNP by WEL can be considered to be sufficient information for DNP to consider the activity in the content of AMPs.That a defined acceptable level of impact has been informed by advice provided by the DNP relevant to the project.
WEL have included a statement to say that DNP have agreed that information provided by Woodside (Dec 2019 version of the OPP and a presentation) and following a meeting in January had addressed their concerns in relation to the project. WEL have also included reference to consultation with DNP in the external context taken into consideration in setting acceptable levels of impact. DNP will also be formally consulted during the EP submission phase of the project.
CONCLUSION
Seabed disturbance is identified as a key impact resulting from the Scarborough project. Seabed disturbance from a number of aspects of the project have been identified and evaluated in s7.1.6 of the OPP. This includes impact from installation of drilling and subsea infrastructure in the project area, dredging in the borrow ground area and dredging, pipelay, backfill and spoil disposal in the trunkline project area. The OPP has presented a case that the impacts to the seabed within the Commonwealth Marine Area will be managed to acceptable levels.The identification and evaluation of seabed disturbance includes direct physical disturbance, generation of turbidity/water quality impacts, removal of benthic food sources/habitats (corals and epifauna), indirect impacts on fauna relying on these food sources/habitats and implications where the seabed is assigned a value such as a KEF or is located within an Australian marine park.Quantitative estimates have been included in the OPP to describe the extent of seabed that will be disturbed according to the placement of subsea infrastructure on the seabed and other works as described above. Sediment dispersion modelling has been included in the OPP to describe the potential extent of indirect impacts from dredging, trenching, backfill and spoil disposal activities, particularly for the inshore sections of the trunkline installation and borrow ground activities. The modelling predictions have been undertaken for both winter and summer seasons and percentile distributions (95th) are used to represent the modelling extent of turbidity generated by installation activities. Descriptions of the input parameters used e.g. particle size descriptions, thresholds for contact and impact appear to be based on relevant literature and data.The OPP states that thresholds for contact and impact have been applied according to knowledge of baseline suspended sediment concentrations in the area, receptor sensitivity levels, location inshore versus offshore according to the locations of receptor types i.e. corals inshore, sponges offshore.There is some uncertainty about how coral thresholds have been post applied after the modelling in a response to a NOPSEMA letter point, however, this can be clarified in the EP assessment stage as more modelling results become available. The dredging activity that may impact corals will also be subject

to management by a monitoring and validation framework during the implementation phase to ensure EPO's are met and that any potential impacts to sensitive receptors are reduced to levels that are ALARP and Acceptable, and ensure impacts are able to be managed to acceptable levels. Woodside have used published information to support their decision to account for turbidity as a proxy for sediment deposition impacts, in that sediment deposition thresholds are breached only after suspended sediment light effects occur and so the OPP proposes that managing impacts according to turbidity will capture any sediment deposition impacts.The modelling for dispersion of turbidity plumes from dredging in the borrow ground immediately adjacent to the Dampier Australian Marine Park Habitat Protection zone did not include the 250m buffer zone between dredging and the park for conservatism. The modelling predictions show no contact of turbidity plumes to sensitive receptors from dredging along the inshore section of the trunkline in Commonwealth waters.The modelling predictions for dredging in the borrow ground area adjacent to the Dampier marine park did not predict contact with the National Park Zone of the marine park. As a result there is no EPO for this park zone, the need for which may need to be re-evaluated at the EP stage as more information becomes available, however, the monitoring and management framework proposed to be implemented will ensure impacts to all receptors will be at levels as predicted or lower. The modelling predicts contact of turbidity plumes with the Habitat Protection Zone of the park although thresholds for contact are described to be at levels below those known to cause impacts to sponges, which are described to be the dominate fauna type on the seabed in the park. Woodside consulted with the DNP in relation to this dredging program to confirm that the proposed activities were not inconsistent with the AMP management plan, including parts relevant to the Habitat Protection Zone of the park.The modelling predicts contact of turbidity plumes with Madeleine Shoals although thresholds for contact are described to be at levels below those known to cause impacts to corals, which are described to be a receptor on the shoals. Dredging in the borrow ground is also predicted to cause moderate levels (recoverable) of impact to corals on the south west corner at Hauy Island. Information has not provided in relation to any particular important of corals in this zone, however, coral is shown to be found around many of the surrounding islands, recovery from impact is predicted and there is a commitment in the plan that monitoring and management will ensure that no impacts will occur. Further information can be provided during the EP assessment including consideration of whether impacts to these corals are being managed to levels that are ALARP. Woodside commits to implementing a monitoring and management framework so as impacts greater than those predicted by the modelling do not eventuate. This framework will use telemetered water quality monitoring data to inform changes to the dredging program where trigger levels are being approached so as to proactively manage the activity to prevent impacts to benthic communities.The EP assessment stage will determine whether the impacts predicted to corals and sponges can be reduced further to levels that are ALARP, including consideration of increasing the distance of the buffer zone to the marine park. The impacts from the installation from the trunkline have been evaluated according to the seabed habitat that will be disturbed. Receptors that will be impacted include mostly sponges and other sessile invertebrate fauna, which the information presented shows are relatively ubiquitous along the entire length of the trunkline, but in patches and at low densities along the trunkline route.The trunkline line will traverse the Montebello Australian Marine Park (multiple use zone) where the habitat impacted is representative of habitats outside of the route and impacts described are not inconsistent with the management plan.The trunkline will intersect the key ecological features of the Ancient Coastline, Continental Slope Demersal Fish Communities and the Exmouth Plateau, but impacts are predicted to be slight on the basis of the small proportion of area impacted and there being no impacts to the ecological functioning of the relevant values of the KEFs. The trunkline traverses nearby to some seabed features at the continental shelf margin including pinnacles, an unidentified seabed feature and the shelf itself. The OPP does not predict impacts to these features and the EP stage will further ensure that any potential impacts from the activity will be managed to levels that are ALARP and acceptable. The OPP evaluates the potential for impacts to marine turtles through loss of foraging habitat and determines that any losses of potential food sources are minimal compared with availability and are not in areas that are identified as important to marine turtles, and as such there are no impacts inconsistent with the marine turtle recovery plan.The OPP evaluates the potential for impacts to marine fishes through loss of habitat and concludes that the levels of impact are minimal and will be consistent with the principles of ESD and will be managed to acceptable levels.The categorisation of epifauna as "low value" receptors is not consistent with how they are classified in published literature in relation to marine turtles and fishes however Woodside have made a case that the particular epifauna that will be affected by their activity are represented elsewhere and in locations and that this has been taken into account in the assigning of the receptor sensitivity category. The seabed in the vicinity of the proposed FPSO and drill centres is relatively featureless and comprised of unconsolidated sediments so impacts are predicted to be negligible due to the scale of impact relative to the extent of similar benthic habitat.To meet the acceptance criteria, the OPP must adequately address comments given during the period for public comment, be appropriate to the nature and scale of the project, appropriately identify and evaluate the environmental impacts of the project, set EPOs that are consistent with the principles of

| | | | |
|---|---|---|---|
| | | | ESD and demonstrate that the impacts will be managed to acceptable levels.On the basis of the information provided in relation to seabed disturbance in the OPP, NOPSEMA can be reasonably satisfied that the acceptance criteria have been met. |
| 5D - 1(c)(i) | Includes a summary of all comments received | General | The Scarborough OPP Formal Consultation Report is included in Appendix K as a table in which the comments provided during the public consultation period are summarised and listed with an assessment of merit and WEL response and any changes made to the OPP in response to the comments are identified.<br>The summary of comments matches with the comments that are saved in Objective either in the worksheet (A688349) or as individual contributions submitted after the public comment portal had been closed (MAC (#1), EDO (#2), Western Gas (#3)). If not word for word, the summaries included are representative of the comments received. |
| | | | Public comments<br>Western Gas<br>The resubmission has clarified that WEL has undertaken Woodside consultation directly with Western Gas and discussed a number of alternative to the proposed trunkline route that were not deemed feasible and therefore are not discussed in the OPP. WEL wrote to Western Gas in Aug 2019 to explain in detail the reasons for why the concepts discussed wether Western Gas were not deemed to provide development opportunities within the timeframe and to reiterate future options for cooperation, including possible backfill development opportunities. [C]<br>EDO<br>Environmental defenders office - in relation to claims made about the evaluation of GHG emissions, section 7.1.3 has been updated and a discussion of the impacts and risks associated with climate change has been included. These are presented in section 7.1.3. While it appears that WEL has adequately addressed EDO's claims in relation to assessment of GHGe across the life of the project, cumulative impacts, there are outstanding matters that are yet to be addressed. These are detailed under the evaluation of impacts and risks (5A 8(b)). |
| | | | Additional changes to OPP have been made in relation to GHG related public comments. See findings under 5D - 1(c)(ii) & (5A 8(b)). |
| 5D - 1(c)(ii) | Includes an assessment of the merits of each objection or claim about the project or any activity that is part of the project | General | The Scarborough OPP Formal Consultation Report is included in Appendix K as a table that includes an assessment of the merits of each objection or claim about the project. Of the comments received only 5 required an assessment of merits that would be relevant to the OPP meeting the requirements of the environment regulations. These included:<br>MAC - seeking the right to commentEDO - concerns about GHGWestern Gas - seeking consultation in regard to pipeline traversing permit areasAnonymous - environmental offsets/biodiversity/cumulative impactsPeter Aird - capping options - This comment asks a question about what plan is in place to deploy a capping stack in the event of a leaking well from the project and then makes a general point that rapid deployment capping systems should be in place onsite for offshore projects.NOPSEMA's view on the assessment of merits for the comments completed by WEL are as follows:<br>MAC - assessment appears reasonable as MAC had not specific comments on the OPP and NOPSEMA's interpretation is that WEL have committed to include MAC in relevant persons consultation for the OPP and upcoming EPs for the Scarborough developmentEDO - assessment of merits completed by WEL appear reasonable Western Gas - there does not appear to be an assessment of merits of the comment by Western Gas, just further identification of the location of the Equus area. There is no assessment of the pipeline going through the permit area.Anonymous - assessment of merits appears reasonable and refers to relevant policyPeter Aird - (DB) WEL's assessment of the merits of the claim appears reasonable. WEL states that there would be no, or negligible, liquid condensate component in a loss of containment scenario. This would likely negate the benefits of deploying a capping stack to reduce the volume of liquid hydrocarbons forming surface slicks and posing a risk to surface receptors. However, providing details of spill response arrangements and control measures is not a requirement of the OPP process and WEL's response states that an emergency response plan which identifies source control options including capping systems, will be developed and submitted as a part of the activity's EPs.RFFWI - Request assessment of merits for Western Gas comments in relation to pipeline traversing permit areas |

| | | | |
|---|---|---|---|
| 5D - 1(c)(ii) | Includes an assessment of the merits of each objection or claim about the project or any activity that is part of the project | General | The OPP appears to have addressed the merits of claims from those that provided public comment including the EDO and Western Gas (Letter 1 - Item 1).<br>The resubmission has clarified that WEL has undertaken Woodside consultation directly with Western Gas and discussed a number of alternative to the proposed trunkline route that were not deemed feasible and therefore are not discussed in the OPP. WEL wrote to Western Gas in Aug 2019 to explain in detail the reasons for why the concepts discussed wether Western Gas were not deemed to provide development opportunities within the timeframe and to reiterate future options for cooperation, including possible backfill development opportunities.<br>The matters raised by EDO are addressed on the GHG sections of the OPP. Further, NOPSEMA's RFFWI #2 provides a request for additional information relevant to the matters raised in the EDO submission (letter 1 - Item 2). |
| | | | The OPP now adequately addresses EDO / CEWA comments. As explained in appendix K, the following outstanding items are addressed:<br>The OPP has now made a case that management measures will manage the potential impacts and risks of GHG emissions to an acceptable level (sections 3.4.1, 6.2.3, 6.5, 7.1.3). NOPSEMA's assessment of the case made by the proponent is provided under Regulation 5A - 8(b) of the general assessment findings.<br>The claim that the OPP fails to manage GHG emissions has been addressed by WEL management commitments in section 7.1.3.<br>Section 6.5 has been updated to link EPOs to the acceptable level including Australia's implementation of the Paris Agreement.<br>Additional information has been included in the OPP to update an evaluation of scope 3 emissions, assumption relating to the role of LNG in reducing global emissions and a discussion on the risks and impacts associated with climate change on values within the Australian jurisdiction.<br>Total lifecycle emissions, including scope 3 (in Aust and overseas) have been included - refer to Fig 7.6 and section 7.1.3.<br>Cumulative emissions have been calculated in the lifecycle and intensity analysis in the context of global emissions. (7.1.3.3)<br>The Zero emissions outcome recommended by the EDO/CCWA, has been evaluated and discounted by WEL as an EPO. Instead WEL has included two EPOs that demonstrate an acceptable level (OPP, p401).<br>The Project has committed to ongoing energy efficiencies such as Design optimisation to reduce direct GHG emissions to ALARP (see also<br>Energy Efficiencies in Section 4.5.4.1); the FPU will be designed to have no continuous operational flaring; energy management plan which will be developed prior to operational phase; fuel and flare analysis, baselining and forecasting throughout operational life; annual setting of energy efficiency improvement and flare reduction targets throughout operational life; ongoing optimisation of energy efficiency through periodic opportunity identification workshops/studies, evaluation and implementation.<br>A new section has been added to more comprehensively explain Scarborough's contribution to decarbonising the global economy (section 7.1.3).<br>A new section in the Assessment of Alternatives section (4.5.4.1 – Energy Efficiencies) has been added to describe measures implemented to date in design phase. A new section 7.1.3.6 (Greenhouse Gas Management and Mitigation) has been added to describe relevant controls in a hierarchy, including these design features but also how GHG emissions will be managed during operations and reporting.<br>The EDO claims that discussion of risk to Murujuga rock art and controls are need in the OPP and and changes to the OPP are required<br>to sufficiently manage risk to rock art from the PLuto project. However, the proponent has responded to this claim by reinforcing that emissions from the Pluto LNG Facility will remain within the impact envelope of the existing approval for that facility (Ministerial statement 757). Therefore the tie-in of Scarborough will not increase the emissions profile assessment and approved under existing approvals for the Pluto LNG facility.<br>The EDO's claim that the displacement of higher emission intensive fuels not being substantiated in addressed by adding further support to the argument including referencing of contemporary IEA WEOs. The OPP also recognises that there is some inherent uncertainty in these predictions influenced by global markets, carbon pricing, policy and regulation. As such there is a monitoring and adaptive management commitment to address this uncertainty.<br>Conclusion<br>With the amendments to chapter 7.1.3, the OPP adequately addresses comments given during the period for public comment, including those raised by the EDO / CCWA in relation to GHG impact assessment and mitigation. The OPP includes a summary of all the comments received during the public comment period, as well as an assessment of the merits of each objection or claim about the project and a statement of the proponent's response to these proponent of the merits of each objection or claim (Appendix K). |

| | | | |
|---|---|---|---|
| 5D - 1(c)(iii) | Includes a statement of the proponent's response or proposed response to each objection or claim, including a demonstration of the changes, if any, that have been made to the proposal as a result of an objection or claim | General | The Scarborough OPP Formal Consultation Report is included in Appendix K as a table that includes the proponents response to each comment and identification of changes made to the OPP. Of the comments received only5 required a response and potential changes to the OPP that would be relevant to the OPP meeting the requirements of the environment regulations. These included:<br>MAC - seeking the right to commentEDO - concerns about GHGWestern Gas - seeking consultation in regard to pipeline traversing permit areasAnonymous - environmental offsets/biodiversity/cumulative impactsPeter Aird - capping optionsNOPSEMA's view on the proposed responses to comments and changes made to the OPP in response are as follows:<br>MAC - WEL's decision not to extend the public comment period but to include MAC in relevant persons consultation in relation to the Scarborough development is sound. This has been reflected in a change made to Table 10.5 of the submission "phase 2 stakeholder consultation activities"EDO - The proposed response to these comments is appropriate and some additional information was added to the OPP to address GHG emissions. However, the additional information included in the EP does not adequately cover the impact assessment of GHG emissions.Western Gas - WEL's response to comments is not sufficient and the submission only identifies the location of the proposed Equus development compared with the offshore project area and does not refer to the pipeline and/or potential tie-ins. Updates made to the EP are relevant i.e. description of environment and industry consultation, but are not complete.Anonymous - The proposed response to these comments is appropriate and some additional information was added to the OPP to address environmental offsets policy. The information included in the EP does not adequate cover assessment of cumulative impacts and acceptability of impacts to protected matters.Peter Aird - (DB) WEL has not made any changes in response to the claim regarding inclusion of arrangements for deployment of a capping stack as evaluation of spill response control measures will be addressed as part of emergency response plans to be developed and submitted as a part of the activity's EPs in the future. |
| | | | See findings under 5D - 1(c)(ii) - complies<br>Appendix K includes a summary.<br>Item 3 - In relation to offsets, until residual environmental impacts can be ascertained, the issue relating to offsets cannot be addressed. IN relation to public comments raising offsets, the projecft has addressed these public comments and included the response in Appendix K. Any residual impacts that are significant and require application of the mitigation hierarchy (inc offsets) are addressed under 5A-8(b). |
| | | | AS per above point - refer to 5A-8(b).<br>Conclusion<br>With the amendments to chapter 7.1.3, the OPP adequately addresses comments given during the period for public comment, including those raised by the EDO / CCWA in relation to GHG impact assessment and mitigation. The OPP includes a summary of all the comments received during the public comment period, as well as an assessment of the merits of each objection or claim about the project and a statement of the proponent's response to these proponent of the merits of each objection or claim (Appendix K). |